THE ANALYSIS AND PERFORMANCE OF MINIMALIST KEYBOARD MUSIC: THREE CASE STUDIES

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DECLARATION

I, Paul David Kean, declare that the work submitted in this thesis is my own.

Where the contributions of others are made they are clearly acknowledged.

Signed.....Paul David Kean..... Date.....31st December 2020.....

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ABSTRACT

Since the mid-20th century there has existed a small but expanding sub-section of musicological literature which states that the structural analysis of a work will yield positive results regarding its performance. The benefits of analysis to performance obtain (in the broadest sense) to process-based minimalist music. However, whereas the literature in question almost exclusively asserts that analysis informs performance at an interpretative level, this thesis will argue that the analysis of process-based minimalism more often informs its performance at the pre-interpretative level of execution. This observation is pertinent, given that performances of process-based minimalist works frequently fail to meet basic pre-interpretative standards of technical competency. In this thesis I will claim that these flaws in the performance of process-based minimalist music are partly caused by what I call the 'analytical challenge' – namely, that because the structures of these minimalist works (contrary to prevailing opinion) are not fully discernible aurally, the resulting lack of structural awareness can cause deficiencies in performance, often at the pre-interpretative level. I will claim that the solution to this analytical challenge is for performers to attain structural awareness via the analysis (be it first-hand or second-hand) of the work in question. With reference to three case studies of works from my own repertoire (Philip Glass *Music in Contrary Motion*, Steve Reich *Piano Phase*, and John Adams *Phrygian Gates*), I will demonstrate the positive benefits that analysis can have on the execution of process-based minimalism. I will claim that, for most works of this kind, some level of performance-oriented analysis is achievable for performers, and that they should therefore consider analysis to be a necessary aspect of performance preparation. I will conclude with the claim that the arguments and exhortations presented in this thesis could potentially facilitate a welcome improvement in the performance quality of process-based minimalism.

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PREFACE

I. METHODOLOGICAL REMARKS

This is an interdisciplinary research project, drawing on both my academic and performing experience in contemporary classical music, as well my academic background in analytic philosophy. The interdisciplinary nature of this project is reflected in the tripartite methodology employed. The three distinct yet complementary research methods at work in this thesis are:

1. Evidence-based research: drawing on my academic background in music, this research method will provide empirical evidence in support of claims or arguments presented. This body of empirical evidence will consist of written primary and secondary sources (eg academic literature, items of journalism, interviews), audiovisual primary sources (eg audio or video recordings of relevant performances, live concert hall performances) and observable data (eg the results of musical analysis).

2. Practice-based research: drawing on my performing experience as a contemporary classical pianist and related to the evidence-based method above, this research method seeks to generate empirical data from the performances of relevant repertoire that I have given during my career. Like research method #1, the data will be presented as empirical evidence, this time in the form of descriptive and elucidatory first-person testimony.

3. Reason-based research: drawing on my academic background in analytic philosophy, this research method seeks to provide support for claims via the presentation of deductive arguments, employing the standard inferential rules of Classical logic.

II. PAUL KEAN: BIOGRAPHY & REPERTOIRE

My interest in minimalist keyboard repertoire began during my time as a BMus piano student at the Royal College of Music (1997 – 2001). Relevant repertoire that I first performed during this time consisted of the following: John Adams, *China Gates* (1977 – 78); John Adams, *Phrygian Gates* (1977 – 78); John Corigliano, *Fantasia on an Ostinato* (1985).

In 2001 I enrolled at the University of Manchester to study for a BA in philosophy. During this period of study (2001 – 2004) I also engaged in an unofficial capacity with the musical life of both the University and the Royal Northern College of Music, and was

active as a contemporary classical pianist with a particular interest in minimalism. Relevant solo repertoire that I first performed during this time consisted of the following: Karlheinz Stockhausen, *Klavierstück IX* (1961); David Lang, *While Nailing at Random* (1983); Frederic Rzewki, *Winnsboro Cotton Mill Blues* (1979). I also made my first venture into contemporary classical ensemble repertoire at this time, participating in a performance of Graham Fitkin's two-piano and saxophone work *Hard Fairy* (1994), with Owen Cool (soprano saxophone) and Adam Swayne (piano).

In 2004 I enrolled at King's College London to study for an MPhil in philosophy. During this time (2004 – 2007) I remained active as a contemporary classical pianist, with minimalism continuing to be my primary repertoire interest. Relevant solo works that I first performed during this time consisted of the following: Frederic Rzewski, *Piano Piece IV* (1977); Jeremy Thurlow, *The Will of the Tones* (2003). Relevant chamber repertoire that I first performed during this time – all with saxophonist Fiona Asbury – consisted of the following: Gary Carpenter, *Sonata for Alto Saxophone and Piano* (1993); Mark-Anthony Turnage, *Two Elegies Framing a Shout* (1994); Graham Fitkin, *Gate* (2001).[1] During this time I also gave the World Premiere of Kevin Malone's *Count Me In* (2005, piano and electronics).[2]

In 2008 I became a member of UK six-piano contemporary music ensemble Piano Circus, with I whom performed until 2018.[3] Relevant repertoire for six pianos (unless otherwise stated) that I have performed with this group consists of the following: Terry Riley, *Keyboard Study #1* (1964, arranged by myself for two pianos); Terry Riley, *Keyboard Study #2* (1965, arranged by Piano Circus for six pianos); Philip Glass, *Music in Contrary Motion* (1969, arranged by Piano Circus for six pianos); Steve Reich, *Four Organs* (1970, four organs and maracas); Steve Reich, *Six Pianos* (1973); Graham Fitkin, *Fract* (1989, two pianos), *Loud* (1989); David Lang, *Orpheus Over and Under* (1989, two pianos); Graham Fitkin, *Aract* (1990, two pianos), *Log* (1990), *Line* (1991); David Lang, *Face So Pale* (1992); Julia Wolfe, *My Lips From Speaking* (1993); Graham Fitkin, *Totti* (2004).

The three works that feature as case studies have been performed on numerous occasions during my time at Goldsmiths: *Music in Contrary Motion* was first performed in 2013, and then again in 2017. Both of these performances occurred after my research into *Music in Contrary Motion* had been completed, and thus served to demonstrate its results. With the composer's permission, *Piano Phase* was initially performed in 2013 as

[1] Geoff Brown, 'PLG Young Artists', *The Times*, 16th January 2007, <https://www.thetimes.co.uk/article/plg-young-artists-dblzz607gm5>[accessed 13th January 2020]
[2] 'Kevin Malone, 'Count Me In', *Composers Edition*, <http://www.composersedition.com/kevin-malone-count-me-in> [accessed 13th January 2020]
[3] 'About Us', Piano Circus official website, <https://www.pianocircus.com/home>[accessed 13th January 2020]

a one-player, piano-and-tape arrangement of my own devising. Then in 2014 I gave a performance of the work in its 'original' two-piano format with pianist Katherine Tinker. Finally, in 2016 I gave my first performance of *Piano Phase* as a solo work for '2 pianos 2 hands'. Both the piano-and-tape performance and the piano duo performance occurred when my research into *Piano Phase* was ongoing, so these performances served to contribute to its results. However, the 2-pianos 2-hands performance occurred after my research into *Piano Phase* had been completed, and thus served to demonstrate its results.[4] Finally, I first performed *Phrygian Gates* in 2001 (many years before my research commenced), although subsequent performances of the work at Goldsmiths in 2013 and 2017 served, respectively, to contribute to my research and to demonstrate its results.

All three works were performed in my 2018 PhD Final Recital (see Appendix II).

4 Paul David Kean, 'Steve Reich | Solo Piano Phase (1967) | Live Performance | Paul David Kean (Pianos)' [recorded 3rd October 2016], YouTube, 2016 (uploaded 30th December), <https://www.youtube.com/watch?v=sCKwbDcT10w> [accessed 30th December 2020]

INTRODUCTION

This thesis constitutes a study of instrumental performance, and as such it begins with the following general enquiry: what do performers do?

It is reasonable to describe performing classical musicians as recreative artists who actualize (in sound and time) the abstract entities (or 'works') created by composers, most often with reference to an intermediary blueprint in the form of a notated score. This description of the performer's role is consistent with that of Russian pianist and pedagogue Heinrich Neuhaus, who states that to be a performer is to 'be able to recreate the artistic image of the composition'.[5] Furthermore, the content of this recreative act appears to have two aspects. First, there is the 'executive' aspect, which commonly requires the performer to meet certain generally-agreed-upon performance criteria, (such as playing the correct pitches in the correct sequence), and which Marilyn Nonken refers to when she describes the performer as, among other things, a 'technician who negotiates the basic realization of the notated symbol'.[6] Second, musical performance exhibits an 'interpretative' aspect, and although more contentiously discussed among scholars than the executive aspect, it is generally agreed that 'interpretation' requires the performer to acquire and communicate an 'idiomatic' understanding of the work in question. This 'idiomatic communication' seems consistent with Leonard B. Meyer's description of performance as 'the actualization of an analytic act', the purpose of which is 'to make the relationships and patterns potential in the composer's score clear to the mind and ear of the experienced listener.'[7]

The next question is more specific in nature: do the challenges associated with both these aspects of the performer's dualistic role arise in the performance of minimalist music? This question is warranted for the simple reason that minimalism differs in significant ways from the musical movements that precede it, and so it cannot be assumed that the performer's role will remain the same either. This music – characterized by its steady pulse, unchanging dynamics, harmonic simplicity, extreme repetition, and its frequent use of gradual processes – is both aesthetically and conceptually distinct from its cultural past: according to Alex Ross, minimalism discontinues 'the conception of a musical work as a self-contained linguistic activity that develops relationships among discrete thematic characters over a well-marked period of time'.[8] As a consequence of this aesthetic and conceptual singularity, minimalism is dramatically different from a listener's perspective. Jeremy Peyton Jones describes the way in which the extreme repetition of minimalism causes the listener to 'lose any sense

[5] Heinrich Neuhaus, trans. by K.A. Leibovitch, *The Art of Piano Playing* (London: Kahn & Averill, 1973), p.29
[6] Marilyn Nonken, 'Introduction: Vessels', *Contemporary Music Review* 21/1 (2002), 1-4 (p.1)
[7] Leonard B. Meyer, *Explaining Music: Essays and Explorations* (Berkeley: University of California Press, 1973), p.29
[8] Alex Ross, *The Rest is Noise: Listening to the Twentieth Century* (London: Fourth Estate, 2007), p.517

of beginning, middle and end, of direction and climax',[9] something which necessitates a 'different approach to listening that doesn't rely on anticipation and recollection'. This 'different approach' often produces 'a heightened awareness combined with a feeling of being mesmerized: a concentration on small changes and an ability to move around and inside the sound'.[10] Listeners often mention an extraordinary concomitant of this mesmeric aspect, described variously as 'euphoric', 'mystical', 'ecstatic' or 'psychedelic': Reich himself arguably alludes to these experiences when, using similar rhetoric, he boldly claims that 'music should put all within listening range into a state of ecstasy',[11] and Ross states that works like Reich's *Piano Phase* 'can leave you happy for hours, like drugs without the mess'.[12] Indeed, this ecstatic dimension may go some way to explaining both minimalism's status as 'the most well-known and commercially successful new style of what we still call 'classical music' in the late twentieth century',[13] and the ardent fervour of its hardcore adherents.

This enthusiasm expressed by minimalism's devotees was (and often still is) equally matched by the hostility voiced by its detractors. American pianist and critic Samuel Lipman describes minimalism as 'no more than a pop music for intellectuals'[14] – an easy-listening music of no real substance, which nevertheless appeals to its educated audiences' conceptual sensibilities. German composer and musicologist Clytus Gottwald attacks both minimalism's employment of inhuman mechanical processes and the perceived monotony of its extreme repetition, in his denunciation of Reich's *Drumming* as 'Fließbandmusik' ('conveyor-belt music').[15] Elliot Carter likewise singles out for opprobrium the repetition of minimalism, stating that he 'also hears constant repetition in the speeches of Hitler'.[16] Indeed, Carter's allusion to minimalism's supposed totalitarian connotations is not an isolated case: Russell Hartenberger of Steve Reich and Musicians recalls 'comments about Reich's music […] from critics who called the music fascist', with such assertions based on the assumption that 'the music did not allow for

[9] Jeremy Peyton Jones, 'Accommodating the Threat of the Machine: the act of repetition in live performance', in *The Ashgate Research Companion to Minimalist and Postminimalist Music*, ed. by Kyle Gann, Keith Potter & Pwyll ap Siôn (Aldershot: Ashgate, 2013), 141-157 (p.148)
[10] *Ibid*., p.149
[11] Steve Reich, 'Music and Performance' [1969 – 1974: 1993], in Steve Reich, ed. by Paul Hillier, *Writings on Music 1965 – 2000* (Oxford: Oxford University Press, 2002), 81-82 (p.81)
[12] Alex Ross, 'Fascinating Rhythm. Celebrating Steve Reich', *New Yorker*, 5th November 2006, <https://www.newyorker.com/magazine/2006/11/13/fascinating-rhythm>[accessed 20th November 2019]
[13] Kyle Gann, Keith Potter & Pwyll ap Siôn, 'Introduction: experimental, minimalist, postminimalist? Origins, definitions, communities', in *The Ashgate Research Companion to Minimalist and Postminimalist Music*, ed. by Kyle Gann, Keith Potter & Pwyll ap Siôn (Aldershot: Ashgate, 2013), 1-16 (p.2)
[14] Samuel Lipman, 'From Avant-Garde to Pop', *Commentary*, July 1979, <https://www.commentarymagazine.com/articles/from-avant-garde-to-pop/> [accessed 17th November 2019]
[15] Clytus Gottwald, 'Signale zwischen Exotik und Industrie: Steve Reich auf der Suche nach einer neuen Identität von Klang und Struktur', *Melos/Zeitschrift für Neue Musik* 1/1 (1975), 3-6 (p.6)
[16] Elliott Carter, interview in Michael Walsh, 'The Heart Is Back in the Game', *Time*, 20th September 1982, p.60

freedom of expression by the performer, and that total control was held by the composer and the process that was set in motion.'[17]

Alongside such extra-aesthetic and quasi-political arguments, some naysayers offer more directly musical explanations for the supposed non-applicability of interpretation to minimalism. Many of these assertions cite the low-quality nature of minimalism as the explanation for the absence of any interpretative dimension: on the subject of John Adams' piano piece *China Gates*, Sarah Cahill remembers a piano teacher telling her that 'no interpretation was necessary because there was no real musical substance'.[18]

In contrast, some detractors have denigrated minimalism by appeal to its apparently undemanding technical requirements. Philip Glass recalls a relevant incident in the early years of his ensemble:

> We're playing outside, in the park, and in the middle of the concert, this guy comes up, and starts pounding on the keyboard, yelling at the top of his voice 'This is not music! You can't do this! This is an insult! I'm a music teacher...' – and he was talking to the audience – '...and these people cannot play! They can't even play scales!'[19]

Now if all these scornful pronouncements were to be believed, it would be reasonable to conclude that minimalism is indeed music of low quality, which denies its performers any 'expressive and stimulating possibilities'[20] in the respective form of interpretative and executive challenges. However, the claim that minimalism's facile technical requirements make it bad music can be refuted with ease, as it is simply not true that all minimalism is easy to perform. In the chapters that follow, I will describe the myriad performative challenges that apply to a considerable quantity of minimalist works.

The claim that minimalism's insusceptibility to interpretation renders it low-quality music can also be refuted, as it is possible to demonstrate that minimalism does in fact permit interpretation. Reich himself states that the recordings he made of his works with Steve Reich and Musicians 'served, and still serve, as a resource for other ensembles to assess their own interpretations',[21] a statement made meaningful by the assumption that interpreting minimalism is possible. Micaela Haslam of Synergy Vocals states that Reich's input to their rehearsals has made clear that 'his music has a life of its own and has

[17] Russell Hartenberger, *Performance Practice in the Music of Steve Reich* (Cambridge: Cambridge University Press, 2016), p.109
[18] Sarah Cahill, 'Performance Anxiety and Minimalism', in *The Ashgate Research Companion to Minimalist and Postminimalist Music*, ed. by Kyle Gann, Keith Potter & Pwyll ap Siôn (Aldershot: Ashgate, 2013), 385-387 (p.387)
[19] Philip Glass, interview from *Glass: A Portrait of Philip in Twelve Parts*, dir. by Scott Hicks (Koch Lorber Films, 2007)
[20] Roger Heaton, 'The Performer's Point of View', *Contact* 30 (1987), 30-33 (p.30)
[21] Steve Reich, 'Foreword', in Russell Hartenberger, *Performance Practice in the Music of Steve Reich* (Cambridge: Cambridge University Press, 2016), xvii – xix (p.xix)

room for interpretation'.[22] Indeed, the mistaken belief that minimalism doesn't allow for interpretation is potentially founded on a misconception of what the 'idiomatic understanding' involved can actually consist of; for whenever a performer must commit to a decision about how the music should be played, in the face of unspecified directions from the composer (in whatever form those directions may take), then that performer has made an interpretative decision. Sometimes this 'unspecified' means 'vague' (eg numerous early works by Philip Glass which feature the vague tempo instruction of 'fast') and performers must employ their interpretative faculties to give necessary precision to these directions. On other occasions, 'unspecified' translates as 'absent', (eg the two works examined in Chapters 2 and 3 – Philip Glass *Music in Contrary Motion* and Steve Reich *Piano Phase* – which have no articulation instructions), yet decisions must still be made about a particular dimension of performance (such as articulation in the cases of *Music in Contrary Motion* and *Piano Phase*, for the simple reason that 'having articulation' is an unavoidable aspect of playing *anything*).

Of course, both vague and absent directions offer a certain interpretative freedom: Hartenberger describes the 'great deal of latitude'[23] that Reich's music affords its performers, and cites *Drumming* as an example of the performers' licence to employ dynamic inflection 'based on our musical instincts'.[24] British pianist Philip Thomas goes further, and states that 'performers are ultimately free to make interpretative decisions which are far removed from the composer's preferences and taste but which, as long as the parameters which *are* fixed are observed, must be judged as valid performance solutions'.[25] But all this 'substantive liberty' exists within a 'procedural necessity'; one has options from which to choose, say, a tempo – but *not* choosing one is not an option. And this mandatory dimension of interpretation is more pronounced when the notation is 'inconsistent, or exists in different versions', cases which, according to Stefan Österjö, entail that 'interpretation of the score is necessary'.[26]

So it is clear that minimalism admits of interpretation, and it is perhaps reasonable to assume that the mistaken belief to the contrary stems from the comparatively small number of decisions that are often required in the interpretation of minimalism. But the presence of fewer interpretative decisions does not imply the absence of an interpretative aspect. Indeed, in such circumstances the individual decisions themselves arguably assume a greater importance, given their comparatively larger proportion of the work's overall interpretative dimension.

[22] Micaela Haslam, email correspondence, 8th January 2020
[23] Hartenberger, 2016, p.98
[24] *Ibid*., p.109
[25] Philip Thomas, 'Determining the Indeterminate', *Contemporary Music Review* 26/2 (2007), 129-140 (p.137) – this statement is made with reference to Howard Skempton's piano music, but its general application is plausible.
[26] Stefan Österjö, *SHUT UP 'N' PLAY! Negotiating the Musical Work* (PhD thesis, University of Lund, 2008), p.69

Now if both the executive and interpretative categories of performance challenges apply to minimalism as they do to standard classical repertoire, is it then reasonable to assume that the *solutions* employed to meet these challenges as they appear in standard repertoire also apply to minimalism? In particular, can performers of minimalism utilize the discoveries of scholarship which asserts the positive impact of analysis on performance, even though its claims are made within the context of standard repertoire? The latter question is especially relevant to those minimalist works that are identifiable with 'musical processes': for if the analysis of a work positively inform its performance, then perhaps a musical work that is at the same time a straightforwardly analysable entity (eg a minimalist musical process) will experience the greatest improvement in performance quality.

In the chapters that follow I hope to demonstrate that, despite being established in the context of standard classical repertoire, the benefits of analysis to performance do also obtain when it comes to process-based minimalism. Furthermore, these benefits admit of both interpretative and executive varieties for standard repertoire and minimalism alike. However, whereas the relevant scholarship on the subject more frequently asserts that analysis informs performance at an interpretative level, it is my contention – and, indeed, the central claim of this thesis - that the analysis of process-based minimalism more often informs its performance at the more rudimentary, 'pre-interpretative' level of execution.

Of course, not all performance challenges require analytical solutions. For instance, many pre-interpretative, executive challenges can be solved with the mere application of instrumental technique, and many interpretative issues can be resolved by employing sound musical judgment. So if the solutions to the two varieties of performance challenge themselves divide into two categories (ie analytical and non-analytical), it follows that there are four possible scenarios that can obtain when considering the general relationship between analysis and performance:

1. Non-analytical solutions to pre-interpretative challenges (ie the sum total of a performer's technical facility, obtained from their years of training and performing experience, and employed to meet various executive issues presented by a given work).

2. Non-analytical solutions to interpretative challenges (ie decisions regarding a particular work's interpretation that are grounded in practical musicianship, and which might appeal to factors such as intuition, taste or authenticity).

3. Analytical solutions to pre-interpretative challenges (eg tackling a complicated cross-rhythmic passage in a solo piano piece by conceiving the two different rhythms as a single composite rhythm, and using this composite rhythm as an aural or notational guide to correct rhythmic execution).

4. Analytical solutions to interpretative challenges (eg in a work of polyphony, decisions to bring to the textural foreground certain obscured items of thematic material, which were themselves only identified via analysis of the work's score).

In this thesis I will explore how each of these four general scenarios applies to process-based minimalism. There will be particular emphasis upon the analytical solutions to interpretative and pre-interpretative challenges, with the greatest emphasis upon the latter.

1

ANALYSIS, PERFORMANCE & MINIMALISM

1.1 ANALYSIS & PERFORMANCE

I. LITERATURE REVIEW

Academic interest in the impact of musical analysis on performance is a fairly recent phenomenon, and attesting to this is the fact that every text cited in this review was published since the Second World War. The overwhelming majority of these texts claim that analysis informs performance at an *interpretative* level (by fostering an idiomatic understanding of the work), with very few sources claiming that analysis can inform performance at a more rudimentary, pre-interpretative and technical level of *execution* (by helping performers to meet certain generally-agreed-upon performance criteria).

Jonathan Dunsby understands the term 'interpretation' to mean 'the understanding of a score derived principally from the internal evidence of that score',[27] and this definition does seem to suggest a link between 'internal evidence' (such as that which is discovered via analysis), and the attainment of an interpretative 'understanding'. Erwin Stein states that the performer's primary purpose 'is to realize the character of the music', and that they should 'seek the character in the music's formal features', rather than in the performer's 'preconceived ideas about moods or emotions to be expressed'.[28] And if we consider 'seeking the character' to be synonymous with 'interpretation', then it is reasonable to conceive interpretation as some end-goal to which the analytical engagement with a work's formal aspects constitutes the means.

In *Musical Form and Musical Performance* Edward T. Cone claims that musical form 'is basically rhythmic',[29] and that a work's structure 'consists of expansions of a pervasive upbeat-downbeat pattern.'[30] And while he concedes that it would be an oversimplification to describe the 'single rhythmic form' of every tonal composition as 'an extended upbeat followed by its downbeat',[31] he does point to the partial truth of such an oversimplification, when he states that 'there is a sense in which a phrase can be heard as an upbeat to its own cadence' and that 'larger and larger sections can be so apprehended', to the extent that an a work could be conceived as 'a single huge rhythmic impulse, completed at the final cadence.'[32] For Cone, performers will achieve 'valid and effective performance' only if they are capable of 'discovering and making

[27] Jonathan Dunsby, 'Performance and Analysis of Music', *Music Analysis*, Vol. 8, No. 1/2 (Mar. – Jul. 1989), 5-20 (p.7)
[28] Erwin Stein, *Form and Performance* (London: Faber, 1962), p.20
[29] Edward T. Cone, *Musical Form and Musical Performance* (New York/London: W. W. Norton & Company, 1968), p.25
[30] Edward T. Cone, '"Musical Form and Musical Performance" Reconsidered', *Music Theory Spectrum* 7/1 (Spring 1985), 149-158 (p.149)
[31] Cone, 1968, p.25
[32] *Ibid*., p.26

clear the rhythmic life of a composition'.[33] These concerns are interpretative not least as they presuppose that certain pre-interpretative conditions of technical execution are already in place; for one can hardly expect the rhythmic form of a work to be communicated if the vehicle for such communication (ie the sequence of notes) cannot be executed proficiently.

Christopher Wintle also regards the impact of analysis on performance to be interpretative in nature. The results yielded by his analysis of Anton Webern's Concerto Op. 21/II include the identification of 'Webern's hierarchisation of pitches', which, according to Wintle 'creates the sense of directed motion which can, in turn, form an interpretative foundation for the performer'.[34]

In *Musical Structure and Performance*, Wallace Berry addresses a number of 'challenging interpretative issues', and resolves each issue with reference to an analytical justification. Notable points include Berry's discussion concerning decisions that performers must make regarding the prevalence of work's 'cofunctioning elements (form, meter, harmony, timbre, and others)' when such elements are, so to speak, 'mutually exclusive' in terms of their emphasis in performance. Berry states that, subsequent to analysis, the performer 'must decide which [cofunctioning elements] should prevail in effect', but admits that 'interpretive realization often favors motivic and other formal groupings'.[35]

Regarding tempo, Berry appears to endorse the common assumption that 'metronomic tempo is best decided in relation to pace and content within pertinent structural elements'. But he also suggests that this relation, while often 'complementary' (ie a fast tempo for high-energy music with rapidly-changing content) can also be 'compensatory' (ie opting to play a 'slow' piece with a faster tempo than one might instinctively adopt, so as to maintain an element of forward motion).[36] On the subject of metre, Berry observes that when 'metric organization is deemed at variance with a meter signature or with metric precedent, the performer must often yield to compositional intent through the sort of prudent enforcement of accents that arises naturally out of mere awareness.'[37] And the 'awareness' that provides almost passive emphasis of this 'metric fluctuation' is attained by way of analysis.

Another notable discussion sees Berry ask whether the performer should do anything 'about a piece's broadest tonal structure', and, if not, whether 'the awareness of such a

[33] Cone, 1968, p.31
[34] Christopher Wintle, 'Analysis and Performance: Webern's *Concerto* Op./24/II', *Music Analysis* 1/1 (1982), 73-99 (p.86)
[35] Wallace Berry, *Musical Structure and Performance* (New Haven/London: Yale University Press, 1989), p.27
[36] *Ibid*., p.34
[37] *Ibid*., p.36

structure' even matters.[38] Berry is neutral on the first question, stating that performers might choose for aspects of tonal structure 'to be exposed in some special way', or they might choose not to intervene with such 'self-evident' aspects, (seeking only to 'not contravene or diminish them'). However, he effectively answers the second question in the affirmative, stating that the awareness of a work's tonal structure, by way of analysis, is desirable, as the analysis 'is the inescapable basis for [the aforementioned] doing and not doing.'[39]

II. LITERATURE REVIEW: APPRAISAL

The central premise shared by all of the texts cited above is, namely, that analysis can positively inform performance at the interpretative dimension. But discussion of how analysis might aid its pre-interpretative, executive dimension is generally absent, and this absence has not been lost on some commentators: in his review of Berry's *Musical Form and Performance*, John Rink observes that a lack of 'specific instructions to performers is [a] weakness' and that 'technical matters are virtually ignored'.[40] When Berry does offer technical exhortations to performers, such advice 'tends toward generality'.[41] The following is Rink's appraisal of Berry's second case study (Berg, 'No.3' of *Four Pieces for Clarinet and Piano*, Op.5):

> For instance, we read: 'no deliberate strokes other than of meticulous (and problematic) clarity are indicated' (: 93), and 'The imperative of perfect clarity is especially challenging in the piano part, the technical severities of which are exacerbated by Berg's instructions' (: 120); but no indication of how to achieve such clarity is given in either case.[42]

Such omissions of detailed technical instruction may well be the result of a certain detectable scepticism regarding analysis-based solutions to executive issues. For instance, Dunsby claims that any performance approach based solely on execution, 'whether modern [ie "Stravinskyian"], or old in the "sewing-machine" approach to the late Baroque, has no avowed need of analysis however broadly conceived',[43] a view which implies that analysis is generally irrelevant to matters of execution.

There are admittedly a few exceptions to the general absence of technical considerations: Schmalfeldt states that she had 'practiced [Beethoven's Bagatelle

[38] Berry, p.39
[39] *Ibid*., p.41
[40] John Rink, 'Musical Structure and Performance by Wallace Berry', *Music Analysis* 9/3 (Oct. 1990), 319-339 (p.335)
[41] *Ibid*.
[42] *Ibid*.
[43] Dunsby, p.17

[Op.126, No.2] for many hours without hearing the recurrence at mm. 54 – 57 of the turn motive' and that, coincidentally, the 'excitement of these measures led to the [tempo-oriented] problem of "rushing"'.[44] However, once aware of the turn motive's presence by way of analysis, Schmalfeldt was able to make this motive 'more prominent by the technique of "finger-pedaling"', something which she felt would aid the execution of correct tempo in terms of a 'reduction of the tendency to rush.'[45]

John Rink claims that analysis can occasionally be of 'enormous practical value to the performer in tackling technically demanding passages'. On the subject of the 'difficult first theme in the third movement of Rachmaninov's Piano Concerto Op. 18', Rink claims that hierarchical analysis can improve the performer's ability to 'concentrate the inner ear on the outer lines and exclude the fast inner parts from one's aural image of the passage […] relying on carefully rehearsed fingers rather than explicit cognitive awareness for clear articulation of the quavers.'[46]

Such examples of analysis benefiting technical execution in performance are few and far between, though. And when they do crop up, they function as the proverbial exceptions that prove the following rule: that those who claim analysis can positively inform performance do so with specific reference to its interpretative dimension.

[44] Janet Schmalfeldt, 'On the relationship of analysis to performance: Beethoven's 'Bagatelles' Op.126, Nos. 2 and 5', *Journal of Music Theory* 29/1 (Spring, 1985), 1-32 (p.18)
[45] *Ibid*.
[46] Rink, p.324

1.2 MINIMALISM & ANALYSIS

I. PREAMBLE

All the texts cited in the previous section seek to demonstrate the link between analysis and performance with reference to musical examples that are either standard 'classical' works or dodecaphonic compositions. So can we extrapolate the claims of these texts to process-based minimalism? Or does this subdivision of the minimalist movement diverge too far from the musical examples used to prove these claims, to the extent that statements asserting the positive impact of analysis on performance do not actually apply? These questions will be addressed following an examination of process-based minimalism itself.

II. LITERATURE REVIEW: WHAT IS MINIMALISM?

As its name would suggest, minimalism typically exhibits *minimization* or *reduction*: K. Robert Schwarz quotes La Monte Young's rather gnomic definition of minimalism – '[t]hat which is created with a minimum of means' – and goes on to state that minimalist music 'is based on the notion of reduction, the paring down to a minimum of the materials that a composer will use in a given work'.[47] Michael Nyman describes minimalism as music which 'cuts down the area of sound-activity to an absolute (and absolutist) minimum',[48] and Wim Mertens cites the 'very limited number of pitches' exhibited by many minimalist works as an example of its reductive tendency.[49]

Closely associated with minimization/reduction is the notion of *simplicity*: Edward Strickland describes the 'simple, even simplistic, material' on which much minimalist music is based.[50] Potter cites the 'structurally and texturally simple' nature of minimalism,[51] while Timothy A. Johnson claims that one primary feature of the minimalist style is a 'simple harmonic palette'.[52]

[47] K. Robert Schwarz, *Minimalists* (London: Phaidon, 1996), p.9
[48] Michael Nyman, *Experimental Music: Cage and Beyond* (London: Studio Vista/New York: Schirmer, 1974; 2nd edn, Cambridge: Cambridge University Press 1999), p.139
[49] Wim Mertens, trans. by J. Hautekiet, *American Minimal Music: La Monte Young, Terry Riley, Steve Reich, Philip Glass* (London: Kahn & Averill/New York: Alexander Broude, 1983), pp.11-12
[50] Edward Strickland, *Minimalism: Origins* (Bloomington & Indianapolis: Indiana University Press, 1993), p.13
[51] Keith Potter, 'Minimalism', in *The New Grove Dictionary of Music and Musicians*, ed. by Stanley Sadie, 29 vols (London: Macmillan, 2001), 16, 716-18 (p.716)
[52] Timothy A. Johnson, 'Minimalism: Aesthetic, Style, or Technique?', *The Musical Quarterly* 78/4 (1994), 742-73 (p.749)

This harmonic simplicity explains why, typically, minimalism exhibits *tonality* or *modality*:[53] the 'clear tonal center' of which Reich speaks[54] is also cited as a prevailing characteristic by Potter, who describes minimalism as music which is 'tonal or modal'.[55] Elsewhere, Nyman describes Minimalism as music consisting of 'scrupulously selective, mainly tonal, material'.[56]

Minimalism's simplicity also explains why the music is typically *non-representational*: while traditional Western classical music, according to Mertens, is representational in the sense that 'the musical form relates to an expressive content and is a means of creating a growing tension', minimalism, on the other hand, is 'non-representational and is no longer a medium for the expression of subjective feelings.'[57] Jonathan W. Bernard makes a similar point about minimalism's non-symbolic quality when he describes the music as exhibiting 'an emphasis upon the surface of the work'[58].

The notion of *stasis* is often cited as a hallmark of minimalism: this notion, to my mind, admits of two types – 'static means' and 'static ends'. The 'static means' are those unchanging musical ingredients of which minimalist music consists: Schwarz states that 'practically every musical element – harmony, rhythm, dynamics, instrumentation – remains fixed for the duration of the work'.[59] Potter describes minimalism as 'rhythmically regular and continuous' music which exhibits features such as 'static harmonies, articulated with unchanging dynamics' and 'unvarying fast pulses'.[60] Mertens describes minimalism as featuring 'a dominant equality of timbre and rhythm' and 'a constant density', in reference to its unchanging rhythm, timbre and texture.[61]

The most important static means exhibited by minimalist music is what Strickland calls the 'musical continuum',[62], and which consists of either *repetition* or *drones*: he refers to Minimalism's 'repetition or extension' of the pitches employed, 'in the form, respectively, of modules or drones'.[63] He also states that 'overt and immediately audible repetition' of material constitutes the 'predominant structural principle' of much minimalist music.[64] Strickland is not alone in citing the musical continuum as the primary static means of

[53] Some scholars might object to this claim by stating that are many examples of minimalism which are tonally ambiguous (as in, there is more than one 'pitch candidate' for tonal centre); to this I would respond that tonal ambiguity actually supports the claim that minimalism is typically tonal or modal – for this ambiguity implies that, while there may be more than one pitch candidate, these instances are nevertheless conceived as at least having one or other of them as a tonal centre.
[54] Steve Reich, 'Some Optimistic Predictions about the Future of Music', in Steve Reich, ed. by Paul Hillier, *Writings on Music 1965 – 2000* (Oxford: Oxford University Press, 2002), 51-52 (p.52)
[55] Potter, 2001, p.716
[56] Nyman, p.139
[57] Mertens, p.88
[58] Jonathan W. Bernard, 'The Minimalist Aesthetic in the Plastic Arts and in Music', *Perspectives of New Music* 31/1 (1993), 86-132 (p.95)
[59] Schwarz, 1996, p.9
[60] Potter, 2001, p.716
[61] Mertens, p.11
[62] Strickland, p.123
[63] *Ibid*., p.126
[64] *Ibid*. P.13

minimalist music: Mertens refers to the 'decisive nature of the repetition as a structural principle' which governs pattern-based minimalism (for drone-based minimalism, 'the principle of continuity [ie sustained sound] is decisive').[65] Rebecca Leydon speaks of the undifferentiated iteration of short cells when she describes minimalism as being 'characterized by the monolithic technique of incessant motivic repetition'.[66]

The second type of stasis found in minimalism – the 'static ends' – can be understood as the overall sense of temporal or narrative stasis that the listener experiences, achieved via the employment of the 'static means' previously described: Johnson states that the best examples of the minimalist aesthetic consist of works that 'lack goals and motion toward those goals'.[67] Nyman refers to the non-directional, static quality of minimalism via a quote attributed to La Monte Young, who draws parallels between the stasis of minimalism and that of mediaeval and non-Western music. Young claims that climax and directionality 'have been among the most important guiding factors [in traditional Western classical music], whereas music before that time, from the chants, through organum and Machaut, used stasis as a point of structure a little bit more the way certain Eastern musical systems have'.[68]

As one might expect, the 'musical continuum' (ie repetition or drones) is regarded as the primary means to the static ends: with specific reference to repetition, Schwarz, like Young, contrasts minimalism with traditional Western classical music, claiming that repetition in the latter 'is used within the context of a dramatic, directionalized form', while in the former it is 'used to create what [Philip] Glass has called "intentionless music", which replaces goal-oriented directionality with absolute stasis'.[69] Mertens, assenting to this contrast, states that the repetition in Western classical music 'is used in pre-eminently *narrative* and *teleological* frame',[70] whereas the repetition employed in minimalist music 'can be described as non-narrative and a-teleological', for there appears to be a 'non-directed evolution in which the listener is no longer submitted to the constraint of following the musical evolution'.[71]

When not exhibiting strict stasis in terms of its static means, minimalism will invariably exhibit *graduality*: Schwarz states that, when any musical element does change in minimalist music, then it 'changes only very slowly',[72] and Strickland cites as a common example of graduality the 'extreme deceleration of harmonic movement'.[73] Graduality is

[65] Mertens, p.16
[66] Rebecca Leydon, 'Towards a Typology of Minimalist Tropes', *Music Theory Online* 8/4 (December 2002), <http://www.mtosmt.org/issues/mto.02.8.4/mto.02.8.4.leydon.html> [accessed 17th December 2019]
[67] Johnson, p.744
[68] Nyman, p.140
[69] Schwarz 1996, p.9
[70] Mertens, p.6
[71] *Ibid*., p.17
[72] Schwarz, 1996, p.9
[73] Strickland, p.126

also exhibited by the extremely slow processes that govern many works of minimalism: Reich describes the processes that occur in his music as 'happening so slowly and gradually that listening to [them] resembles watching a minute hand on a watch – you can perceive it moving after you stay with it a little while'.[74] Often these gradual processes govern the entire structure of many works of minimalism, something Potter attests to when he refers to the 'formal rigour' of minimalism, demonstrated by the presence of processes which, according to Potter, are 'clearly and deliberately audible to the listener'.[75] Similarly, Gann, Potter and ap Siôn identify audible process as a salient feature of minimalism, claiming that many early minimalist works exhibited a structure that was 'on the surface and easily audible' to the extent that 'you could tell just from listening, often just from the first audition, what the overall process was'.[76] Indeed, it is by demonstrating the presence of such gradual and (supposedly) fully audible processes that any work of 'process-based' minimalism qualifies for discussion in this thesis.

Often as a consequence of these gradual processes, minimal music, rather ironically, tends to exhibit *maximal duration*: Schwarz compares the 'lengthy time-frames' of minimalism to those of non-Western music,[77] while Potter describes the 'long periods of time' during which the musical ingredients of minimalism remain unchanged.[78] Another common feature of minimalism is its *static instrumentation*: this feature is arguably a consequence of the fact that minimalist music 'originated in small, composer-led ensembles [...] which were all founded on a rather ritualistic concept of everyone playing all the time, often with the instrumentation left somewhat open'.[79] The stasis of this 'fixed textural density' contrasts with the freedom afforded by the 'open instrumentation' of the scores for these works (ie such works may be performed by any combination of instruments).

However, specific instrumentation is not the only thing that these scores lack. Perhaps also because of the composer-led nature of early performances (for which the 'notation' might have been no more than a series of prompts to be fleshed out orally during rehearsal), minimalist scores lack a certain 'conventional determinacy' with regards to their performance directions. For instance, some scores (such as those for some early works by Terry Riley) feature notation and performance directions which deliberately lend a certain amount of freedom and indeterminacy to performers (eg regarding the number of repetitions), and in these cases the indeterminacy is an intended part of the work. Other scores (such as those for some early works by Philip Glass) are essentially

[74] Steve Reich, 'Music as a Gradual Process' [1968], in Steve Reich, ed. by Paul Hillier, *Writings on Music 1965 – 2000* (Oxford: Oxford University Press, 2002), 34-36 (p.36)
[75] Potter, 2001, p.716
[76] Gann, Potter & ap Siôn, p.6
[77] Schwarz, 1996, p.12
[78] Potter, 2001, p.717
[79] Gann, Potter & ap Siôn, p.4

incomplete, lacking as they do various performance directions that were customarily followed in performances given by the Philip Glass Ensemble.

Minimalist music can also exhibit that range of phenomena which Potter calls 'psychoacoustic effects',[80] and which Reich calls 'metamusic' – these terms refer to 'the unintended acoustic details that arose (or were perceived) as a side effect of strictly carried-out processes', but which were often partly caused by the extreme repetition required for these gradual processes to run their course.[81]

III. MINIMALIST KEYBOARD MUSIC

There are two distinct playing techniques that feature frequently in keyboard-oriented minimalism. Both these techniques relate to characteristics of minimalism as listed above, as they both involve the repeated execution of a limited number of rhythmically continuous pitches within a narrow register on the keyboard. As such, they both exhibit the minimalist characteristics of repetition, reduction (the limited number of pitches), and stasis (the static means of rhythmic continuity).

The first of these techniques is *vertical*: motivic patterns are divided between the left and right hands, and the performer executes the material with 'up-down' movements, either in an 'alternating-hands' fashion, or with the hands in rhythmic unison. This vertical technique is prominent in Reich's music, and it usually exhibits a straightforward, left-right-left-right, alternating-hands pattern, although other patterns can occur. Reich describes an instance required for his multiple-organ work *Phase Patterns*, in which 'each hand plays certain notes throughout the piece without change, only alternating up and down, left, right, left, left, right, left, right, right, which in Western rudimental drumming, is called a paradiddle'[82] This vertical playing technique can be understood, in terms of drum rudiments, as various permutations of alternating single stroke/double stroke combinations – the vertical playing technique is a *percussive* technique.

The second technique is *horizontal*: entire motivic patterns often resembling scales or arpeggios are assigned to individual hands and executed linearly, with little or no need for the player to turn out of a closed hand position. As such, the second minimalist keyboard-playing technique is reminiscent of various five-finger or ten-finger exercises encountered by piano students worldwide. It is also prominent in the music of Philip Glass – his *Music in Contrary Motion* is, according to Potter, 'most easily played on

[80] Keith Potter, *Four Musical Minimalists: La Monte Young, Terry Riley, Steve Reich, Philip Glass* (Cambridge: Cambridge University Press, 2000). p.11
[81] Gann, Potter & ap Siôn, p.5
[82] Steve Reich, 'Phase Patterns' [1970], in Steve Reich, ed. by Paul Hillier, *Writings on Music 1965 – 2000* (Oxford: Oxford University Press, 2002), 50-51 (p.50)

keyboard instruments', as it appears 'to have been conceived at the keyboard'.[83] For these reasons, the horizontal technique is a *pianistic* – or 'keyboardistic' – technique.

IV. LITERATURE REVIEW: APPRAISAL

If one were to cross-reference the two literature reviews above, then any statement that analysis can positively inform performances of process-based minimalism at an interpretative level might start to sound dubious (at least *prima facie*), as many of the analytical recommendations in [1.1, I] depend upon certain musical features that, as seen in [1.2, II], are typically absent from works of process-based minimalism. For instance, Cone's conception of every tonal composition as 'a single huge rhythmic impulse, completed at the final cadence'[84] is arguably made irrelevant by the harmonic stasis of process-based minimalism and its subsequent lack of cadences. Also, the 'sense of directed motion' (which, says Wintle, can 'form an interpretative foundation for the performer'[85] of Webern's Concerto) will typically be lacking from a work of non-directionalized minimalism, rendering any such 'interpretative foundation' impossible.

Now while the relevance to minimalism of individual analytical claims such as these will be assessed with reference to particular minimalist works (see [1.4], and Chapters 2, 3 and 4) the general relevance to minimalism of the secondary literature cited in [1.2, I] is undermined somewhat by its following implication: that analysis significantly informs performance only at the interpretative level. If this is the case, then the literature cited above cannot help performers with many of the challenges presented by process-based minimalist works; for such challenges frequently concern the more rudimentary, pre-interpretative and 'executive' aspects of performance. This assertion will be substantiated in the next section.

[83] Keith Potter, 'Introductory Note', in *Philip Glass: First Classics, 1968 – 1969,* ed. by Keith Potter (London: Chester, 2010), 4-7, (p.7)
[84] Cone, p.26
[85] Wintle, p.86

1.3 THE CHALLENGES OF PERFORMING MINIMALISM

I. PRE-INTERPRETATIVE DIFFICULTIES

When performing a particular type of music, the difficulties that performers have to face often follow from the salient characteristics of the type of music in question. For instance, the displays of pyrotechnic flamboyance witnessed during performances of much Romantic piano repertoire can be viewed as a consequence of the drama and emotional intensity that arguably define Romanticism. Process-based minimalism is similar in the sense that the physical, mental, technical and aural challenges that it presents to performers are grounded in its extreme repetition, steady pulse, unchanging rhythm, a constantly loud dynamic, maximal duration, and the presence of gradual processes and psychoacoustic effects.

However, process-based minimalism is different in the sense that, whereas performances of Romantic piano repertoire commonly exhibit a certain 'executive proficiency' when given by esteemed practitioners, renditions of process-based minimalist works can often fail to meet certain pre-interpretative performance requirements, and this frequency obtains even when we consider performances by experienced practitioners of minimalism.

Sarah Cahill recalls a performance she gave of John Adams' *China Gates* (a short and technically undemanding piece written especially for her and which she had been playing for 35 years), during which she 'took a wrong turn around halfway through, fumbled to grasp the phrase, finally stopped', after which she was forced to open up her score and 'search for the passage among the hills and valleys of quaver patterns'. Following a period of silence, Cahill 'finally found the spot and finished the performance, humbled that after 35 years, *China Gates* could be so elusive'.[86]

Cahill is not the only experienced performer of minimalism who has demonstrated an inconsistent level of executive competence onstage. On the 9th November 2013 I attended a concert featuring *Music in Twelve Parts* by Philip Glass at the Royal Festival Hall, London. It was being performed by the Philip Glass Ensemble, with Glass himself at one of the keyboards. The work had been written specifically for this group of players and they had been playing it for nearly 40 years. I therefore expected a highly accomplished rendition of the work from an ensemble with such extensive experience of performing minimalism in general, and this work in particular. However, my reaction to the performance was muted, owing to the periodically imperfect technical execution of

[86] Cahill, 2013, p.387

the Ensemble that evening. Particularly detrimental to the listening experience were the errors that occurred in sections exhibiting a thinner, more transparent texture (eg the transition from Part 9 to 10). Igor Toronyi-lalic made a similar observation regarding the ensemble's technical display:

> It wasn't a perfect performance […] there were a few moments where technical exhaustion affected the music, most noticeably in the celebrated transition from Part 4 to 5, which was a bit bungled.[87]

On the 14th February 2015 I witnessed another less-than-perfect performance of minimalism from seasoned performers. The London Sinfonietta concert in King's Place's Minimalism Unwrapped festival featured a performance of Reich's *Four Organs*. Again, I expected a high-quality rendition of the work from an ensemble with an established minimalist pedigree. However, as Geoff Brown observed, a 'number of entries were fudged',[88] and I myself witnessed one of the organ players miscalculating his page turns, which caused inadvertent breaks in the sustained tones and a subsequent disruption of the intended sonic stasis.

Even my own performing career has brought home to me on numerous occasions the myriad pitfalls of performing minimalism. At the core of Piano Circus's repertoire is Reich's *Six Pianos* which I first performed with the ensemble in 2009. As a performer of this work I am most familiar with the 'Piano 3' part, the lowest in register of the work's three continuum parts. Like the other two (Pianos 1 and 2), my part consists of technically straightforward patterns that adhere to a single hand alternation throughout – 'left-left-right-left right-left-left-right'. But despite the apparently undemanding nature of the material that might follow from its simplicity and monotony, I found myself prone to abrupt and aurally disruptive instances of rhythmic instability during my first three or four performances of the work, and in the end I was only able to overcome these flaws when sufficient practice and performing experience of the work had been accrued.

So what the above examples show us is that even our most capable performers of minimalism can struggle to meet certain pre-interpretative performance requirements. The next section concerns itself with 'analysis/performance scenario #1' (see Introduction) as it features an examination of five categories of pre-interpretative challenge and a presentation of non-analytical solutions relevant to four of these categories. Incidentally, it should be noted that this emphasis upon minimalism's pre-

[87] Igor Toronyi-lalic, 'Philip Glass/Steve Reich, Royal Festival Hall', *The Arts Desk*, 2013 (uploaded 11th November), <https://www.theartsdesk.com/classical-music/philip-glasssteve-reich-royal-festival-hall> [accessed 17th December 2019]
[88] Geoff Brown, 'London Sinfonietta at King's Place, N1', *The Times*, 17th February 2015, <https://www.thetimes.co.uk/article/london-sinfonietta-at-kings-place-n1-36s0lp9bsv5> [accessed 23rd February 2019]

interpretative challenges is not to suggest that challenges of interpretation do not arise in the performance of this repertoire. The current focus simply reflects the fact that executive matters are prior to interpretative ones and should therefore be addressed first, especially since the testimonial evidence cited above could suggest that issues of execution are being neglected.

II. THE PHYSICAL CHALLENGE

The extreme repetition that is central to minimalism gives rise to what many consider to be the primary difficulty associated with performing this music – namely, its physical challenge; for when this extreme repetition is combined with other static means such as steady pulse, unchanging rhythm, a constant (usually loud) dynamic and maximal duration, the result is an endurance test unlike any other in musical performance. Put simply, minimal music requires maximal physical effort.

Numerous performers have mentioned the physical aspect of performing minimalist music: saxophonist John Harle speaks of the 'constant physical challenge' that he encountered when performing works by British minimalist composer Michael Nyman.[89] Micaela Haslam states that in much of Reich's music, 'percussionists need to have incredible stamina to repeat patterns over such long periods', and that 'pianists often have to treat their instruments like percussion instruments […] pianos are quite "heavy" instruments, so players have to work physically very hard'.[90] Sarah Cahill also speaks of physical endurance, this time in relation to 'the more athletic, powerhouse style of minimalism': she cites the '10-minute arc of rapid tremolos' found in Alvin Curran's *For Cornelius* (1982) as an example of the kind of material that demands such stamina. Commenting on the difficulty of this tremolo passage, Cahill states that 'if there is any tension in your hands and arms, you can't get through it'. And as if to highlight the physical challenge involved, Cahill implies that performing minimalism is comparable to 'any extreme sport', in the sense that practitioners 'run the risk of injury.'[91]

[89] John Harle, 'Performing Minimalist Music', in *The Ashgate Research Companion to Minimalist and Postminimalist Music*, ed. by Kyle Gann, Keith Potter & Pwyll ap Siôn (Aldershot: Ashgate, 2013), 381-384 (p.382)
[90] Haslam
[91] Cahill, 2013, p.386

Philip Glass describes the physical challenge his music presents to keyboard players:

> Your hand has to be pretty strong, and your fingers have to be independent. You need strength simply because the pieces are so long. It's not uncommon for us to play at rapid-fire tempo for an hour and a half, so our strength, in the band, is a question of sheer endurance.[92]

III. MEETING THE PHYSICAL CHALLENGE: ENDURANCE

The physical challenge described above can be met in a variety of ways. Hartenberger employs the following methods to meet the general physical demands of Reich's music:

> I try to transfer points of tension in my arms and hands mentally […] a technique that I call "energy shifting". It also helps to think about my breathing. Sometimes, breathing into the tightening arm muscles helps relieve the tension.[93]

Hartenberger also employs conscious attempts at physical relaxation at any opportunity before or during the performance:

> In the early days of the Reich ensemble, we often began concerts with *Clapping Music*. The second piece on the programme was *Piano Phase* on two marimbas played by Bob Becker and me. I found that the endurance necessary to play *Clapping Music* affected my control of the mallets when I started playing *Piano Phase*, so I learned to take a minute to relax my arms before beginning the performance of *Piano Phase*.[94]

In a similar vein to Hartenberger's 'energy shifting', Cahill speaks of her methods for solving the stamina issues presented by Curran's *For Cornelius*:

> One solution is to move your body, shift your weight on the piano stool and keep redistributing the stress between left hand and right hand. Like any repetitive exercising of a muscle, you need to add variety to avoid strain.[95]

I myself would add that it is important to take Cahill's earlier comparison of performing minimalism to sport seriously. Certain forms of exercise that increase strength in the upper arms (ie push ups and rowing), which I initially took up for their own sake, have coincidentally effected a huge improvement in my strength and relaxation when

[92] Allan Kozinn, 'The Touring Composer as Keyboardist', in *Writings on Glass: Essays, Interviews, Criticism*, ed. by Richard Kostelanetz (New York: Schirmer Books/London: Prentice Hall International, 1997), 102-108 (pp.107-108)
[93] Hartenberger, 2013, p.379
[94] *Ibid*., p.379
[95] Cahill, 2013, p.386

performing minimalist music. I would go so far as to recommend practising these or similar activities for the express purpose of improving performances of minimalism. Also, I think that Cahill's comparison of minimalist performance to an *extreme* sport is not quite right: performing minimalism is an *endurance* sport, and on many occasions aspires to the conditions of activities such as marathon running (an activity which I also practise, and from which I believe my performances of minimalism have incidentally benefited in terms of endurance).

These indirect methods for increasing endurance may well contribute to the overall objective, but based on firsthand experience, the best way to develop the necessary stamina for performing minimalist music successfully is to 'perform' the work as often as possible during one's practice time. By doing this, the performer is regularly confronted by the same physical and technical demands that the final performance will require, and consequently the performer's stamina will increase, as will the likelihood of a good performance.

IV. THE MENTAL CHALLENGE

Alongside the physical challenge, performing minimalism presents a significant mental challenge. Minimalist music demands incredibly high levels of concentration from its players, a demand which is grounded in both the extreme repetition and the maximal duration which characterize this music. The performer does not have the luxury of constant mental stimulation they might get from the variety of content found in other types of repertoire. Instead, performers of minimalism must develop an ability to stay mentally alert even though the material does not change for long periods of time. Otherwise, a lapse of concentration is just as likely as a lack of endurance to produce errors in pitch, pulse or rhythm. Thus mental stamina is as important as physical stamina. Hartenberger makes this point when he states that the members of Steve Reich and Musicians were required 'to develop skills that enabled us to manage repetition and metrical ambiguity by increasing our *concentration* [my italics] and endurance'.[96]

V. MEETING THE MENTAL CHALLENGE: CONCENTRATION

Like its physical counterpart, the mental challenge of performing minimalism can be met in a variety of ways. Performers will often benefit from actively seeking to maintain mental alertness, which can be achieved, for instance, by consciously focusing on different minute details of a repeated figure from one repetition to the next**.** Varying the

[96] Hartenberger, 2013, p.374

object of focus in this manner will provide some mental stimulation, which in turn will foster alertness and concentration.

This approach is particularly suited to maintaining mental alertness when performing Reich's music. For instance, when I perform Piano 3's continuum part in *Six Pianos*, I tend at first to pay attention to the technical requirements of my part, focusing on the kinetic aspects of my playing and aiming for correct and precise execution within the ensemble. Next (once I felt more comfortable, settled and 'in the groove'), I might direct my attention to any 'resultant patterns' that I can hear (motivic fragments embedded in the continuum texture which are either explicitly executed in duplicate by Pianos 5 and 6, or which remain implicit but are nevertheless aurally evident to me). On other occasions I would enjoy partaking in the psychoacoustic effects that manifest: a particularly glorious event in Part Two, after Piano 4's abrupt phase and Piano 5's subsequent build-up, features a combined pattern of five pianists executing the note E4 on every quaver of the figures – and almost always by two pianists simultaneously – which results in the perception of a 'drone' on that note. Varying the object of focus in these ways helps me to maintain my alertness and concentration during performances of *Six Pianos*, in the face of the extreme repetition of my continuum part.

Another approach that aids mental alertness is the cultivation of an ability to 'attend to the present musical moment', and to engage with a particular instance of a repeated figuration with the same presence and mental freshness that one might encounter a singular, 'evanescent sonic event',[97] in spite of its exact similarity to the musical moments that precede or succeed it.

This approach is suggestive of numerous spiritual or meditative practices (eg Yoga, Buddhist meditation), and performers may choose to embark on some form of meditative practice in its own right, and then apply the techniques used in that practice to minimalist performance. Indeed, given the apparent suitability of such activities to the performance practice of minimalism, I do not consider it coincidence that all four of the supposed 'founding fathers' of minimalism – La Monte Young, Terry Riley, Steve Reich and Philip Glass – engaged in Eastern spiritual practices as they were developing their minimalist aesthetic, and that all of them (except perhaps Reich) continue these practices to this day. Alternatively, performers can treat the performance of a particular work of minimalism as itself a meditative practice, with each occurrence of a repeating module constituting the 'meditative focus' to be encountered consciously as if for the first time.

[97] Strickland, p.123

This 'meditative' approach is particularly suited to Glass's early works, given the unmitigated repetition that these works exhibit (and the subsequent lack of microscopic variety required for the previously-described 'object-focus-variation' approach). Many of the meditative practices relevant to this approach involve the conscious, regulated control of the breath. Indeed, I have found that the practice of slow, deliberate breathing can ease anxiety during performances (something I find particularly curative when employed at the precise moment when I can sense the onset of any anxiety). This, admittedly, is an unstructured practice, the benefits of which I discovered almost by accident. However, Hartenberger and Reich actively took part in yogic breathing together, and Hartenberger claims that 'the breathing exercises I learned from my morning yoga sessions with Reich [...] helped greatly in allowing me to play *Drumming* strongly, but with control and a sense of "coolness"'.[98] Here we see the adoption of a spiritual breathing practice not only resulting in 'cool-headed' mental states beneficial to the successful performance of minimalism, but also resulting in a contribution to meeting the physical challenge, by way of delivering physical strength and control.

However, this cross-solution cuts both ways, for I have found from my own practice that the mental challenge encountered when performing minimalist works is often met by way of the methods employed to meet the physical challenge. Executing 'practice performances' of Reich's *Six Pianos* with Piano Circus gave me opportunities to implement the 'object-focus-variation' approach to concentration maintenance (as described above), and my own practice performances of various solo works by Glass allowed me to develop the 'meditative' approach.

VI. THE TECHNICAL CHALLENGE

The primary technical challenge for performers of minimalism, to my mind, is the consistent achievement of note accuracy. It's not that playing the right notes is more challenging than when performing other repertoire (indeed, it's often quite the opposite), but simply that the stakes are far, far higher with minimalism.

The importance of note accuracy in minimalist performance admits of two kinds: first, there is the kind that Sarah Cahill describes when she claims that minimalism 'does not permit mistakes, in a very different way from other kinds of music. With Chopin or Bartok or Stockhausen, you hit a wrong note but you can recover. With minimalist music, if one wrong turn in a pattern derails you, recovery is next to impossible'.[99] What Cahill is alluding to here is that, often when performing minimalist music, musicians will

[98] Hartenberger, 2016, p.137
[99] Cahill, 2013, p.386

find themselves repeating a particular pattern over and over again until they are physically and mentally locked into a cyclic continuum of pitches without clear beginning or end; a wrong note can have the effect of 'breaking the chain', physically and mentally disorienting the performer, something which in turn can lead to further flaws in the performance (this breaking of the chain can result in more wrong notes, rhythmic instability, or can even grind the entire performance to a halt).

Another reason for why it is often difficult to recover when things go wrong in minimalist performances is touched on by Glass:

> The difficulties in my music are in the metrics. You have to be able to play in five in one hand and four in the other. Or, what regularly happens in my music is that I'll set up a recurring meter of three in one hand [...] and a cycle of meters in the other, so that against the three you'll have nine, eight, six, five, four, three, four, five, six, eight, nine, and twelve, all worked out so that they fit the basic cycle of three, but nevertheless require a good rhythmic feeling to carry them off.[100]

So if the metric starting points for the material in each hand rarely coincide,[101] then there are few recognizable 'pickup points' from which to resume playing after a stumble, which increases the chances that this stumble will lead to more severe problems in performance.

The second way in which note accuracy is paramount in minimalist performance is related to what I call the 'clanger factor', and is grounded in minimalism's tendency to exhibit extreme repetition, maximal duration, and 'static ends'. Because minimalist music typically features repeated material for long periods of time, even the tiniest of variations to pitch or rhythm on the part of the composer can produce a significant impact on the listener's experience. This fact is often exploited to great positive effect by minimalist composers: Ross describes how 'the smallest changes [in Reich's *Music for 18 Musicians*] have the force of seismic shocks and something as simple as a bass line going down a half step sends chills up the spine'.[102]

However, the *negative* impact on the listener can be equally significant if those small changes are erroneous on the part of the performer. Mistakes such as wrong notes and rhythmic 'hiccups' have the tendency to impact quite severely and negatively on the listening experience: not only do they upset any feeling of sonic stasis that has previously been established, but they can also inflict quite a violent aural blow on the listener, as the aural significance of any error in a pattern is magnified by the fact that

[100] Kozinn 1980, p.107
[101] It should be clarified that Glass is not talking about 'nine, eight, six etc.' in the time of three, but rather different-numbered groupings of equal-valued notes played simultaneously (eg an 8-quaver grouping at crotchet = 160 played against a 3-quaver grouping, also at crotchet = 160, with the downbeats coinciding every 24 quavers).
[102] Ross, 2007, p.552

this pattern has been played correctly on so many occasions prior to the error. In minimalism, every mistake is a 'clanger', and as a result, the bar for note accuracy is set extremely high.

VII. MEETING THE TECHNICAL CHALLENGE: CONSISTENCY

It is crucial from the outset that performers of minimalism select methods of technical execution that promote consistent note accuracy. For instance, keyboard players must take the greatest care when selecting the most physically sustainable fingering or hand distribution in order to execute multiple repetitions for long duration. When performing Reich's *Six Pianos*, I have opted to play the busier part of the continuum pattern for Piano 3 with my right hand, even though it is the lower-register part and as a result is scored to be played with the left hand. This redistribution of material between the hands means that I play my continuum pattern cross-handed, reversing the 'standard' alternation of the hands employed when executing the continuum parts (see [1.3, I]), and instead employing the vertical, percussive technique according to the alternation 'right-right-left-right left-right-right-left'. My justification for this is that my left hand is weaker than my right hand, and if I were to assign the busier part to my stronger hand, then I am less likely to encounter the kind of fatigue that negatively affects note accuracy.

When preparing Glass's *Two Pages* as a two-hand rendition of the single-line work (with the right hand playing the score as written, and the left hand playing the score transposed down one octave),[103] I opted to play the five-note ascending Basic Unit of Figure 1 with a 'standard' five-finger distribution ('1, 2, 3, 4, 5'), but chose a rather non-standard fingering to play the same pattern in my left hand ('5, 1, 3, 2, 1' as opposed to the more regular '5, 4, 3, 2, 1'). My justification for this was that the fourth finger on my left hand is weak, and if I am to avoid using this finger, and distribute the notes among my stronger fingers, then again I am less likely to encounter the kind of fatigue that negatively affects note accuracy.[104]

VIII. THE AURAL CHALLENGE

The listening challenge for performers of minimalism admits of two types, with the first being grounded in minimalism's tendency to exhibit gradual and (supposedly) fully audible structural processes. Many works of minimalism require performers to make

[103] My decision to perform the work in this fashion is explained in [2.7, I]
[104] Of course, improved technical consistency in the performance of minimalism will occur not only as a direct consequence of selecting the correct method of execution, but also as an indirect consequence of the improved physical and mental stamina as previously discussed.

decisions based entirely on what they hear, and upon which successful performances hinge, as such decisions are necessary for the correct continuation of the processes involved. For instance, the 'Performing Directions' for Terry Riley's *In C* states that 'performers should stay within 2 or 3 patterns of each other. It is important not to race too far ahead or to lag too far behind'; performers of *In C* must 'listen very carefully to one another' to ensure that the process of continuing through the 53 modules of the work, with performers never more than 2 or 3 modules apart, is realized in performance.[105] This is an example of the kind of careful, focused and active listening which is demanded by certain works of minimalism, and which constitutes the first aspect of its aural challenge

The second type of listening challenge presented by minimalism is grounded in its tendency to exhibit psychoacoustic effects, and it is advisable that performers develop a capacity for awareness of these accidental sonic byproducts. Indeed, sometimes this awareness helps performers execute the optimum continuation of a work's process as per the composer's instructions: Riley speaks of the 'polyrhythmic combinations that spontaneously [ie unintendedly] arise between patterns',[106] and performers should be able to recognize such combinations, and allow them to endure for an appropriate duration, in order to give rise to the 'fantastic shapes [that] will arise and disintegrate as the group moves through the piece when it is properly played'.[107]

On other occasions, engaging with a minimalist work's psychoacoustic effects is required because to do so would amount to evidence that these effects are also aurally available to the listener, and that the full gamut of the work's sonic possibilities are most likely there for the listener to enjoy. Thus a capacity for the awareness of psychoacoustic effects gives rise to conditions in which performers and listeners alike are able to partake in the accidental sonic byproducts of the processes at work, which in turn is conducive to greater enjoyment of the both the performing and listening experience.

IX. MEETING THE AURAL CHALLENGE: ACTIVE LISTENING AND PSYCHOACOUSTIC AWARENESS

The two types of aural challenge presented to performers by minimalist music can be met in three ways:

First, and in preparation for the dual tasks of active listening and psychoacoustic awareness, performers can engage with commercial recordings of their chosen

[105] Terry Riley, 'Performing Directions', in *In C* [published score] (New York: AMP, 1964), p.1
[106] *Ibid.*
[107] *Ibid*.

repertoire, and can thus separate these listening tasks from the act of performance – this opportunity to isolate the listening requirement will greatly simplify matters for the performer in the early stages of their aural development.

Second, performers should aim to meet the physical challenge of performing minimalism, to the extent that they should 'be comfortable enough [...] to the point of detachment from the physical action of [playing]',[108] something which will in turn render them free to direct their attention and awareness towards any audible processes or psychoacoustic effects exhibited by the work in question.

Third, performers who meet the mental challenge of performing minimalism will be well-placed to meet the aural challenge. Anyone who has the ability to attain high levels of concentration generally will likely be able to maintain a high level of concentration on aural phenomena specifically, and such performers will, in Reich's own words, experience 'total involvement with the sound: total sensuous-intellectual involvement'.[109]

X. SUMMARY

The general pre-interpretative, 'executive' challenge of performing process-based minimalism is frequently described in terms of the four categories as listed above: physical, mental, technical and aural. Solutions to these challenges are most often presented in corresponding (physical/mental/technical/aural) terms.

However, there is one challenge which is seldom mentioned in the literature on performing minimalism – one I call the 'analytical' challenge. This challenge (and its solution) will be articulated in the next section.

[108] Hartenberger, 2013, p.379
[109] Steve Reich, 'Piano Phase' [1967], in Steve Reich, ed. by Paul Hillier, *Writings on Music 1965 – 2000* (Oxford, 2002), 22–25 (p.24)

1.4 THE ANALYTICAL CHALLENGE

I. PREAMBLE

In this section I will claim that pre-interpretative deficiencies in performances of process-based minimalism (as described in [1.3]) are often caused by performers' lack of structural awareness, which itself often follows from the fact that not all such works exhibit a fully and compellingly audible structure. Consequently, an awareness of a minimalist work's structure is frequently a necessary condition of competent performance, and this awareness is often best achieved via analysis.

II. THE MYTH OF AUDIBLE PROCESS

It is frequently assumed that the gradual processes that govern many minimalist works are fully accessible aurally. Indeed, it was stated in (1.2, II) that minimalism exhibits 'processes, clearly and deliberately audible to the listener', that many early minimalist works exhibited a structure that was 'on the surface and easily audible', and that 'you could tell just from listening [...] what the overall process was'.[110] If this is the case, then the above claim that analysis is needed to achieve structural awareness would be false, and the related enterprise of 'minimalist analysis' would subsequently be rendered superfluous.

However, claims to the full audibility of all minimalist processes are undermined by the fact that the available literature on minimalism contains numerous structurally informative instances of minimalist analysis. These analyses (many of which will be examined in detail later) are illuminating precisely because certain structural aspects of the works in question elude us when we listen to them. Indeed, Potter offers what is effectively an advance qualification to the above view put forward by himself, Gann, and ap Siôn, stating that informative minimalist analyses demonstrates how even 'a purely mechanical process hides "secrets of structure"'.[111] So it would seem that minimalist processes are *not* fully accessible aurally, and that previous assertions to the contrary can validly be called in question.

The inconsistency arises because the claims to the full audibility of all minimalist processes are false. While it might be the case that the overall process (the

[110] Gann, Potter & ap Siôn, p.5
[111] Potter, 2000, p.184. The quotation in double-inverted commas is from Reich's 'Music as a Gradual Process', and is cited in its original context on p.40 of this thesis.

'macrostructure') is 'easily audible', it is quite often not the case that the details of the process (the 'microstructure') are just as easily discerned.

This 'myth' of fully and readily audible minimalist processes arises from the semantic ambiguity of the word 'audible'. This term can be used to mean 'actually heard', but it can also be used merely to mean 'capable of being heard'.[112] In other words, the single word 'audible' can be used to denote two distinct states of affairs – one in which something is *inevitably* heard, and the other in which something is potentially but *not* inevitably heard.

It is only when 'audibility' is understood as meaning 'the property of actually being heard' that the claim to the supposed audibility of all minimalist processes is categorically shown to be false (by the existence of details in such processes that are *not* actually heard). However, when 'audibility' is understood as meaning 'the property of being *available* to be heard', then the above inconsistency can largely be resolved (though unqualified claims that minimalist processes are 'easily audible' remain dubious). With an understanding of the word 'audible' to mean 'potentially but not inevitably heard', it is valid to describe minimalist processes as 'audible' in the sense that each stage in the process translates into a precise sonic event that is at least aurally available to – if not always discerned by – the listener. This understanding of the audibility of minimalist processes is consistent with that asserted in Reich's essay 'Music as a Gradual Process'. Indeed, both Reich's notion of 'a compositional process and a sounding music that are one and the same thing', and his claim that he is unaware of 'any secrets of structure that you can't hear',[113] seem to imply a proportional, one-to-one 'mapping' between structural juncture and potentially discernible sonic occurrence – creating a reciprocal scenario in which sound and process embody each other.

Now while the results of this discussion might permit us validly to describe minimalist processes as 'audible', the fact remains that there are frequently structural details that escape our apprehension. Very often, more than just listening to a given work is needed to gain full knowledge of the processes governing its structure. And returning to our initial consideration of how the analysis of a work might positively inform its performance, it is often the analytical engagement with a work which will yield such structural knowledge.

[112] 'Audible' in *Dictionary.com* <https://www.dictionary.com/browse/audible>[accessed 17th December 2019]
[113]Reich ed. Hiller 2002 [1968], p.35.

III. MEETING THE ANALYTICAL CHALLENGE: PERFORMANCE-ORIENTED ANALYSIS

It is fair to say that the benefits of analysis to performance do indeed obtain for process-based minimalism. However, contrary to the secondary literature cited at [1.1], the analysis of process-based minimalism frequently informs its performance at pre-interpretative, 'executive' level, and thus often constitutes an effective solution to the numerous pre-interpretative challenges that minimalism presents to performers.

Since discovering its general benefit to performance, I have as a matter of course conducted analyses of various process-based minimalist works as part of my performance preparation, and with positive effects on performance quality in each case. In the remainder of this section I provide a demonstration of this, with reference to three works from my solo and ensemble repertoire – Philip Glass *Music in Fifths*, Dave Smith *Diabolus Apocalypsis*, and Steve Reich *Six Pianos.* In each case, analysis produced improvements in pre-interpretative, technical execution, and in the case of Reich's *Six Pianos*, my analysis also produced beneficial results at the level of interpretation. Embodying analysis/performance scenarios #3 and #4 (see Introduction), the three case studies illustrate that both pre-interpretative and (occasionally) interpretative challenges of process-based minimalist works can be met with analytical solutions.

IV. MINI CASE STUDY #1: PHILIP GLASS *MUSIC IN FIFTHS*

On the 21st July 2015 I gave my first performance of Glass's *Music in Fifths* (1969) at the Russet, London, as part of an event hosted by Gabriel Prokofiev's Nonclassical record label. I gave a second performance of this work at Goldsmiths, University of London on the 31st January 2017, as part of an all-Glass solo keyboard programme in honour of the composer's 80th birthday. On each occasion I performed from the 2010 Chester edition of the score, which consists of the work's 35 figures spread over six pages of fully-notated steady quavers.[114]

At the time of these performances, I had not conducted any structural analysis of *Music in Fifths,* and consequently these performances exhibited a number of executive defects that I have since come to associate with 'analytically uninformed' renditions of Glass's music.[115] For instance, figures were occasionally missed out, and the experience often amounted to the frantic sight-reading of a series of barely-differentiated musical cells strung together apparently at random. And although this did not produce wrong notes or

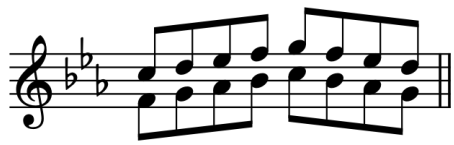
[114] Reprinted in *Philip Glass: First Classics, 1968 – 1969*, ed. by Keith Potter (London: Chester, 2010), 16-21
[115] See [2.2, III] for a full explanation of these executive defects.

rhythmic stumbles in either of the performances, the physical tension and mental anxiety the experience generated in this performer was manifest in other ways (such as periodic rushing of tempo) which still detracted from the performance quality.

I gave my third performance of *Music in Fifths* on 28th June 2018 (again at Goldsmiths, University of London) as part of my PhD Final Recital programme. With the rest of the programme being performed from memory, I was concerned that a full-score-aided performance of *Music in Fifths* would appear incongruous to the audience. Thus my subsequent motivation to minimize the notational prompts used when performing the work was initially presentational (although its results turned out to be beneficial to the substance of the performance as well as its presentation).

The material of *Music in Fifths* derives from a single Basic Unit, which comprises two lines of eight quavers a perfect 5th apart, and which ascends then descends in similar motion (see Ex.1.1). The work's figures consist of whole or partial iterations of this Basic Unit, strung together into patterns of varying lengths and always without explicit metre.

Example 1.1: Basic Unit, *Music in Fifths*



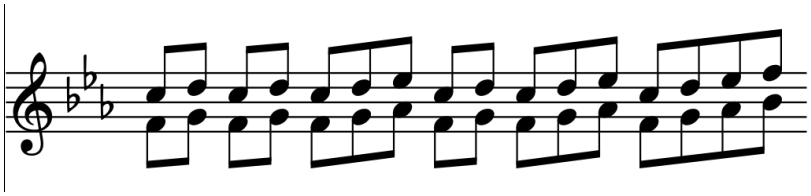
The performance-oriented analysis that I conducted on *Music in Fifths* (see Ex. 1.2) works in the following way: each whole or partial instance of the Basic Unit is represented as a number, which corresponds to the number of quavers that make up each of these whole or partial instances. For example, a complete iteration of the 8-quaver Basic Unit is represented by the number 8, and the material of Figure 17 (a 2-quaver fragment of the Basic Unit, following by a 3-quaver fragment, then a 4-quaver fragment, and then by an inverted iteration of that same three fragments) is represented as '2 3 4 | 2 3 4' (with the dividing line marking the point of inversion). Numerical representation of the grouping is enough to tell me what notes to play because, in almost every case, the partial iterations proceed from the beginning of the Basic Unit (eg a 2-quaver grouping is always the *first* two quavers of the Basic Unit), and so familiarity with the Basic Unit is all I need to be able to execute the correct grouping from its numerical representation.

Example 1.2: Philip glass, *Music in Fifths*, 'groove and grouping' structural analysis

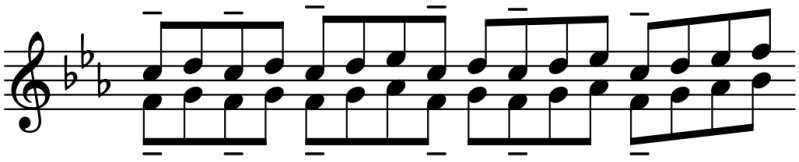
FIGURE	ANALYSIS
1	6 7
2	6 7 8
3	6 8
4	6 7 8(x2)
5	6 8(x2)
6	6 7 8(x3)
7	6 8(x3)
8	6 7 8(x4)
9	6 7 8(x5)
10	6 7 8(x6)
11	6 7 8(x7)
12	6 7 8(x8)
13	8
14	2 8
15	2 4 | 2 4
16	2 3 4 2 4
17	2 3 4 | 2 3 4
18	2 3 4 4 2 3 4
19	2 3 4 4 | 2 3 4 4
20	2 2 3 4 4 |2 2 3 4 4
21	2 3 2 3 4 4 | 2 3 2 3 4 4
22	2 3 4 2 3 4 4 | 2 3 4 2 3 4 4
23	2 2 3 4 2 3 4 4 | 2 2 3 4 2 3 4 4
24	2 3 2 3 4 2 3 4 4 | 2 3 2 3 4 2 3 4 4
25	'GROOVE' 2 3 4 4 | 'GROOVE' 2 3 4 4
26	'GROOVE' 2 3 4 6 4 | 'GROOOVE' 2 3 4 6 4
27	'GROOVE' 2 3 4 6 7 4 | 'GROOVE' 2 3 4 6 7 4
28	'GROOVE' 2 3 4 6 7 8 4 | 'GROOVE' 2 3 4 6 7 8 4
29	2 3 2 3 4 2 3 4 6 2 3 4 6 7 8 4 | 2 3 2 3 4 2 3 4 6 2 3 4 6 7 8 4
30	'GROOVE' 2 3 4 6 2 3 4 6 7 8 4 | 'GROOVE' 2 3 4 6 2 3 4 6 7 8 4
31	2 3 2 3 4 2 3 4 6 2 3 4 6 7 2 3 4 6 7 8 4 | 2 3 2 3 4 2 3 4 6 2 3 4 6 7 2 3 4 6 7 8 4
32	'GROOVE' 2 3 4 6 2 3 4 6 7 2 3 4 6 7 8 4 | 'GROOVE' 2 3 4 6 2 3 4 6 7 2 3 4 6 7 8 4
33	'GROOVE' 2 3 4 6 2 3 4 6 7 2 3 4 6 7 4 2 4 2 4 | 'GROOVE' 2 3 4 6 2 3 4 6 7 2 3 4 6 7 4 2 4 2 4
34	'GROOVE' 2 3 4 6 2 3 4 6 7 2 3 4 6 7 4 2 3 4 2 3 4 | 'GROOVE' 2 3 4 6 2 3 4 6 7 2 3 4 6 7 4 2 3 4 2 3 4
35	'GROOVE' 2 3 4 6 2 3 4 6 7 2 3 4 6 7 4 2 3 4 4 2 3 4 4 | 'GROOVE' 2 3 4 6 2 3 4 6 7 2 3 4 6 7 4 2 3 4 4 2 3 4 4

The one exception to the numerical representation of individual quaver groupings occurs in Figures 25 – 28, 30, and 32 – 35. The analysis of these figures begins with the word 'groove', which I used to represent the opening six groupings common to each figure (see Ex. 1.3). Early on in my engagement with *Music in Fifths*, my ear conceived the sixteen quavers of these six groupings as one measure of 4/2, exhibiting a syncopated 'groove' determined by the combined rhythm of each grouping's starting point (see Ex. 1.4). I was therefore able to conceive the first six groupings of these figures as a single, cohesive and comprehensible unit of syncopated material, and as such I could represent this passage with a single term – 'groove' – and further minimize the visual prompts required to perform the work.

Example 1.3: *Music in Fifths*, 'groove' as originally scored (in Figs. 25 – 28, 30, and 32 – 35)



Example 1.4: *Music in Fifths*, 4/2 re-beaming of 'groove' (tenuto marks indicate the starting point of each grouping as per the original notation)



The above 'groove and grouping' analysis of *Music in Fifths* improved my technical execution of the work in a number of ways. First, the entire analysis fits onto one side of A4 paper, and I was able to use this as a crib sheet during my performance. This meant that I was able to take in whole figures at a glance, which freed me somewhat from the shackles of sight-reading and allowed me to play with greater ease and fluency, which in turn lowered the likelihood that the aforementioned 'clanger factor' (see [1.3, VI]) would undermine my performance.

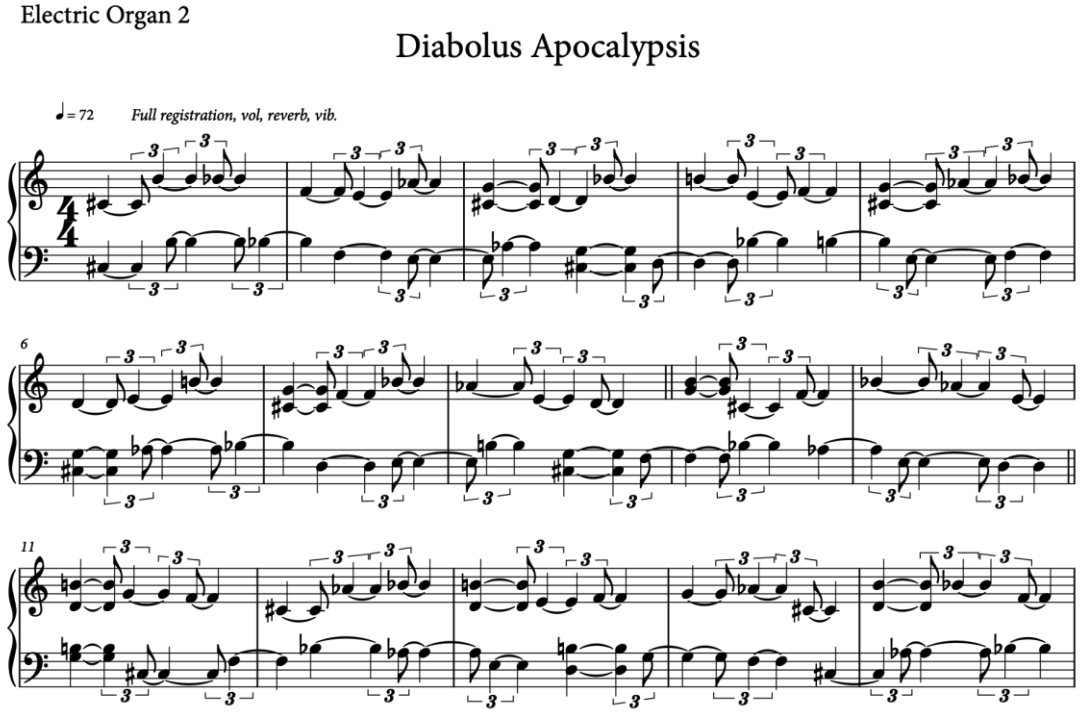
Second, the conceptual re-beaming of the opening six groupings of Figures 25 – 28, 30, and 32 – 35 into a single bar of syncopated 4/2 allowed me to comprehend this passage as one formula (indicated on the analysis by the term 'groove') instead of six individual groupings. Thus the multiple 'words' of this passage were understood as a single musical 'sentence', and my grasp of this unifying 'grammar' allowed me to engage fully with the sounding music once prompted by the term 'groove'. With complete freedom from the score for these sixteen semiquavers, I was able to devote all my attention to the correct execution in sound of this memorized fragment, which in turn contributed to an increase in performance quality of the work as a whole.

V. MINI CASE STUDY #2: DAVE SMITH *DIABOLUS APOCALYPSIS*

On May 5th 2019 I took part in a performance of Dave Smith's *Diabolus Apocalypsis* (1976) at the Tectonics Festival in Glasgow, UK. The work is scored for two pianos – one electric, one acoustic – and two electric organs. I was assigned the 2nd organ part, and I performed the work alongside Christopher Hobbs on 1st organ, Catherine Laws on electric piano, and the composer himself on acoustic piano.

The 2nd organ part has a simple quadruple time signature of 4/4 and features a two-part counterpoint between right and left hands. The rhythmic configuration of the two parts repeats every five bars (ie every line of the score – see Ex. 1.5 for bars 1 – 15):

Example 1.5: *Diabolus Apocalypsis*, 2nd Organ part, bb. 1 – 15



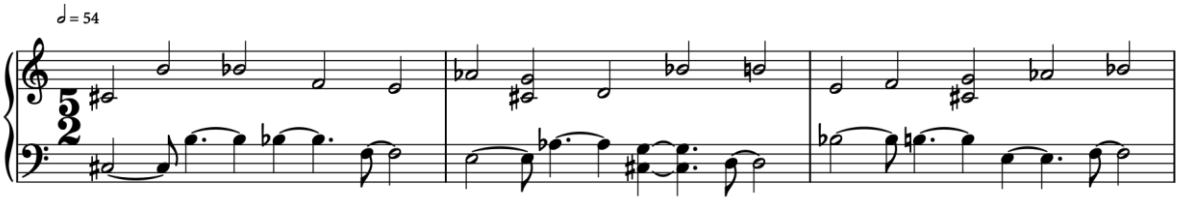
The score also features extensive triplet subdivision of crotchet beats (see above), and consequently it can plausibly be conceived as exhibiting a 12/8 metre. Indeed, it was this compound quadruple metre that I initially adopted when I began preparing my part at the keyboard.

Learning the part under this metric conception was challenging in terms of technical execution (I struggled with the frequent offbeat attacks, and the lack of rhythmic unison between the hands). However, it wasn't long before my ear noticed that the attacks in each hand occurred at regular intervals.[116] Upon closer examination of the score I discovered that, sure enough, the attacks occur every 4 triplet quavers in the right hand, and every 5 triplet quavers in the left hand.

Before taking this discovery further, I asked Smith about how my part interacts with the other three instruments. Crucially, Smith answered that 'the acoustic piano plays crotchets throughout and [is] effectively the timekeeper'[117] for the other parts, which feature disparate, irregular rhythms superimposed onto the foundational crotchet pulse.

After learning about the presence of this crotchet pulse, I settled upon the following metric reconfiguration of the rhythmic system governing each line of the 2nd organ part: instead of conceiving the rhythmic system as five bars of 12/8 at dotted crotchet = 72 (plausible given how the part is notated – see above), I chose to conceive it as three bars of 5/2 at minim = 54 (see Ex. 1.6). This reconfigured system produces the exact same music as the original-notation rhythmic system at Ex. 1.5 (ie same tempo, same rhythm, same pitch duration), and this is achieved via the conversion of the triplet quaver value in the original-notation score to that of a regular quaver value in the metrically reconfigured version (which explains the slower metronome mark of this version).

Example 1.6: *Diabolus Apocalypsis*, 2nd Organ part, bb. 1 – 5 (metrically reconfigured as 3 bars of 5/2 at minim = 54)



[116] It was necessary for my ear to notice this, as it is certainly not evident from the score at first glance.
[117] Dave Smith, email correspondence, 2nd May 2019

The metric reconfiguration works in the following way: the fifteen syncopated four-triplet-quaver right-hand attacks of the original-notation system are converted (via triplet quaver = quaver) into fifteen unsyncopated attacks, four regular quavers long, which are therefore most straightforwardly represented as fifteen minims. It is this line that forms the foundational pulse of the reconfigured rhythmic system. The twelve syncopated five-triplet-quaver left-hand attacks are converted (again via triplet quaver = quaver) into twelve syncopated five-quaver attacks. The superimposition of the syncopated left-hand over the regular right-hand pulse produces a familiar 'five over four' cross-rhythm. The plausibly compound-quadruple-time crotchet pulse of the originally-conceived rhythmic system is converted (also via triplet quaver = quaver) into a steady stream of dotted crotchets. This 'subsidiary pulse' is conceptually superimposed on the foundational right-hand minim pulse and adds the second layer of syncopation to this metric configuration.

I found this 5/2 metric reconfiguration of the 2nd Organ part far more straightforward to execute technically for a number of reasons. First, the difficulty of playing near-constant offbeat attacks in both hands has been removed by the re-scoring of the right hand as regular, onbeat minims. Furthermore, the left-hand part fits comfortably with the right-hand part as the 'five' in a 'five over four' rhythm with which I am (to paraphrase Russell Hartenberger) 'comfortable to the point of detachment'. This means that the lack of rhythmic unison between the hands is no longer a problem, as it is now conceived as a species of rhythmic non-unison with which I am familiar. Also, I no longer have to 'read' the rhythmic aspect of the score and thus my reading task is minimized to the single, straightforward task of pitch recognition.

Second, while the original-notation rhythmic system repeats once per line, the 5/2 metrically-configured rhythmic system repeats three times per line. In other words, the basic rhythmic cell of the 5/2 configuration is smaller. This means there is less rhythmic material with which to familiarize myself and as a result I became comfortable with the rhythmic execution of the material in a shorter space of time.

Third, while both conceptions of the rhythmic system feature a foundational pulse with two superimposed syncopated rhythms, the metric reconfiguration, crucially, features a pulse which I *play*; and I find it far easier to co-ordinate the three independent rhythmic lines (ie one in each hand plus the acoustic piano part) if one of the parts I'm playing is the pulse which anchors the entire rhythmic system.

Ultimately, the metric reconfiguration of my part contributed positively to performance's pre-interpretative aspect in two significant ways. First, the accuracy and fluency of my

individual part was improved by the fact that my reading task consisted solely of pitch recognition. Second, with fewer things to contend with while executing my individual part, I was able to give more attention to the 'ensemble reference points' (places where the downbeats of all four parts align, which occur every 15 bars of the original scoring). This meant I could contribute demonstratively to the 'collective cues' that occurred at these reference points, which helped to maintain a secure ensemble during the performance.

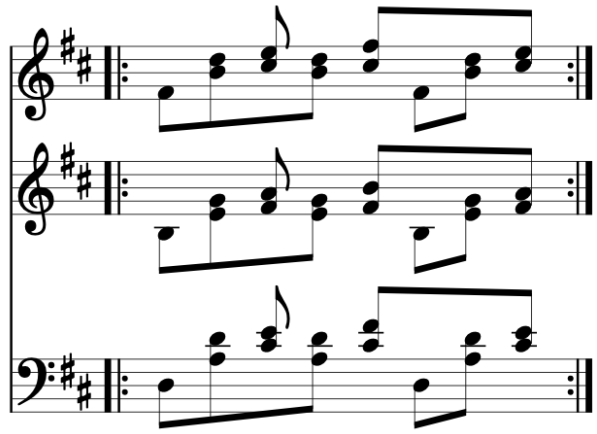
IV. MINI CASE STUDY #3: STEVE REICH *SIX PIANOS* – A WORD ON INTERPRETATION

As previously mentioned, I first performed Steve Reich's *Six Pianos* as a Piano Circus member in 2009, and I performed this work regularly during my decade-long tenure with the ensemble. However, until 2017 I had not conducted any performance-oriented analysis of the work, and consequently my knowledge of its structural facts was limited to those facts that were aurally evident and which made themselves known to me in rehearsals or performances (such as those described at [1.3, V]). This situation changed once I became aware of the positive impact that analysing a work of process-based minimalism can have on the executive aspects of its performance – although in this particular instance, my subsequent analysis of *Six Pianos* also had a positive impact on Piano Circus's capability to interpret the work.

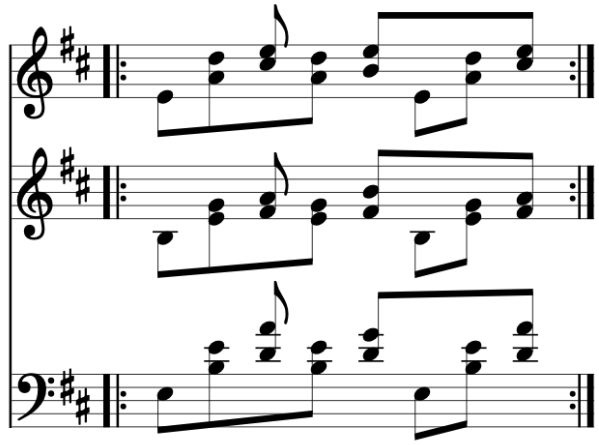
Each of the three sections of *Six Pianos* features a three-part, treble-middle-bass continuum pattern (see Exs. 1.7, 1.8 and 1.9)[118] upon which various phased relationships and resultant patterns are superimposed. Although the near-constant execution of these three parts by Pianos 1 – 3 provides the work's foundation, there is frequent doubling of these parts by Pianos 4 – 6 as the work proceeds, which results in many changes of textural density.

[118] Examples adapted from Steve Reich, *Six Pianos* [published score] (New York: Hendon Music/Boosey & Hawkes, 1992 [1973])

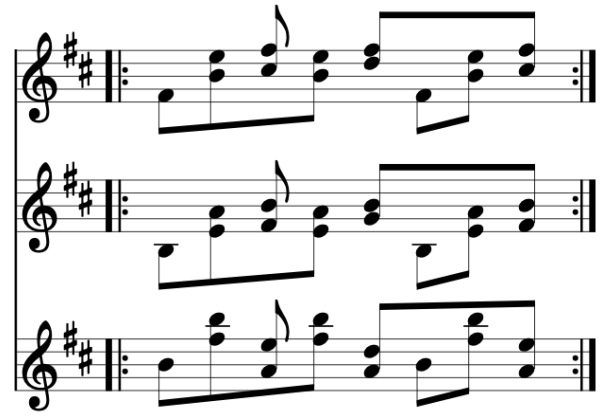
Example 1.7: *Six Pianos*, Part I – three-part continuum pattern (D Major)



Example 1.8: *Six Pianos*, Part II – three-part continuum pattern (E Dorian)



Example 1.9: *Six Pianos*, Part III – three-part continuum pattern (B Natural Minor)



The table below (see Ex. 1.10) analyses *Six Pianos* into 22 distinct 'events', which correspond to the 22 distinct textural stages that the continuum patterns exhibit during the course of the work:

Example 1.10: *Six Pianos*, textural distribution analysis

PART	EVENT #	TEXTURAL DISTRIBUTION					
		PIANO 1	PIANO 2	PIANO 3	PIANO 4	PIANO 5	PIANO 6
(I)	1	Treble	Middle	Bass			Treble
	2	Treble	Middle	Bass	Bass	Bass	Treble
	3	Treble	Middle	Bass	Bass		
	4	Treble	Middle	Bass	Bass	Treble	Treble
	5	Treble	Middle	Bass	Bass	Treble	
	6	Treble	Middle			Treble	
	7	Treble	Middle				
(II)	8	Treble	Middle	Bass			
	9	Treble	Middle	Bass			Middle
	10	Treble	Middle	Bass	Middle	Middle	Middle
	11	Treble	Middle	Bass	Middle		
	12	Treble	Middle	Bass	Middle	Treble	Treble
	13	Treble	Middle	Bass	Middle	Treble	
	14	Treble	Middle		Middle	Treble	
(III)	15	Middle	Bass	Treble	Bass	Middle	
	16	Middle	Bass	Treble	Bass	Middle	Treble
	17	Middle	Bass	Treble			Treble
	18	Middle	Bass	Treble	Treble	Treble	Treble
	19	Middle	Bass	Treble	Treble		
	20	Middle	Bass	Treble	Treble	Middle	Middle
	21	Middle	Bass	Treble	Treble	Middle	
	22	Middle	Bass	Treble	Treble	Middle	Bass

This analysis of *Six Pianos* aided the pre-interpretative execution of my individual part (the continuum part of Piano 3) in three ways. First, the analysis of the work into 22 distinct textural events gave me clearer expectations of how the overall process was going to unfold, and this furnished me with a certain peace of mind, which in turn translated into a generally more relaxed physical state. Second, these 22 audibly distinct textural states can plausibly be used as the 'varying objects of focus' (see 1.4, V) which foster the alertness and concentration necessary to avoid errors in pitch, pulse or rhythm in the face of the extreme, soporific repetition of my continuum part.

But this analysis of *Six Pianos* also aided performance quality at the interpretative level. Crucially, the itemization of the 22 textural states exhibited during the work allowed me and the other Piano Circus members to make informed interpretative decisions regarding dynamics in relation to textural density. For instance, an awareness of the textural distribution of the parts at event #18 – the most treble-heavy event of the work with four out of six players in the treble register – will inform our use of dynamics at that event. We may opt, in Berry's words, to 'yield to compositional intent',[119] and let the treble's volume dominate naturally as per the composer's distribution of parts. Or we may feel that the multiple treble parts need more volume support from the middle and bass parts than is provided by the composer's dynamic instruction, and so a conscious decision to play the middle and bass parts above the notated dynamic marking may be taken. Either way, an informed interpretative decision to 'do or not do' could only be made once the textural facts of this event were made known via my analysis. So just as Berry said about a work's broad tonal structure, the textural analysis of *Six Pianos* is for this event 'the inescapable basis for doing and not doing.'[120]

[119] Berry, p.36
[120] *Ibid*., p.41

1.5 RECOMMENDATIONS & CONCLUSIONS

I. THE ACHIEVABILITY OF MINIMALIST ANALYSIS

Given that the structure of many process-based minimalist works is 'on the surface', there is evidently less depth to their structure than there is to, say, a Beethoven piano sonata. Consequently, a performance-oriented analysis of a work of process-based minimalism will typically not require the kind of analytical acumen demanded by the analysis of a Beethoven piano sonata. Analysing a work of process-based minimalism will rarely require extensive musicological training, or familiarity with Schenkerian methods. Most of the time, all that is required is a fair degree of analytical and numerical competence, the musicianship that performing musicians necessarily possess (by way of their training and education), and the will to carry out the analysis in the first place. Thus a performance-oriented analysis of a process-based minimalist work is likely to be within the performer's grasp (both in terms of the performer's analytical capabilities, and in terms of the time available to the performer to carry out such an analysis).

II. RECOMMENDATIONS

For the overwhelming majority of process-based minimalist works, some level of performance-oriented structural analysis is both achievable for performers and beneficial to performance quality. Performers should therefore consider such analysis to be as much a necessary part of performance preparation as note learning, rehearsal, practice performances, and other such aspects of preparation for the concert stage. This amounts to a recommendation for performers of process-based minimalism to make the independent first-hand analysis of such repertoire a regular practice.

It is also recommended that performers research and engage with both the literature that relates analysis to performance, and that which contains the structural analyses of process-based minimalist works. In so doing, performers may learn techniques for conducting their own analyses of process-based minimalist works, or they may obtain useful information from actual analyses of works they are performing. In either case, it is important that performers take a pragmatic stance regarding this body of literature. The sum of relevant analytical literature should be viewed as a resource from which a performer can select certain items, to be used as intellectual 'tools' for the improvement of performance quality. It is not a body of incontrovertible truths that must be expressed wholesale in performance.

III. CHAPTER CONCLUSION

The arguments and exhortations presented in this chapter could potentially foster two positive outcomes**.** First, both the dissemination of my analytical findings, and any implementation by other performers of my recommendations, is likely to result in an improvement in the performance quality of process-based minimalism. Second, both the content of this document, and any further scholarship inspired by its arguments and recommendations, may expand the total body of literature on analysis and performance to accommodate process-based minimalism.

2

PHILIP GLASS

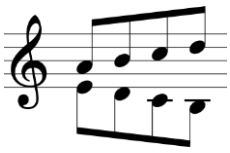
2.1. CASE STUDY #1: *MUSIC IN CONTRARY MOTION*

I. BASIC ANALYSIS

Composed in 1969,[121] *Music in Contrary Motion* belongs to a set of published works written that same year, which all demonstrate the rigorous employment of Glass's trademark additive and subtractive processes. The titles of these works – *Two Pages*, *Music in Fifths*, *Music in Contrary Motion,* and *Music in Similar Motion* – constitute 'a clear indication of the highly reduced sense of what the musical material might be'.[122] Indeed*, Music in Contrary Motion* proceeds (as per the score) in two-part contrary motion for its entirety. All 23 figures that make up the work[123] are constructed from two basic sub-units which receive (mostly) additive or (occasionally) subtractive treatment.

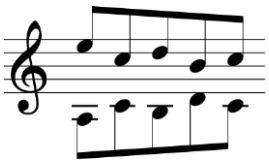
Each figure begins with the first of the work's two basic sub-units – a four-note scalic pattern (see Ex. 2.1):

Example 2.1: the four-note scalic pattern



All figures are constructed from quaver-groupings that derive either from this four-note scalic pattern, or from the work's second basic sub-unit – a five-note third-based pattern (see Ex.2.2):

Example 2.2: the five-note third-based pattern



[121] Composed in July 1969 at Sight Point, Inverness County, Nova Scotia. See Ex. 2.5 in [2.1, II] – as reprinted in Mertens, 1983 p.73 – which features an autograph in the bottom right-hand corner of the manuscript fragment. Note Glass's incorrect spelling of 'Inverness'.
[122] Kenneth Gloag, *Postmodernism in Music* (Cambridge: Cambridge University Press, 2012), p.121
[123] Any analytical remarks in this chapter will primarily refer to the 23-figure version of *Music in Contrary Motion* – as reprinted in Potter, 2010, pp. 22–34 – and any deviations found in other versions of the work (recorded or printed) will be cited as my analysis proceeds.

For all figures, the second half is an inversion of the first,[124] and for the majority of the work (ie Figs. 1–19) the material derived from each of the two basic sub-units is kept separate. Consequently, both halves of each figure begin with the material derived from the four-note scalic pattern, and end with the material derived from the five-note third-based pattern. Thus the common structure of Figs 1–19 is 'ABAB' ('A' = material derived from the 1st basic unit and 'B' = material derived from the 2nd basic unit).

II. LITERATURE REVIEW

There are few sources in the available literature on minimalism that mention *Music in Contrary Motion*, and most of those provide little more than a brief commentary on the work.[125] Mertens states that, as well as exhibiting musical motifs which 'are mainly elaborated horizontally', *Music in Contrary Motion* is a work in which 'three parts sound together: two converging and diverging lines, and a third basic line serving as a support'.[126] Claims to the work's three-part texture are substantiated by a manuscript fragment of *Music in Contrary Motion* which Mertens reprints in his book (see Ex. 2.5 in [2.3, V])

Mertens' text appears to be the sole source of information on *Music in Contrary Motion* for works by two other authors: Strickland,[127] also citing the work's three-part texture, states that Glass 'adds a quasidrone of alternating E and A to the two principal voices'. He makes further reference to pitched material when he describes these 'principal voices' as 'a diatonic ascent from A over middle C to E in the right hand and symmetrical descent from E to A below middle C in the left.' In addition, Strickland describes *Music in Contrary Motion* as a work 'in running eighths marked "fast, steady"'.[128]

Rob Haskins also appears to be using Mertens' text as the one and only source of information on *Music in Contrary Motion*, for his article features a computer-set version[129] of the manuscript fragment provided by Mertens. Haskins reproduces this fragment (which features the beginning and ending of *Music in Contrary Motion*) to validate his claim that Glass's early works 'grow in intensity for [their] duration', and

[124] These inversions are transposed by a perfect fifth (up in the right hand and down in the left hand as befits the contrary motion), and this has the effect of 'swapping' the first half's right-hand and left-hand material.
[125] There are a number of substantive analytical remarks regarding *Music in Contrary Motion* in Potter, 2000. These will be discussed in [2.5, II].
[126] Mertens, p.72
[127] All of Strickland's observations can be corroborated with reference to the manuscript fragment in Mertens' book.
[128] Strickland, p.217
[129] Rob Haskins, 'Another Look at Philip Glass: Aspects of Harmony and Formal Design in Early Works and *Einstein on the Beach'*, *An Online Journal of Experimental Music Studies*, 2005 (uploaded 12th September), <http://www.users.waitrose.com/~chobbs/haskinsglass.html>[accessed 17th December 2019]

that in the case of *Music in Contrary Motion*, 'this intensification process is accomplished simply by increasing the length and intricacy of the additive variations'.[130]

Elsewhere, K. Robert Schwarz describes the work as 'shocking in [its] reductive audacity', consisting only of 'two torrential lines of eighth notes, each elongating and contracting', while underneath, 'a bass is added as a drone'.[131] And Kenneth Gloag claims that the work's austere quality 'is reinforced by Glass's performance of it on electric organ on the recording, with the electronic sound further enhancing its mechanistic, inexpressive aura.'[132]

III. *MUSIC IN CONTRARY MOTION* AS MINIMALISM

Music in Contrary Motion is a paradigmatic example of process-based minimalist music, for it exhibits many of minimalism's salient characteristics as listed in [1.2, II]. The work exhibits minimization or reduction, in terms of the mere five pitch classes employed throughout (A, B, C, D, and E). Furthermore, a quick examination of these pitch classes will reveal that *Music in Contrary Motion* exhibits tonality or modality (specifically, a modal A minor).

The work also exhibits the static means invariably employed in minimalism**.** For instance, the tempo marking is 'fast, steady', prescribing a rapid tempo that remains fixed for the duration of the work. Rhythmic stasis is also exhibited, for the work consists of a continuous stream of uninterrupted steady quavers. Unsurprisingly*, Music in Contrary Motion* exhibits extreme employment of minimalism's primary static means – the 'musical continuum' – which mostly manifests as repetition.[133] The repetition employed admits of two types: to paraphrase a distinction made by Wes York,[134] the work features both 'external repetition' (ie the practice of repeating a particular figure a number of times before proceeding to the next), and 'internal repetition' (ie the recurrence of individual cells, in full or in part, at any point within a particular figure).

Music in Contrary Motion exhibits the 'formal rigour' that helps define process-based minimalism, which is demonstrated by the presence of gradual, audible processes which are played out via the static means of repetition. The works consists of musical motifs, constructed from the limited number of pitch classes as listed above, which are then subjected to Glass's rigorous employment of additive (or occasionally subtractive)

[130] Haskins
[131] Schwarz, 1996, p.123
[132] Gloag, p.121
[133] Most performances of *Music in Contrary Motion* exhibit repetition in the form of the pedal point drones referred to in [2.1, II], which nonetheless do not occur in the score. This matter will be addressed in [2.4].
[134] See Wes York, 'Form and Process' in *Writings on Glass: Essays, Interviews, Criticism* ed. by Richard Kostelanetz (New York: Schirmer Books/London: Prentice Hall International, 1997), 60-79 (p.64). See also [2.5, I] for a detailed commentary on York's analytical terminology.

compositional processes. These processes are 'audible' according to the understanding of audibility as described in [1.4, II]: each stage in the process translates into a precise sonic event that is at least aurally available to – if not always discerned by – the listener.

The graduality of these processes furnishes *Music in Contrary Motion* with a 'maximal' duration both typical of minimalism and significant given the work's paucity of musical ingredients. The 1975 Shandar recording of the work (with Glass himself as solo organist)[135] clocks in at 15' 31'',[136] the 2001 MDG recording (with Steffen Schleiermacher as solo organist)[137] clocks in at 22' 22", and the 2017 Brilliant Classics recording (with Jeroen van Veen as solo pianist)[138] clocks in at 22' 36".

Finally, the work's notation exhibits the open instrumentation common among minimalist scores, and as such it may be performed by any combination of instruments. This fact is demonstrated by the plurality of instrumentations exhibited by the recordings cited in the previous paragraph.

In addition, *Music in Contrary Motion* can also be viewed as a paradigmatic example of minimalist keyboard music (provided, of course, that the chosen instrumentation is keyboard-oriented). In such instances, performers are required to execute the horizontal keyboard-playing technique – see [1.2, III] – that is prominent in minimalist keyboard music in general and in Glass's keyboard writing in particular. In *Music in Contrary Motion,* linear motivic patterns are assigned to individual hands, and proceed horizontally in either a scalic or an arpeggiated fashion (players are not even required to turn out of a closed hand position). The resemblance of this 'keyboardistic' technique to that required for five-finger and ten-finger technical exercises is validated by the approach to keyboard playing taken by Glass himself: he states that his colleague and fellow organ player George Adoniadis told him that 'Hanon and Dohnanyi exercises help' in the execution of his own music, and at the time of speaking, Glass had 'been working on the Dohnanyi book myself'.[139]

So if *Music in Contrary Motion* accurately represents the paradigm of process-based, keyboard-oriented minimalism, then it is reasonable to assume that performers of this work will face the kind of challenges typically associated with standard models of this branch of minimalism. These challenges will be discussed in the next section.

[135] Philip Glass, *Two Pages/Contrary Motion* (Philip Glass, electric organ) */Music In Fifths/Music In Similar Motion*, Elektra Nonesuch 9 79326-2 (CD, 1994): a reissue of *Music in Fifths, Music in Similar Motion*, Chatham Square 1003 (LP, 1973); *Contrary Motion, Two Pages*, Shandar 83.515 (LP, 1975)
[136] The recording features a modified version of *Music in Contrary Motion*, simply entitled *Contrary Motion* – see [2.3, III].
[137] Philip Glass, *Early Keyboard Music* (Steffen Schleiermacher, organ), MDG 613 1027–2 (CD, 2001)
[138] *Minimal Piano Collection Volume XXI – XXVIII* (Jeroen van Veen, piano), Brilliant Classics 95543 (CD, 2017)
[139] Kozinn, 1980, p.107

2.2 *MUSIC IN CONTRARY MOTION*: PERFORMANCE CHALLENGES

I. PRE-INTERPRETATIVE DIFFICULTIES

Because *Music in Contrary Motion* is a typical example of process-based minimalism, it follows that renditions of this work can frequently fail to meet certain pre-interpretative performance requirements, even when performed by experienced practitioners of minimalism (see [1.3, I]). A comparison of the two available solo organ recordings of *Music in Contrary Motion* reveals different ways in which seasoned performers might struggle to meet the technical requirements of the work.[140] The 1975 Shandar recording – with Glass himself as solo performer – exhibits a high level of note accuracy (all but one of the figures are executed accurately), but the articulation is deficient, unclear or inconsistent throughout the recording, and the tempo is often unsteady. In contrast, the 2001 MDG recording – with Steffen Schleiermacher as solo performer – features note errors in 13 of the 22 figures, although the tempo remains solid and the articulation is technically proficient.

My own initial encounter with *Music in Contrary Motion* also demonstrates the difficulties it presents to performers. On the 14th May 2008 I gave my first concert with Piano Circus at The Space in South London. Among the items on that evening's programme was the ensemble's own 'six-performer' arrangement of *Music in Contrary Motion*. In this arrangement, each page of the thirteen-page score[141] is played in unison by two players at the keyboard, and a third player provides pedal notes for that page. These active roles are rotated as the piece progresses so that all six performers get a chance to fulfil each role.

I was involved in the performance's most problematic episode. Towards the end of the piece, while I was playing Figure 19 of the work in unison with (now ex-member) Graham Rix, one of us misread the score, and this resulted in a patently non-unison configuration of our parts. To make matters worse, we found it impossible to get back in unison, and all we could do was muddle through the remainder of the figure in our dubious, non-unison fashion until the next pedal point was placed to signal the figure's end.

[140] Granted, the 2017 van Veen solo piano recording is technically flawless.
[141] This arrangement was performed from the commercially available manuscript edition – see Philip Glass, *Music in Contrary Motion* [published score] (New York: Dunvagen/Chester, 1969)

II. GENERAL CHALLENGES ENCOUNTERED

The difficulties described above are examples of the general pre-interpretative challenges presented by minimalism (as described in [1.3]) which are themselves grounded in the kind of 'paradigmatic' characteristics that *Music in Contrary Motion* exhibits. For instance, the work features constant, unrelenting quaver motion, so its physical challenge amounts to the execution of ceaseless, steady quavers for the duration of the work without pause. Indeed, physical stamina is a general demand of Glass's early keyboard writing: in a 2002 *New York Times* review of Glass's music (performed by the composer himself)**,** Allan Kozinn states that although Glass 'does not regard himself as a keyboard virtuoso', his technique 'is adequate for the demands' of his music, 'the greatest of which is endurance'.[142]

In addition, the repetition Glass employs in *Music in Contrary Motion* is of a particularly unmodified variety – in Strickland's wonderfully reflexive words, 'Glass offers more of the same and the same and the same and more of the more of the same'.[143] As a result, the mental challenge of staying alert in the face of extreme repetition and an absence of varied musical stimuli is uncommonly pronounced here.

Although minimalism's aural challenge (as described in [1.3, VIII]) is not specifically applicable to *Music in Contrary Motion* (as neither active listening nor psychoacoustic awareness are necessary conditions for a competent performance), the technical challenge (as described in [1.3, VI]) is wholly applicable. Indeed, the above description of Piano Circus's performance of *Music in Contrary Motion* demonstrates how, in ensemble performances of the work at least, a wrong note can often have the effect of breaking the chain of pitches, which in turn can lead to further flaws in performance.

As per 'analysis/performance scenario #1' (see Introduction), these general physical, mental and technical pre-interpretative performance challenges that apply to *Music in Contrary Motion* can be addressed via the non-analytical solutions that are presented in [1.3, III], [1.3, V] and [1.3, VII] respectively. But alongside these general challenges, some demands presented by minimalist works are specifically associated with their composers. In the case of Philip Glass, early works such as *Music in Contrary Motion* feature unmitigated 'internal repetition' (ie the recurrence of individual cells, in full or in part, at any point within a particular figure), and when combined with the aurally obscure 'finer points' of the processes involved (see [1.4, II]), this internal repetition can cause problems for performers.

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[142] Allan Kozinn, 'For Philip Glass, It's All About Endurance, Not Virtuosity'', *New York Times,* 2nd December 2002, <https://www.nytimes.com/2002/12/02/arts/music-review-for-philip-glass-it-s-all-about-endurance-not-virtuosity.html> [accessed 18th December 2019]

[143] Strickland, p.213

For instance, the additive procedures employed in such works – grounded in the familiar minimalist tropes of repetition and gradual processes – are highly rigorous, but that rigour is not always aurally apparent, and as a result the details of the process are often obscured, with the location of each addition often seeming arbitrary. And because the additive procedures employed in these works involve adding material to figures which already exists in that figure, there is often a perceived lack of differentiation between one figure and the next. Thus it is very easy to play a figure ahead by mistake, or to stumble backwards on to a previous figure, or even to become lost within a particular figure – in each case the process is disrupted and further obscured aurally from the listener.

The internal repetition found in each figure would make any comprehensive, detailed, purely aural awareness of the structure governing Glass's early works extremely difficult to attain, and 'performance' of these pieces is thus often reduced to what feels like frantically sight-reading a series of identical or near-identical musical cells, strung together apparently at random ([see 1.4, IV]). The tension that this scenario generates in a performer makes instances of wrong notes and rhythmic instability far more likely, and so there is a specific explanation for why the 'clanger factor' might arise in performances of *Music in Contrary Motion.*

Another challenge presented by Glass's early works is the fact that many of them have what could be described as an 'indeterminate ontological status'.[144] Grounded in the open or incomplete nature of many minimalist scores, this indeterminate ontological status is a function of various individual indeterminacies regarding certain musical features (eg pitch, dynamics, number of repetitions, tempo); for if these features are not determined by a work's score, then it is unclear which features of the work are its essential components, and which features are either non-essential, or subject to a plurality of applications.

I will provide a solution to the Glass-specific note accuracy challenge towards the end of this chapter (see [2.6, III]. For now, the following three sections will tackle the problem of ontological indeterminacy in *Music in Contrary Motion.*

[144] By 'ontological status' I am referring to that combination of essential ontological characteristics (ie features defining the existence of some entity) which must obtain in order for a performance of a musical work to actually qualify as a rendition of that work.

2.3. THE ONTOLOGICAL INDETERMINACY OF *MUSIC IN CONTRARY MOTION*

I. TEMPO, DYNAMICS, ARTICULATION & INSTRUMENTATION

As per 'analysis/performance scenario #2 (see Introduction), the various instances of ontological indeterminacy exhibited by *Music in Contrary Motion* constitute interpretative challenges that (for the most part) can be solved non-analytically. Four such instances of indeterminacy are the work's tempo, dynamics, articulation and instrumentation. The 1969 copyright Dunvagen/Chester manuscript edition of *Music in Contrary Motion* has only one performance instruction, the tempo marking of 'fast, steady'. As such, there is no indication of what dynamics or articulation to employ, nor is the instrumentation specified. And even the one performance instruction is not unproblematic: for while the instruction to play 'steady' successfully proscribes any change in tempo, the instruction to play 'fast' is vague and therefore does not successfully determine an appropriate tempo or range of tempi.

Now while reference to the two available commercial recordings of *Music in Contrary Motion* might contribute to solving the issue of tempo (this approach is taken later on in this chapter – see [2.4, II]) – an encounter with these recordings gives rise to the next three issues of ontological indeterminacy.

II. PEDAL POINTS

There is no instruction in the score of *Music in Contrary Motion* to play anything other than the notated two-part contrary motion. However, the two organ recordings of the work feature a tonic A pedal note for the first half of each figure, and a dominant E pedal for the second half.

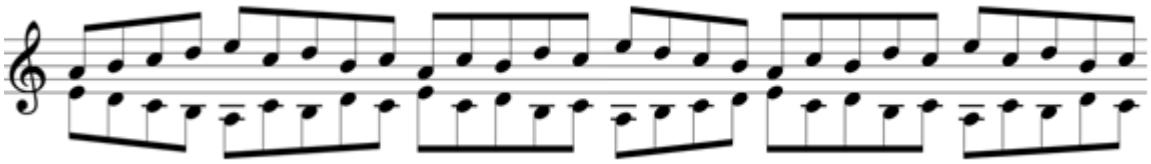
III. STARTING POINT FOR EACH FIGURE

As stated in [2.1, I], each figure in the score begins with the first basic sub-unit (see Ex. 2.3 for Figure 1 as per the score), but in the Philip Glass recording, all figures begin with an inversion of the second basic sub-unit. In this recording, each figure commences from the first instance of the second basic sub-unit that is found in the second half of each figure as per the score.[145] The figures progress from their new starting point until the

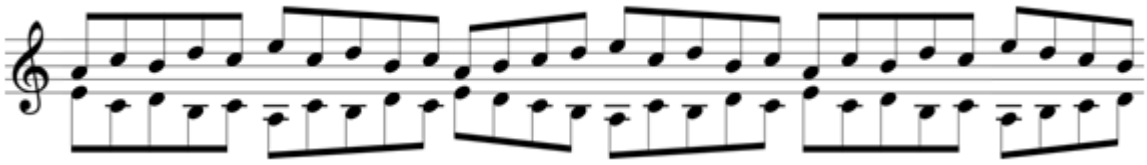
[145] The only exception to this rearrangement is Figure 2, which is played from its one and only instance of the 2nd basic sub-unit, found in the figure's first half as per the score.

double bar line, and then continue from the beginning of the figure as per the score until the remaining groupings have been played (see Ex. 2.4 for Figure 1 as per the Glass recording). Potter acknowledges this 'alternative' starting point via an analytical illustration, stating that if, 'for Figure 1, the score can be represented as a + b + c + d + e + f, with the scale pattern first, then the recording can be described as c + d + e + f + a + b'.[146] So the issue here is whether this 'alternative' starting point is permissible, and if so, whether it has equal validity or priority to the 'original' starting point.

Example 2.3: Figure 1 (as per the score)



Example 2.4: Figure 1 (as per the Glass recording)



IV. REPETITION OF FIGURES

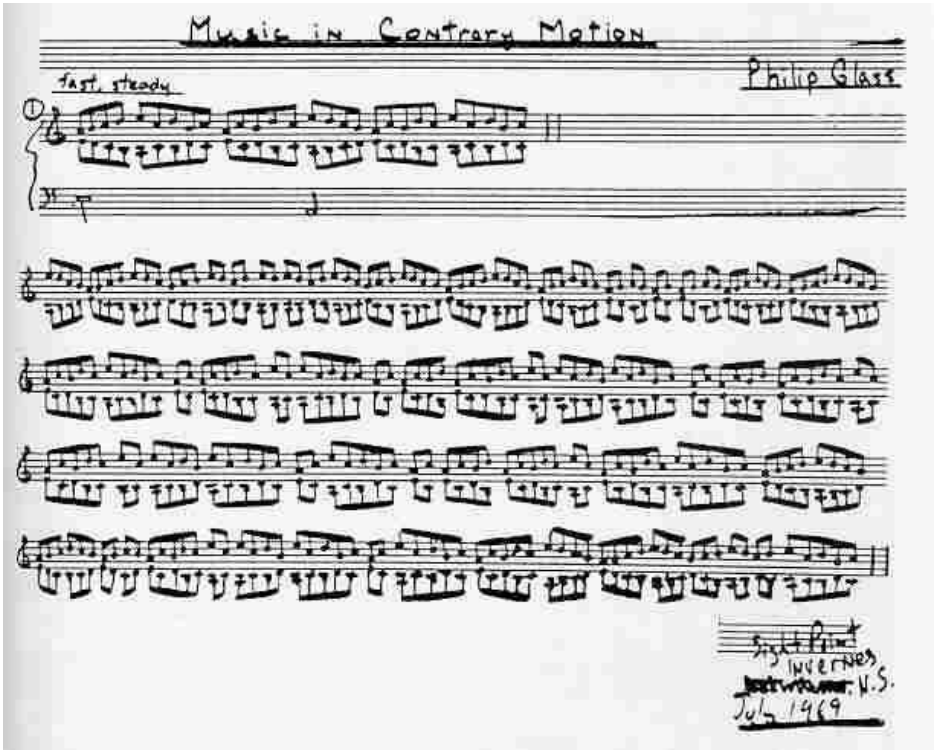
There is no indication in the score of *Music in Contrary Motion* to repeat any of the figures. However, in the Steffen Schleiermacher recording, each figure is repeated once (so played twice). In the Philip Glass recording, the number of repetitions is different per figure, with Glass adhering roughly to an inverse proportionality between figure length and number of repetitions (ie the longer the figure, the fewer the number of repetitions, with no repeats from Figure 11 onwards, last figure excepted). The Jeroen van Veen recording demonstrates a similar inverse proportionality (19 repeats for Figure 1, 11 repeats for Figure 2, 2 or 3 repeats for Figures 3 – 10, 1 repeat for most of Figures 11 – 18, and no repeats for Figures 19 – 23).

[146]Keith Potter, 'Music in Contrary Motion', in *Philip Glass: First Classics, 1968 – 1969,* ed. by Keith Potter (London: Chester, 2010), p.22

V. THE ENDING OF THE WORK

The 1969 copyright Dunvagen/Chester manuscript edition consists of 22 figures on 13 pages. However, there is a manuscript fragment (see Ex.2.5) that features the latter half of a 'final figure', eight quavers longer than the latter half of the 1969 score's final figure. The presence of an additive process implied by this increased quaver length strongly suggests that this manuscript fragment contains part of a 23rd figure.

Example 2.5: manuscript fragment of *Music in Contrary Motion* score[147] [148]



What's more, the 2010 Chester edition actually has 23 figures, with the commentary stating that the editor's only source was 'the composer's original hand-written score', a manuscript that 'occupies fourteen pages'.[149] This contradicts the implication of the 1969 manuscript edition – namely, that there are only thirteen pages of manuscript.

In addition to all this, Glass's own recording of *Music in Contrary Motion* ends with a figure not found in either edition. The recording proceeds from Figure 22 (the 1969 copyright score's final figure) onto Figure 23 (the 2010 Chester Edition score's final

[147] As reprinted in Mertens 1983, p.73 – it should be acknowledged that, in relation to the previously-mentioned issue of pedal points, the above manuscript fragment actually features notated pedal points for the first figure, albeit in reverse order to that of the recordings (the fragment features a dominant E pedal note for the first half of each figure, and a tonic A pedal for the second half). A discussion of how these notated, reverse-order pedal notes relate to the issue at hand can be found in [2.4, V].
[148] As previously stated in [2.1, II], Haskins appears to be using Mertens' text as the one and only source of information for his computer-set version of this manuscript fragment.
[149] Potter, 2010 ('Music in Contrary Motion'), p.22

figure), and then onto a 24th and 'final' figure, eight quavers longer than Figure 23. So if, among the different versions of *Music in Contrary Motion*, there are total of three different endings to the piece, then it is unclear which of these is the 'correct' ending, or whether any or all of these endings are permissible.

One might suggest that all three stopping points are permissible, owing to the fact that the composer has implicitly endorsed each one of them. The 1969 Dunvagen edition that ends at Figure 22 is written in the composer's own script; the manuscript fragment that ends with Figure 23 is also in the composer's own script, as are the pages of manuscript that the 23-figure 2010 Chester edition is based on; and the 1975 Shandar recording that ends with a 'Figure 24' is performed by Glass himself. From these facts, one might conclude that the composer's involvement in the production of all three versions validates the different stopping points of each and makes all three of them permissible.

However, this attempt to legitimize multiple stopping points via an appeal to authorship is rendered insufficient by the following consideration: Potter refers to Glass's description of *Music in Contrary Motion* as a work written in 'open form', which gives the work the effect of 'music spun out endlessly with no reason for concluding even when it does.'[150] A similar assertion is made by Tim Page**,** who also cites Glass's description of the work's open form, stating that the work 'never really ends, it just stops [...] the expanding figures upon which [the work] is constructed could, theoretically, continue augmenting forever'.[151] Both statements suggest the arbitrariness of any stopping point for *Music in Contrary Motion*: no stopping point is the work's 'true' ending, as it 'never really ends' and could theoretically be expanded infinitely.

However, this statement is contingent upon the untested assertion that the work does indeed have open form, and so we are no closer to a justification for the validity of multiple stopping points. Thus the ontological indeterminacy surrounding the ending of the work remains.

[150] Potter, 2000, p. 295
[151] Tim Page, 'Liner Notes', *Philip Glass: Two Pages/Contrary Motion/In Fifths/In Similar Motion*, Elektra Nonesuch 9 79326–2 (CD, 1994)

2.4 ONTOLOGICAL INDETERMINACY: SOLUTIONS

I. PREAMBLE

It should be stated that the previously-discussed ontological indeterminacy exhibited by the score of *Music in Contrary Motion* does not imply that its composer was at fault in any way. To accuse Glass of, so to speak, 'notational negligence' is to assume that he subscribes to, in the words of Kyle Gann, 'the universal paradigm for what a score is: a linear continuity on bound paper which contains all the information needed to replicate the piece in performance.'[152] But it is well-known that many minimalist composers deviated from this paradigm: Gann cites works by Dennis Johnson and Meredith Monk as items from 'a wealth of music whose score notation, if it exists at all, doesn't adequately represent it.'[153] Thus it is reasonable to speculate that Glass's score for *Music in Contrary Motion* functioned simply as a reminder of what the work involved, and which ended up being published in its original, bare form. This speculation, however, does nothing to remove the ontological indeterminacy which is still very much an issue with the score. The remainder of this section addresses this issue in depth.

II. TEMPO

Addressing the following instances of ontological indeterminacy is an interpretative enterprise, and consequently the interpretation-centric literature cited in [1.1, I] is at least eligible for reference. For instance, the vagueness of the work's tempo instruction – 'fast, steady' – can be dealt with in part with reference to Berry's statement that **'**tempo is best decided in relation to pace and content within pertinent structural elements'.[154] Relating this to *Music in Contrary Motion*, one could argue that an appropriate tempo for the work is one which conveys and facilitates a steadily rapid pace, and which allows for satisfactory aural comprehension of the work's (mostly) additive structure. With this in mind, it is reasonable to state that, while the van Veen's solo piano recording lives up to this ideal (maintaining a fast, steady tempo of crotchet = c.200, with clear and note-perfect execution throughout) the two solo organ recordings of the work do not. Regarding the 1975 Shandar recording, the tempo of crotchet = c.200 might have claims to authority (given that this recording is performed by Glass himself), but such claims would be undermined by the fact that the steadiness of the tempo is frequently not

[152] Kyle Gann, 'Getting Off the Assembly Line', *ArtsJournal*, 2005 (uploaded 25th January), <https://www.artsjournal.com/postclassic/2010/01/getting_off_the_assembly_line.html> [accessed 18th December 2019]
[153] *Ibid*.
[154] Berry, p.34. To this I would like to add Potter's qualification that 'instrumentation and performance space should both play a role' in ultimately determining the most suitable speed for any performance of *Music in Contrary Motion* - see Keith Potter, 'Music in Fifths', in *Philip Glass: First Classics, 1968 – 1969,* ed. by Keith Potter *(*London: Chester, 2010), p.15

maintained. In the 2001 MDG recording, the same tempo of crotchet = c.200 is often accompanied by the inadvertent omission of quaver groupings, something which potentially disrupts one's perception of the work's additive processes. From these considerations, one might warn against choosing a tempo that is too 'fast' to be 'steady', or that is too 'fast' to convey, with security and clarity, the work's 'pertinent structural elements'.

III. DYNAMICS

It is plausible to argue that the recommended and most authentic employment of dynamics would be to play *Music in Contrary Motion* at a constantly loud volume. As Glass himself reflects on his early works:

> I learned a lot from the rock and roll guys. This is hardcore minimalist, really, rocking and rolling minimalist music. And it was loud and it was fierce and it made a very big impression. When I wrote, in the music, the instructions for the players, I just wrote 'fast and loud.'[155]

As previously mentioned [see 2.3, I], Glass does *not* actually recommend a loud dynamic in *Music in Contrary Motion*: Potter states that, 'several [works] are headed simply "fast, steady"'. But Potter also states that 'Glass himself has usually played all these works at a high intensity – loud as well as fast'.[156] This would seem to underscore the supposed authenticity of playing *Music in Contrary Motion* at a loud volume.

However, one might argue that, given the lack of any explicit dynamic instruction, it is also permissible to perform the work at a constantly quiet dynamic level. Potter states that exploring quieter dynamics might have value by altering 'the listener's perception of structure and, in particular, the nature and extent of its tensions, their accumulation and any potential they may have for resolution'.[157]

But perhaps these 'aesthetic benefits' of a low-dynamic performance come at a considerable expense to the listener: Glass states that listening to his music at a high volume 'brings out the psychoacoustical phenomena that are part of the content of the music – overtones, undertones, difference tones.'[158] If this is the case, then a low-dynamic performance of Glass's music might deprive the listener of some of the music's essential content, resulting in an impoverished listening experience. Such considerations

[155] Philip Glass, interview from *The Sound and the Fury* (episode 3, 'Easy Listening?'), produced and directed by Ian MacMillan (BBC Four, 1st broadcast 26th February 2013)
[156] Potter, 2000, p.287
[157] *Ibid*.
[158] Richard Kostelanetz, 'Philip Glass' [1979], in *Writings on Glass: Essays, Interviews, Criticism* ed. by Richard Kostelanetz (New York: Schirmer Books/London: Prentice Hall International, 1997), 109–112 (p.112)

seem to tip the scales back in favour of high-dynamic performances of Glass's early music.

But while one could arguably permit either a loud or (less so) a quiet rendition of *Music in Contrary Motion*, it would be harder to endorse a performance that exhibited dynamic change (eg the terraced dynamics that features in van Veen's recording). Potter states that 'the most important, and unambiguous, requirement for the dynamic level of any performance of these works is that any volume initiated at the outset will be consistently and rigorously preserved throughout'.[159] Indeed, an infringement of the static means of unchanging dynamic that typifies minimalism generally (see [1.2, II]) would 'seem to run counter both to the music's natural logic and to the "experimental" aesthetic', especially if such dynamic change took the form of '"expressive" crescendo and diminuendi.'[160]

IV. ARTICULATION

The absence of articulation in *Music in Contrary Motion* is an 'unspecified' dimension that performers must nevertheless make decisions about (see Introduction), for it is not possible to play something with no articulation. That is to say, every conceivable way of playing these works corresponds to a straightforwardly comprehensible articulation strategy, be it *legato*, *non legato*, *staccato*, *tenuto*, *pesante*, *marcato*, *martellato*, or a combination of any of all of these.

When considering how to articulate the work, thought should be given to how sustainable a particular approach might be, in light of the physical challenge that minimalism presents generally, and the challenge that the constant quaver execution of *Music in Contrary Motion* presents in particular. Of course, the choice of instrumentation will be a factor in determining an instrumentally suitable articulation strategy, although it is reasonable to assume that articulation tending towards *legato* is generally preferable than that tending towards *staccato*, given that the former is generally less strenuous and thus easier to maintain for the duration of the work. Indeed, this demand for uniform articulation can be justified if we extrapolate from the previous requirement for uniform dynamics (see [2.4, III] above), and assert that an infringement of the static means of unchanging articulation could also be construed as running 'counter both to the music's natural logic and to the "experimental" aesthetic'. The negative impact of such an infringement is demonstrated by the 2017 recording by van Veen, whose employment of

[159] Potter, 2010 ('Introductory Note'), p.7
[160] Potter, 2000, pp. 287-288

varied dynamics dispels any hope the listener may have of achieving 'static ends' and their attendant mesmeric effects.

V. PEDAL POINTS

Given the lack of any relevant, explicit instruction in the composer's hand-written score, it is arguably permissible to perform *Music in Contrary Motion* simply as a work of two-part contrary motion as notated, and without pedal notes (as van Veen does in his 2017 solo piano recording). However, the fact that the composer's own recording features tonic/dominant pedal notes in each figure suggests that a rendition of the work with pedal notes is more 'authoritative' or 'standard' than one without. This suggestion gains strength once we revisit the secondary literature cited in [2.1, II]: Mertens, Strickland and Haskins all make reference to the pedal points in their description of the work's essential components, and the manuscript fragment reprinted by Mertens (see Ex. 2.5) actually features notated pedal points for the first figure, albeit in reverse order to the recordings. Indeed, this last fact would seem to imply that playing the pedal notes in the order E/A (as opposed to A/E) is a permissible alternative.

To this I would want to add that the inclusion of pedal points (in whatever order) is arguably preferable to their omission. First, the midway location of each figure's second pedal note draws attention to the significant structural fact that the second half of each figure is an inversion of the first, and this signpost will furnish both performers and listeners with greater structural awareness. Second, the textural enrichment brought about by these pedal points enhances the listening dimension by creating an '*interpenetration* of fast [modules] and slow [drones]', a trope which, according to Robert Fink, is a 'key feature of the [minimalist] experience'.[161]

A third consideration makes reference to an item of secondary literature cited in [1.1, I]: assuming that Edward T. Cone's claims apply to *Music in Contrary Motion,* performers of this work will achieve 'valid and effective performance' only if they are capable of 'discovering and making clear [its] rhythmic life',[162] which, like all tonal compositions, 'consists of expansions of a pervasive upbeat-downbeat pattern.'[163] Thus the inclusion of the tonic/dominant pedal points arguably serves to emphasise the work's iterating downbeat/upbeat structure and thus contributes to the achievement of 'valid and effective performance'.

[161] Robert Fink, *Repeating Ourselves: American Minimal Music as Cultural Practice* (Berkeley, Los Angeles & London: University of California Press, 2006), p.105
[162] Cone, 1968, p.31
[163] Cone, 1985, p.149

VI. STARTING POINT FOR EACH FIGURE

It would seem reasonable to view the 'alternative' version of *Music in Contrary Motion* from the 1975 Shandar recording as permissible, given that it is provided by the composer himself. It might also seem reasonable to regard the version from the notated score as the more important of the two, since it is the version which Glass opted to publish and circulate among the wider public. However, it would be hard to offer a conclusive justification for this: apart from the different starting points, both versions are identical in terms of figure content. Thus it is reasonable to assume that there will be no extra technical issues to consider when performing the 'alternative' version of *Music in Contrary Motion*.

The only real distinction between the two versions is that the notated version gives a certain primacy to the four-note scalic sub-unit, whereas the version from Glass's recording gives a certain primacy to the five-note third-based sub-unit. And given that there seems to be nothing inherently wrong with starting each figure with either sub-unit, it would seem that personal musical preference is the only criterion with which to choose. A preference one way or the other may be informed by the perceptual implications of the two different versions. For instance, if a performer wishes the first event of each figure to be one of the many, small and rhythmically regular additions of material derived from the four-note sub-unit, then they will play the notated version. However, if they want each figure to lead with the less frequent, larger and rhythmically irregular additions of material derived from the five-note sub-unit, then they will play the 'alternative' version. Such preference-based choices embody Berry's recommendation to performers that they 'must decide which [musical elements] should prevail' in their 'interpretive realization' of a work,[164] and at the expense of interpretative alternatives (see [1.1, I]).

It should be said that, from a practical point of view, the notated version is likely to remain the 'standard' version of *Music in Contrary Motion*, given the amount of time and effort required to convert the score into the 'alternative' version as heard on Glass's recording. Granted, one could attempt to perform the 'alternative' version from the notated version as it is, although both the extra visual activity, and the mental processing required to calculate each figure's new different starting point, are likely to create a rather frantic sight-reading experience, which in turn could lead to technical defects in performance.

[164] Berry, p.27

VII. REPETITION OF FIGURES

It is possible to put forward arguments for a plurality of permissible solutions to this issue. For instance, performances with no repeats at all are arguably permissible, given that no explicit instruction to repeat figures is found in the score. However, it could also be argued that performing an ever-decreasing number of repetitions as the figure length increases is, if not the only permissible approach, potentially the more 'recommended' or 'authentic' approach. After all, this latter strategy, implemented by van Veen on the 2017 Brilliant Classics recording, also constitutes the composer's own practice on the 1975 Shandar recording, which might in turn suggest that this approach is 'authoritative' and that it should have priority over other, albeit permissible, alternatives. This stance can be strengthened with reference to secondary sources, as it would seem to be supported by Potter when he states that a good general strategy 'for deciding on the number of repetitions would be: the longer the figure, the fewer the repetitions'.[165]

In contrast, my own practice when performing *Music in Contrary Motion* demonstrates a preference for preserving the proportionality exhibited in the score from one figure to the next – by executing the work either with no repeats, or with the same number of repeats per figure. This preference is founded on the following phenomenological consideration.

More often than not, I preserve the score's proportionality by playing each figure with no repeats. As each successive figure lengthens, I experience an extraordinary 'perceptual dissonance' between judging how close I am to the work's *notational* conclusion, and how close I am to its *temporal* conclusion. For instance, when I am at Figure 20, my perception is that I am approaching the end of the piece (I have played 19 out of 23 figures and thus I am over 80 percent of the way through the piece in terms of figures); yet at Figure 20, the work is only a little over 60 percent completed in terms of time (approximately five and a half minutes of the total 14-minute duration is still to be performed).

So as the additive processes continue and the figures lengthen, my perception of the time taken to perform each figure becomes distorted, in that it feels like the later figures took less time to play than actually elapsed whilst playing them. This phenomenon – perceiving time as passing increasingly faster – comes about because the figures in

[165] Keith Potter, '*Two Pages'*, in *Philip Glass: First Classics, 1968 – 1969,* ed. by Keith Potter (London: Chester, 2010), 10–11 (p.11)

Music in Contrary Motion become increasingly longer in duration, and so the 'information-events' occur at increasingly longer intervals.[166]

The above phenomenon can only obtain if the proportionality of the score is preserved; and if one considers a perception-altering experience like this to be a valuable dimension of both the listening and the performing experience, then the presence of such a phenomenon would justify the preservation of the score's proportionality, either via no repeats at all, or by repeating each figure the same number of times.

VIII. INSTRUMENTATION

There are a number of reasons why one might consider a solo organ performance of *Music in Contrary Motion* to take priority. First, the two lines in the score appear to constitute idiomatically sound keyboard writing; the music is in the 'keyboard-friendly' key of A Minor, and the contrary-motion configuration is reminiscent of solo keyboard passage-work and ten-finger technical exercises (such as the Dohnanyi exercises that Glass himself favours – see [2.1, III]). The suitability of the horizontal, keyboardistic technique to this material strongly suggests that a solo keyboard instrumentation (like that of all three available commercial recordings) should take priority. Indeed, as was stated at [1.2, III], *Music in Contrary Motion* was in all likelihood composed at the keyboard and thus is most suitably executed by keyboard instruments.

Second, the benefits afforded by the inclusion of pedal points (see [2.4, V] above) strongly suggest that, specifically, a solo *organ* performance should take priority (they are executed in each recording as part of a solo organ performance, as is feasible given the possibilities of that particular instrumentation).

Third, *Music in Contrary Motion,* according to Gloag*,* exhibits a 'mechanical working through of [...] minimal pitch material [which] is intentionally inexpressive',[167] and so it is in keeping with the work's inherent inexpressivity to perform it on an instrument (such as an organ) which is incapable of dynamic nuance.

All this is not to say that alternative (solo or ensemble, keyboard or non-keyboard) arrangements of *Music in Contrary Motion* are impermissible (see van Veen's solo piano recording). It's simply that the work is inherently suited to being performed as a solo organ piece, and as such this is arguably the most effective instrumentation for performing the work.

[166] Studies have shown that time appears to move faster if less information needs to be processed: neuroscientist David Eagleman states that the 'more familiar the world becomes, the less information your brain writes down, and the more quickly time seems to pass' – see Burkhard Bilger, 'The Possibilian', *New Yorker*, 25th April 2011, <https://www.newyorker.com/magazine/2011/04/25/the-possibilian> [accessed 19th December 2019]
[167] Gloag, p.121

It is worth bearing in mind that although decisions about instrumentation are often not interpretative *per se*, they do often entail interpretative consequences. For instance, the choice to play *Music in Contrary Motion* as a solo organ piece entails a commitment to extremely narrow parameters of expressivity, and a commitment of this sort amounts to an interpretative decision about how the work is to be played. Indeed, such decisions about instrumentation corroborate Philip Thomas's claim that 'choices in response to indeterminate elements […] consequently shape and define the limits of the work in question.'[168] In other words, when a decision is made regarding a particular instance of indeterminacy, it is often the case that other instances cease to be indeterminate as a result. So if *Music in Contrary Motion* plausibly requires fewer decisions about indeterminacy than there are enumerable instances of it, then perhaps works like this are less indeterminate than they might first appear.

IX. THE ENDING OF THE WORK

The tension that exists between the plurality of permissible solutions described above, and the fact that some of these permissible solutions come more recommended than others, can be seen as a general consequence of dealing sensitively and musically with any indeterminate feature found in a particular score. Ian Pace points to this tension when he defines a musical score as something which 'delineates the range of possible performance activities',[169] whilst at the same time recognizing that not all possibilities 'are equally valid'.[170] Similarly, Philip Thomas states that interpretative decisions are likely to 'be made within a more narrow band' if the performer chooses to gain a wider appreciation of the context of the work'.[171]

Notwithstanding this tension, the indeterminacy exhibited by *Music in Contrary Motion* (in terms of its tempo, dynamics, pedal points, the starting point for each figure, the repetition of figures and instrumentation) has been comprehensively addressed above, with reference to both performance practice on the one hand, and primary and secondary sources on the other. These extra-notational approaches to determining the 'pluralistic' ontology of the work would seem to validate Christian Wolff's belief – as

168 Philip Thomas, 'Fingers, Fragility and Freedom – Christian Wolff's Pianist: Pieces', *Divergence Press (*University of Huddersfield), 2016 (uploaded 27th October), <http://divergencepress.net/articles/2016/10/27/fingers-fragility-and-freedom-christian-wolffs-pianist-pieces> [accessed 24th January 2019]

169 Ian Pace, 'Beyond Werktreue: Ideologies of New Music Performance and Performers.' (Paper presented at the Lecture, 14-01-2014, Royal College of Music), *City Research Online*, <http://openaccess.city.ac.uk/6558/> [accessed 19th December 2019]

170 *Ibid*.

171 Thomas, 2007, p.137 – again, this statement is made with reference to Howard Skempton's piano music, but its general application is plausible.

quoted by Thomas – that the score 'is one element in a conversation, an inducement to exploration, something flexible'.[172]

However, similar interpretative solutions to the indeterminacy surrounding the ending of *Music in Contrary Motion*, and the related claims as to the work's 'open form', can only be provided via a comprehensive analysis of the work. This example of 'analysis/performance scenario #4 (see Introduction) will be presented in the next section.

[172] As quoted in Thomas, 2016

2.5 ONTOLOGICAL INDETERMINACY: THE ANALYTICAL SOLUTION

I. LITERATURE REVIEW

The only publication to my knowledge that contains any substantive analytical remarks regarding *Music in Contrary Motion* is provided by Keith Potter, who starts his analysis with the observation that the lower voice of the work's two-part contrary motion is 'a "tonal" inversion of the upper one'[173] (albeit proceeding from the dominant E as opposed to the tonic A). Potter goes on to describe the differences in length between additions derived from the 1st basic sub-unit and those derived from the 2nd basic sub-unit. He states that sudden, 'subsequently drastic, expansion of third-based sub-units and slower expansion of scalic sub-units give rise to the basic structure of *Music in Contrary Motion*'.[174] He identifies the 'exact mirror relationship between the first and second half of each figure', and describes how this relationship is reinforced by the pedal notes heard in Glass's 1975 recording: 'Glass's own recorded performance crucially adds a pair of pedal points – one on the tonic, the other on the dominant – to signal each half figure'.[175]

It is significant that, given the supposed audibility of minimalist processes, Potter's commentary contains one error regarding the structure of *Music in Contrary Motion*. He states that 'the third-based sub-unit decreases for the first time as the work reaches its last stages';[176] and while the third-based sub-unit does indeed decrease towards the end of the piece (in Figure 21, to be precise), it is *not* the first time in the piece that this has happened – a similar subtraction from the third-based sub-unit is made at Figure 2. So rather than supplying 'a hint that a subtractive process could eventually eat away what the additive one had built',[177] the subtraction at Figure 21, in virtue of its similarity to the subtraction at Figure 2, might more plausibly suggest that the network of (mostly additive) processes from Figures 1 to 19 could be carried on further, via the iteration of that very network.[178]

Potter's commentary of *Music Contrary Motion* has the most substance of any currently available secondary source, but it doesn't amount to – nor, in fairness, does it seem intended as – an extensive analysis of the work. In fact, there is only

[173] Potter, 2000, p.294
[174] *Ibid*., p.294/295
[175] *Ibid*., p.294
[176] *Ibid*. p.295
[177] *Ibid*. p.294
[178] See my figure-by-figure analysis later in this chapter.

one comprehensive and detailed analytical study of *any* of Glass's 1969 works, which is found in an article on *Two Pages* by Wes York.

York's analysis of *Two Pages* is exhaustively detailed, to the extent that much of the content of his paper is surplus to performance requirements. However, performers of *Two Pages* will benefit from many of York's discoveries. For instance, he analyses the work as exhibiting a 'five-part scheme',[179] and indicates that the process governing part V of this scheme ('process A') is an inversion of that which governs part V. Whereas, in part I, 'process A always involved successive subtractions of one note from the top of the basic [five-note ascending] pattern', in part V 'these successive subtractions are taken from the bottom'.[180] This particular insight can benefit performers of *Two Pages* in the sense that they can achieve an understanding of two entire sections (parts I and V) simply by comprehending a single formula ('process A'), instead of having to wrestle with the many individual and seemingly arbitrary instances of addition or subtraction that feature in these two sections.

York's analysis of *Two Pages* has had some influence on my own research. As mentioned previously, I have paraphrased York's distinction between 'external repetition' and 'internal repetition': for while his definition of 'external repetition' (ie the practice of repeating a particular figure a number of times before proceeding to the next) is identical to mine, his definition of 'internal repetition' differs from the one I assert. For York, 'internal repetition' is narrowly applied to *consecutive* repetitions of a particular figure's component parts within that figure,[181] whereas I apply it more broadly to the recurrence of a particular figure's component parts, *consecutively or non-consecutively,* within that figure.

II. THE MYTH OF AUDIBLE PROCESS

It was demonstrated in [1.4, II] that the processes at work in minimalism are often not fully and readily audible; for while the overall process might be 'easily audible', the finer details of the process are less easily discerned. And Glass's early music is strong evidence for this claim: York's analysis of *Two Pages* is illuminating precisely because certain aspects of the work's structure elude us when we listen to it; on the reasonable assumption that he listened to the work prior to analysing it, Potter's analytical errors in his commentary *of Music in Contrary Motion* could only have been made if the true

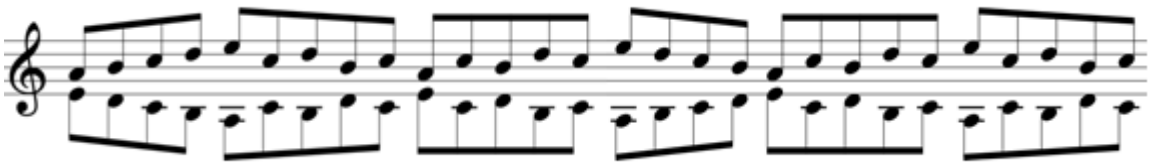
[179] York, p.77
[180] *Ibid*., p.76
[181] *Ibid*. p.64

nature of the structure was aurally obscure; and having been a listener of *Music in Contrary Motion* since 2002 and a performer of it since 2008, I can say that it was only after I analysed the work that I became aware of its structural details – engaging with the work aurally as both a performer and listener did not allow me to access the complete truth as to its structure. Thus more than mere aural engagement with *Music in Contrary Motion* is needed to gain full knowledge of the processes governing its structure, and it is with that in mind that I present my figure-by-figure structural analysis of the work.

III. STRUCTURAL ANALYSIS: FIGURES 1–3

The first half of Figure 1 consists of the 1st basic sub-unit, followed by the 2nd basic sub-unit, followed by an inversion of the 2nd basic sub-unit. The second half of Figure 1 is an inversion of the first (see Ex. 2.6):

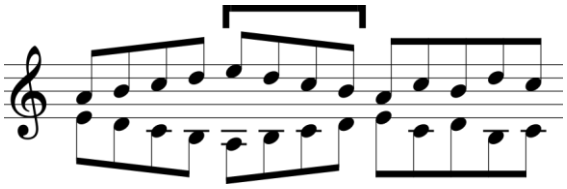
Example 2.6: Figure 1



(In the interests of brevity, from Figure 2 onwards my analysis will consist of an examination of the first half of each figure only; the second half of each figure is an inversion of the first, so any complete analysis of the first half holds, *mutatis mutandis*, for the second half.)

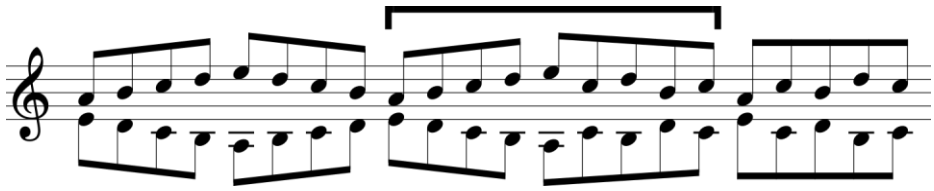
In Figure 2, the second grouping of Figure 1 is replaced by a transposed inversion of the 1st basic sub-unit (see Ex. 2.7). The second-half inversion is altered accordingly.

Example 2.7: Figure 2 (first half, replacement indicated by bracket)



In Figure 3, the two basic sub-units are inserted in between the 2nd and 3rd groupings of Figure 2 (see Ex. 2.8):

Example 2.8: Figure 3 (first half, addition indicated by bracket)



No obvious pattern has yet to be established by Glass's process. Indeed, while the progression from Figures 2 to 3 is made via the kind of additive process that predominates in this work, the earlier progression from Figures 1 to 2 is made by a rare *substitutive* process, with one grouping replacing another. This also turns out to be a *subtractive* process, as the new grouping is shorter in quaver length than the one it replaced.

This is not to say that there is no process strategy at work here. In fact, what Glass is doing from Figures 1 to 3 is proceeding to a point at which the first half of the figures feature both the 1st basic sub-unit followed by its inversion, and the 2nd basic sub-unit followed by its inversion.

IV. OVERVIEW OF THE PROCESS NETWORK BETWEEN FIGURES 4 & 19

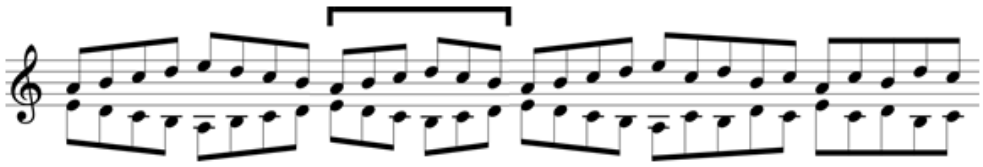
The network of additive processes that occurs from Figures 4 to 19 can be described as follows: three additions of material derived from the 1st basic sub-unit are made at Figures 4 – 6, followed by one addition of material derived from the 2nd basic sub-unit to Figure 7. The 4-figure microstructure at Figures 4 – 7 is repeated three times across three subsequent 4-figure sets (Figures 8 – 11, 12 – 15, and 16 – 19).

For the majority of figures that make up *Music in Contrary Motion,* the two separate sets of material derived from the two basic sub-units do not mix. In addition, the process governing the addition of material derived from one sub-unit is completely distinct from that which governs the addition of material from the other. Consequently, it is possible to examine these two processes separately.

V. ADDITION OF MATERIAL FROM 1ST BASIC SUB-UNIT: FIGURES 4–6

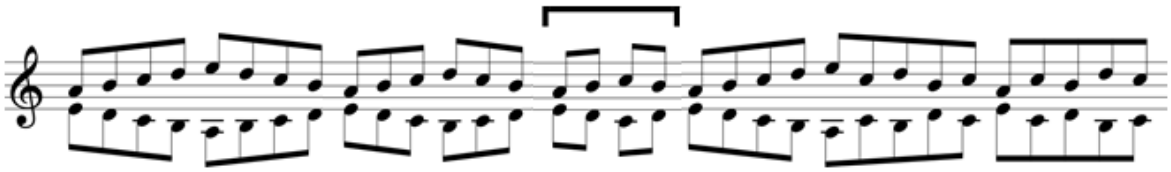
In the first half of Figure 4, two groupings – the first three quavers of the 1st basic sub-unit followed by their inversion – are inserted in between the 2nd and 3rd groupings of Figure 3 (see Ex. 2.9). The second-half inversion is altered accordingly.

Example 2.9: Figure 4 (first half, addition indicated by bracket)



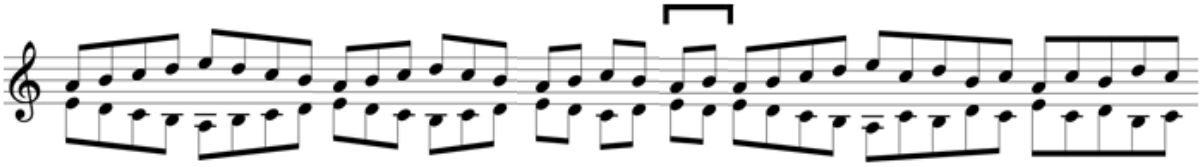
In Figure 5, two groupings – the first two quavers of the 1st basic sub-unit followed by their inversion – are inserted immediately after the two previously added groupings of Figure 4 (see Ex. 2.10):

Example 2.10: Figure 5 (first half, addition indicated by bracket)



In Figure 6, the first two quavers of the 1st basic sub-unit are inserted immediately after the two previously added groupings of Figure 5 (see Ex. 2.11):

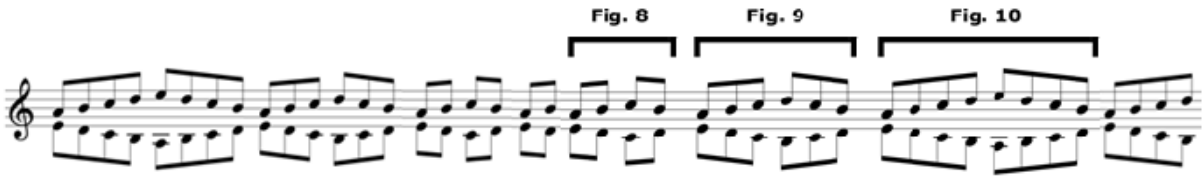
Example 2.11: Figure 6 (first half, addition indicated by bracket)



VI. ADDITION OF MATERIAL FROM 1ST BASIC SUB-UNIT: FIGURES 8–10

The three additions at Figures 8 – 10 combine to construct a retrograde of the 1st basic-sub-unit-derived material that exists at Figure 6. So as one might expect, the additions at Figure 8 are identical to those at Figure 5, the additions at Figure 9 are identical those at Figure 4, and the final additions at Figure 10 are identical to the groupings that commence the 1st-basic-sub-unit-derived material at Figure 3 (see Ex. 2.12):

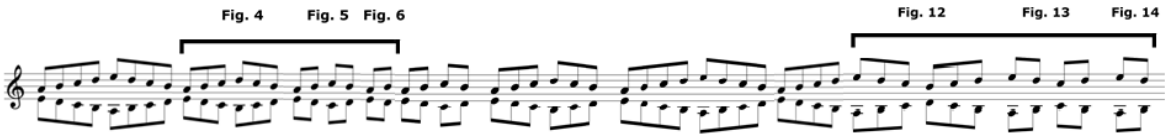
Example 2.12: Figure 10 (first half, 1st-basic-sub-unit-derived-material, additions from Figs. 8 – 10 in brackets)



VII. ADDITION OF MATERIAL FROM 1ST BASIC UNIT: FIGURES 12–14

The three additions at Figures 12 – 14 combine to construct an inversion of those at Figures 4 – 6 (see Ex. 2.13):

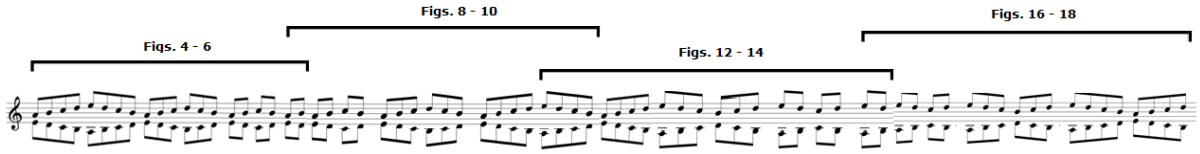
Example 2.13: Figure 14 (first half, 1st-basic-sub-unit-derived-material, additions from Figs. 4 – 6 and 12 – 14 in brackets)



VIII. ADDITION OF MATERIAL FROM 1ST BASIC UNIT: FIGURES 16–18

The three additions at Figures 16 – 18 combine to construct retrograde inversion of the 1st basic sub-unit-derived material that exists at Figure 6, following this material's retrograde (completed at Figure 10) and its inversion (completed at Figure 14 – see Ex. 2.14):

Example 2.14: Figure 18 (first half, 1st-basic-sub-unit-derived-material, material completed at Figs. 4 – 6, 8 – 10, 12 – 14 and 16 – 18 in brackets)

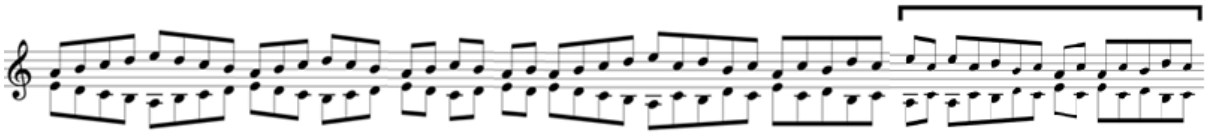


IX. ADDITION OF MATERIAL FROM 2ND BASIC UNIT: FIGURES 7, 11, 15 & 19

The expansion of 2nd-basic-sub-unit-derived material is governed by a single process, which occurs across four non-consecutive figures (Figures 7, 11, 15 and 19). Each of these figures occurs immediately after the completion of one of the 1st basic sub-unit's 3-figure additive processes.

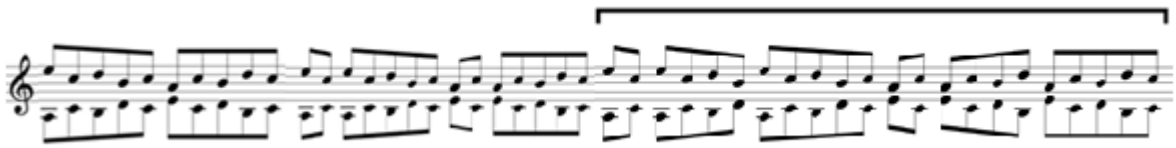
In Figure 7 the work's existing 10-quaver 2nd-basic-sub-unit-derived material is lengthened via the addition of two groups of two quavers, and then that new, longer, 14-quaver passage is placed immediately after the initial 10-quaver material (see Ex. 2.15):

Example 2.15: Figure 7 (first half, addition indicated by bracket)



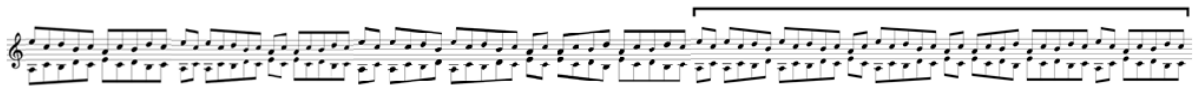
Each subsequent addition in this process constitutes an elongation of the previous addition and is placed immediately after it. At Figure 11, the 14-quaver addition at Figure 7 is lengthened to 22 quavers, via the addition of two 4-quaver groupings (see Ex. 2.16):

Example 2.16: Figure 11 (first half, 2nd-basic-sub-unit-derived material, addition indicated by bracket)



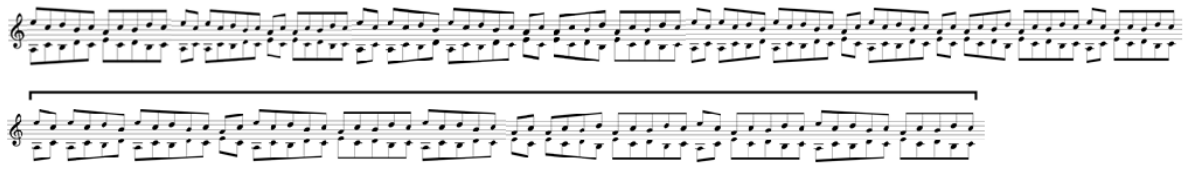
At Figure 15 the 22-quaver addition at Figure 11 is lengthened to 36 quavers, by the addition of two 7-quaver passages (see Ex. 2.17):

Example 2.17: Figure 15 (first half, 2nd-basic-sub-unit-derived material, addition indicated by bracket)



Finally, at Figure 19, the 36-quaver addition at Figure 15 is lengthened to 56 quavers, via the addition of two 10-quaver groups (see Ex. 2.18). Each of these 10-quaver additions is an iteration of 10-quaver 2nd-basic-sub-unit-derived material that existed at Figure 6 (albeit with the first of these additions as an inversion of that material).

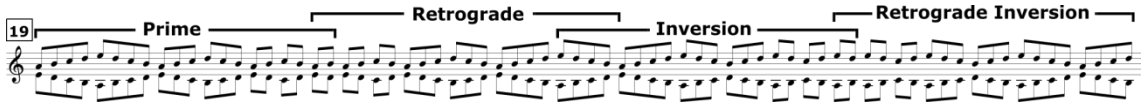
Example 2.18: Figure 19 (first half, 2nd-basic-sub-unit-derived material, addition indicated by bracket)



X. THE 'COMPLETENESS' OF FIGURE 19

It is possible to conceive Figure 19 of *Music in Contrary Motion* as a structural 'final destination' for the network of processes so far employed – the point at which all these processes have run their course and have nowhere left to go. An analysis of Figure 19 can help reinforce this claim as to the figure's 'completeness': of the 61 quaver groupings that make up the first half of Figure 19, groupings 1 – 25 consist of 1st-basic-unit-derived material (the 'prime' is at groupings 1 – 7, its retrograde at 7 – 13, its inversion at 13 – 19, and its retrograde inversion at 19 – 25, see Ex. 2.19):

Example 2.19: Figure 19 (first half, analysis of quaver-groupings 1 – 25)

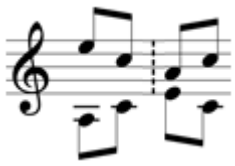


If we relate this analysis to the processes governing the addition of 1st basic-sub-unit-derived material (see Ex.2.14), we can see that, respectively, these four processes (found at Figures 4 – 6, 8 – 10, 12 – 14 and 16 – 18) complete the prime, retrograde, inversion and the retrograde inversion. Thus all options are exhausted, and without the necessary formulae or clues for further development, the network of additive processes governing the 1st-basic-unit-derived material can be considered 'closed' – or 'complete' – at Figure 19.

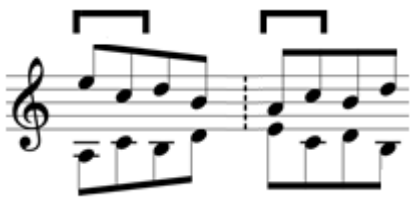
A sense of completeness is also exhibited by groupings 26 – 61 of Figure 19 (those groupings that contain material from the work's 2ndbasic-sub-unit-derived material). As previously mentioned (see [2.5, IX] above), the outcome of the additive process governing Figures 7, 11, 15 and 19 is the complete iteration of both the 10-quaver 2nd-basic-sub-unit-derived material that existed at Figure 6, and its inversion. The sense of 'completeness' is underlined by the fact that the 10-quaver iteration consists of the 'complete' 2nd basic sub-unit itself, followed by its 'complete' inversion.

The construction of the two 10-quaver passages occurs incrementally across Figures 7, 11, 15, and 19. The new material occurring in the additions at these four figures consists of two 2-quaver groupings at Figure 7 (see Ex. 2.20), two 4-quaver groupings at Figure 11 (see Ex. 2.21), two 7-quaver passages at Figure 15 (see Ex. 2.22), and finally the two 10-quaver passages at Figure 19 (see Ex.2.23):

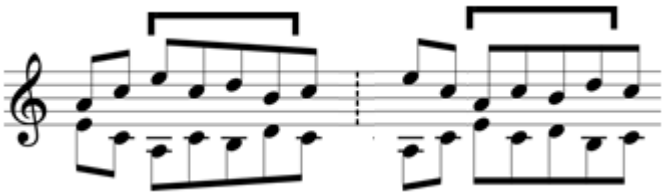
Example 2.20: new material in the addition at Figure 7 (first half)



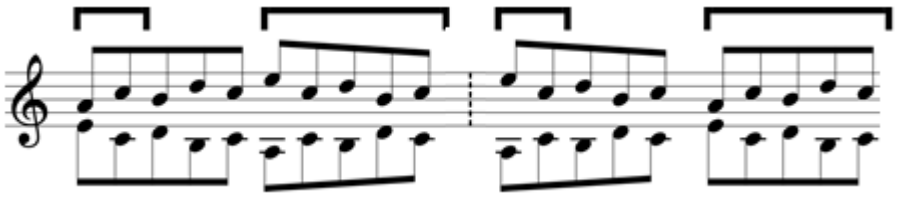
Example 2.21: new material in the addition at Figure 11 (first half, previous instance of new material at Ex. 2.19 indicated by brackets)



Example 2.22: new material in the addition at Figure 15 (first half, previous instance of new material at Ex. 2.20 indicated by brackets)



Example 2.23: new material in the addition at Figure 19 (first half, previous instance of new material at Ex. 2.21 indicated by brackets)



Thus the process governing the addition of 2nd-basic-sub-unit-derived material runs its course at Figure 19 via the complete construction of two instances of the 2nd basic sub-unit paired with its inversion. And without the necessary formulae or clues for further development, the additive process governing the 2nd basic-sub-unit-derived material can also be considered 'closed' – or 'complete' – at Figure 19.

XI. THE FIRST STAGES OF ITERATION: FIGURES 20, 21, 22 AND 23

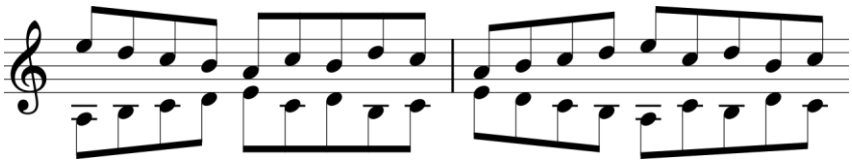
If *Music in Contrary Motion* only went as far as Figure 19, then the 'completeness' of this figure would falsify any claims to the work's open form. However, at Figure 20 the entire network of processes that occurs at Figures 2 – 19 begins to repeat, and this means that claims to the open form of *Music in Contrary Motion* are indeed true.

Such claims are true in two senses. First, the iteration of the network of processes continues for a mere 4 figures (Figures 20 – 23), as opposed to the 18 figures necessary to complete this iteration; so the work has open form in the sense that one could theoretically continue the work until the iteration of the network of processes is completed (up to a hypothetical 'Figure 37'). Second, this first iteration of the network of processes suggests appropriate strategies for its infinite reiteration, and so *Music in*

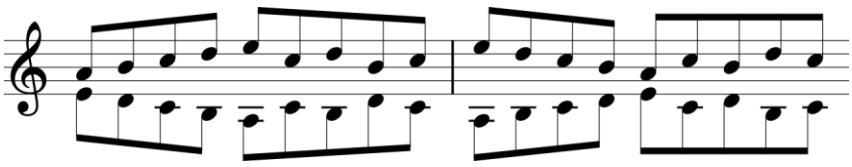
Contrary Motion has open form in a much more significant sense – it is a work that, theoretically, could be continued beyond the score infinitely.

Figure 20 marks the return to the early stages of the process network as there is a resemblance relation between the additions of Figure 20 and those of Figure 3. The two additions in the first half of Figure 20 (see Ex. 2.24) are the same two additions that occur in the whole of Figure 3 (see Ex. 2.25), albeit in reverse order. And given that the inverted second half of Figure 20 will also feature these same two additions, it follows that the additions that occur in Figure 3 occur twice in Figure 20. Thus the iterated network of processes that begins at Figure 20 is a *duplicate* iteration.

Example 2.24: the two additions at Figure 20 (first half)

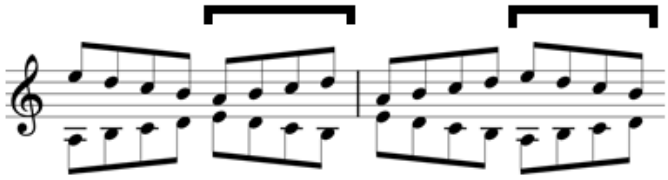


Example 2.25: the two additions at Figure 3 (whole figure)

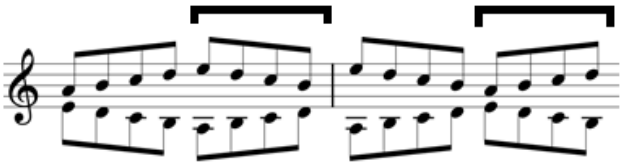


There is also a resemblance relation between the changes at Figure 21 and those at Figure 2: the two 9-quaver segments added to the first half of Figure 20 are each reduced to eight quavers at Figure 21 (see Ex. 2.26) via the replacement of a 5-quaver grouping with a 4-quaver grouping. These replacements are identical to those that occur in the whole of Figure 2 (see Ex. 2.27), albeit in reverse order. And given that the additions that occur in Figure 2 occur twice in Figure 21 (owing to Figure 21's second-half inversion), the duplicate iteration that begins at Figure 20 continues at Figure 21.

Example 2.26: the two replacements at Figure 21 (first half, replacement groupings in brackets)



Example 2.27: the two replacements at Figure 2 (whole figure, replacement groupings in brackets)

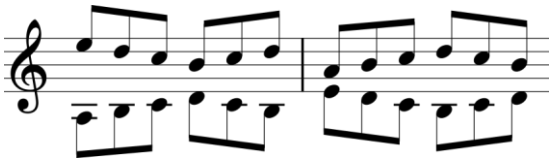


It is worth noting that the duplicate iteration of the network of processes does not start in the same sequence as the initial network, for it is the second figure involved in the iterated network (Figure 21) that corresponds with the first figure involved in the initial network (Figure 2), and vice versa. The reason for this is that Figure 2 features a 'subtractive replacement' applied to Figure 1 (see Ex. 2.7), but it is not possible to commence the iteration at Figure 20 with a similar subtractive replacement applied to Figure 19, as there is nothing in Figure 19 that sufficiently resembles Figure 1, from which to make this subtractive replacement.

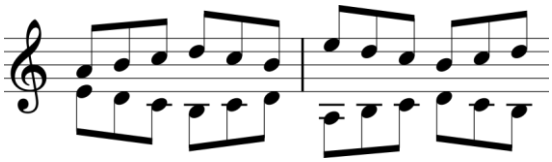
However, the material added at Figure 3 is identical to that material in Figure 1 which is subtractively replaced at Figure 2. Thus it makes sense to start the iteration with a duplicate addition at Figure 20 (in the fashion of the addition at Figure 3), and then perform a duplicate subtractive replacement of this material at Figure 21 (in the fashion of the single replacement at Figure 2), and then continue with the duplicate iteration of the rest of the network of processes in the exact same sequence as the initial network (ie Figure 22 corresponds with Figure 4, Figure 23 corresponds with Figure 5 etc.). In this way Glass can be seen to be iterating every step of the initial network of processes, albeit with the first two steps in reverse order.

And there is indeed a correspondence between the two additions in the first half of Figure 22 (see Ex. 2.28) and those in the whole of Figure 4 (see Ex. 2.29):

Example 2.28: the two additions at Figure 22 (first half)

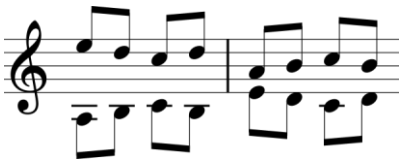


Example 2.29: the two additions at Figure 4 (whole figure)

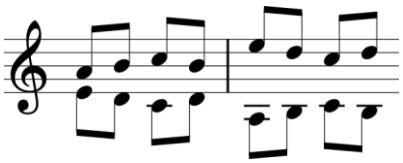


A final correspondence obtains between the two additions in the first half of Figure 23 (see Ex. 2.30) and those that occur in the whole of Figure 5 (see Ex. 2.31):

Example 2.30: the two additions at Figure 23 (first half)



Example 2.31: the two additions at Figure 5 (whole figure)



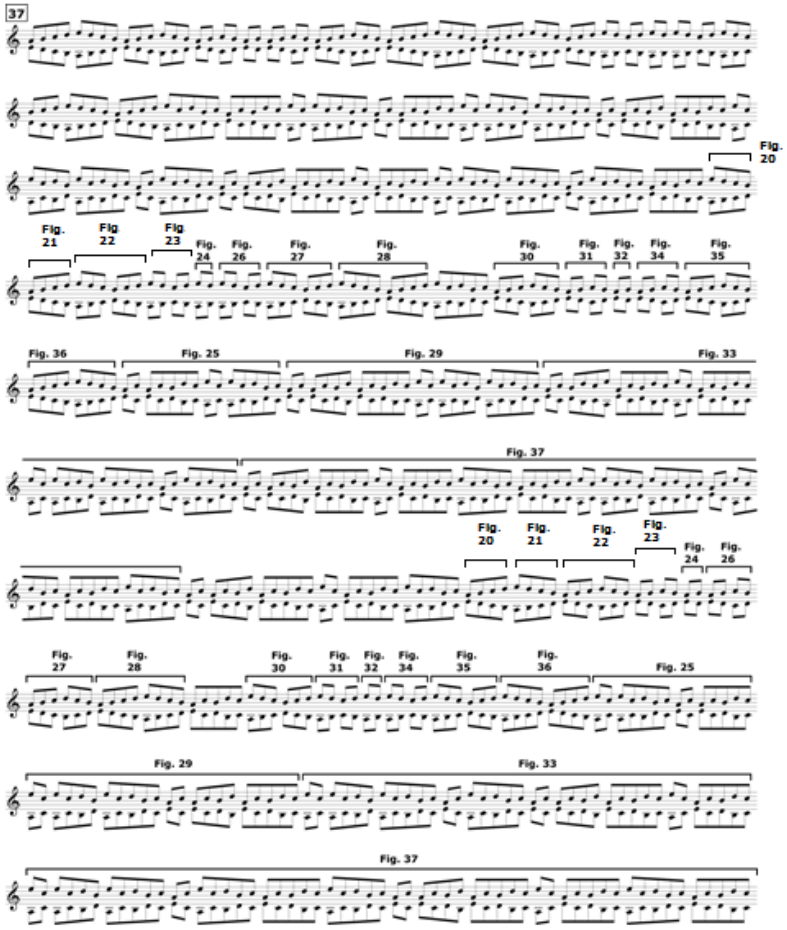
XII. BEYOND THE SCORE: HYPOTHETICAL POSTULATION OF FIGURES 24–37

Once the duplicate iteration of the (mostly additive) processes Figures 2 – 19 is set up by Figures 20 – 23, this iteration can proceed through a hypothetical 'Figures 24 – 37', in the exact same sequence as the initial network of processes does through Figures 6 – 19 (ie the additions at Figure 24 duplicates those at Figure 6, the additions at Figure 25 duplicates those at Figure 7, and so on). This duplicate iteration would reach its

conclusion at a hypothetical 'Figure 37' (corresponding to Figure 19, the 'final destination' of the intial process network).

The possibility of reaching beyond the score to a hypothetical 'Figure 37' can be illustrated by the construction of that very figure (see Ex. 2.32), which indicates the groupings added at preceding figures as the duplicate iteration is completed:

Example 2.32: hypothetical 'Figure 37' of *Music in Contrary Motion* (first half, additions/substitutions at Figures 20 – 37 indicated by brackets)



This construction of 'Figure 37' demonstrates that the duplicate iteration beginning at Figure 20 can be continued beyond the score until its completion, which in turn demonstrates the first sense in which *Music in Contrary Motion* has open form. Furthermore, by copying the sequence and location of the duplicate iteration in relation to the initial process network, a further – *quadruplicate* – iteration could be constructed, and this ever-doubling series of reiterations could continue *ad infinitum*. Thus *Music in Contrary Motion* does indeed have open form in the very significant sense that it could be continued beyond the score – forever.

2.6. APPLICATIONS & RESULTS

I. INTERPRETATIVE ISSUES, NON-ANALYTICAL SOLUTIONS

As a result of the research into instrumentation, dynamics, articulation, tempo, starting point for each figure, and pedal points (see [2.4]), it can plausibly be argued that a performance for solo organ, performed at a constantly loud volume, with a consistent articulation that tends towards *legato*, at a tempo of crotchet = c.200, and with the starting point for each figure as per the score, constitutes the recommended mode of performance for *Music in Contrary Motion*. However, this statement is qualified by the existence of 'permissible interpretative alternatives' concerning dynamic level, instrumentation, pedal points and starting point for each figure. There is also a plurality of permissible approaches to the repetition of figures (see [2.4, VII]), exhibited by the practice endorsed by Philip Glass and Keith Potter (performing ever-decreasing number of repetitions as the figure length increases), and an alternative one endorsed by Steffen Schleiermacher and by myself (preserving the proportionality exhibited in the score from one figure to the next, by performing the work either with no repeats, or with the same number of repeats per figure).

These considerations were for the most part exemplified in my PhD Final Recital performance of *Music in Contrary Motion*. This solo organ rendition of the work proceeded at crotchet = c.180, with the constant dynamic as loud as the technical logistics would permit, with consistent *legato* articulation, and with the starting point of each figure as per the score. The proportionality exhibited in the score from one figure to the next was preserved by my decision to perform the work with no repeats.[182]

II. INTERPRETATIVE ISSUES, ANALYTICAL SOLUTIONS

The demonstration of the work's open form (see [2.5]) also has implications for performance. First, proving the work's open form in turn proves the earlier claim that no one stopping point is the 'true' ending of the work. Second, proving this lack of a 'true' ending amounts to a justification for the validity of multiple stopping points: it is permissible, from an ontological point of view, to end the work at *any* of the three candidates for 'final figure' (Figs. 22 – 24), as each of these figures occurs after the open form – an essential ontological characteristic of the work – is demonstrated by the process network's partial iteration. It would also be permissible to end the work at any

[182]Paul David Kean, 'Philip Glass | Music in Contrary Motion (1969) | Live Performance | Paul David Kean (Organ)' [recorded 28th June 2018], YouTube, 2019 (uploaded 14th October), <https://www.youtube.com/watch?v=8Apr_yg5ahA> [accessed 30th December 2020]

figure beyond these three figures, provided the selected final figure occurred within a valid iteration of the process network.

A favourable consequence of the work's open form (and the valid multiplicity of stopping points thereof), is that it allows for an infinite variety of 'correct' versions of *Music in Contrary Motion*, giving the performer greater freedom and flexibility in terms of staging or programming the work (the multiple permissible approaches to the repetition of figures are an important consideration here).

For instance, one might choose to stage a performance of the work as a kind of sonic installation lasting several hours, in which case one could permissibly generate a score that extended way beyond the published 23 figures, and then treat it to a 'liberal' employment of figure repetition in order to reach a suitably 'maximal' performance duration.

Alternatively one might choose to programme the work in a 45-minute recital alongside other repertoire, in which case one could perform the work only as far as Figure 22 and employ no repetitions whatsoever (indeed, my PhD Final Recital performance of *Music in Contrary Motion* took this form and clocked in at around 12 and a half minutes). But despite their considerable differences in duration, both these versions of *Music in Contrary Motion* would count as ontologically sound representations of the work.

III. PRE-INTERPRETATIVE ISSUES, ANALYTICAL SOLUTIONS

The purpose of the structural analysis presented in [2.6] was to demonstrate the open form of *Music in Contrary Motion*. As such, the analysis is not specifically oriented towards improving performances of the work from a pre-interpretative, 'executive' perspective. However, this analysis can be used as the basis for a performer-oriented analysis of *Music in Contrary Motion*, similar to that of *Music in Fifths* (see Example 1.2 in [1.4, IV]) which, when used as a crib sheet by performers, can serve to address a number of the work's pre-interpretative demands.

My performance-oriented analysis of *Music in Contrary Motion* (see Ex. 2.33) works in the following way: the 23 rows of the analysis represent the first half of the work's 23 figures,[183] with the analysis of 2nd basic-unit-derived material in bold. Regarding the analysis of 1st basic-sub-unit-derived material, each number represents a number of quavers. In most cases, the numbers represent a symmetrical number of quavers that is inverted at the midway point (eg the number '4' will represent a 4-quaver grouping

[183] Performers can read from the beginning of each line once the figure's first half is completed, for the analysis holds, *mutatis mutandis*, for the figure's second-half inversion.

followed by its inversion). There are two exceptions to this: first, the number '4^{1}' represents the (non-symmetrical) 4-quaver 1st basic sub-unit itself (and features the superscript numeral to distinguish it from the symbol '4', which, as previously mentioned, represents a 4-quaver grouping other than the 1st basic sub-unit); second, the italicized numbers '*2*' and '*12*' represent non-symmetrical passages of 2 quavers and 12 quavers respectively.

Example 2.33: *Music in Contrary Motion*, performance-oriented structural analysis[184]

FIG.#	ANALYSIS
1	4^{1} **5**
2	8 **$\underline{5^{1}}$**
3	*12* **5**
4	8 6 4^{1} **5**
5	8 6 4 4^{1} **5**
6	8 6 4 2 4^{1} **5**
7	8 6 4 *2* 4^{1} **5**(+2) **7**
8	8 6 4 *2* 4 4^{1} **5**(+2) **7**
9	8 6 4 *2* 4 6 4^{1} **5**(+2) **7**
10	8 6 4 *2* 4 6 *12* **5**(+2) **7**
11	8 6 4 *2* 4 6 *12* **5**(+2) **7**(+4) **11**
12	8 6 4 *2* 4 6 *12* $\underline{6}$ **5**(+2) **7**(+4) **11**
13	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ **5**(+2) **7**(+4) **11**
14	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ $\underline{2}$ **5**(+2) **7**(+4) **11**
15	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ $\underline{2}$ **5**(+2) **7**(+4) **11**(+7) **18**
16	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ $\underline{2}$ $\underline{4}$ **5**(+2) **7**(+4) **11**(+7) **18**
17	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ $\underline{2}$ $\underline{4}$ $\underline{6}$ **5**(+2) **7**(+4) **11**(+7) **18**
18	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ $\underline{2}$ $\underline{4}$ $\underline{6}$ $\underline{8}$ **5**(+2) **7**(+4) **11**(+7) **18**
19	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ $\underline{2}$ $\underline{4}$ $\underline{6}$ $\underline{8}$ **5**(+2) **7**(+4) **11**(+7) **18**(+10) **28**
20	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ $\underline{2}$ $\underline{4}$ $\underline{6}$ $\underline{8}$ **5**(+2) **7**(+4) **11**(+7) **18**(+10 [$\underline{4^{1}}$ **5^{1}**])**28**
21	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ $\underline{2}$ $\underline{4}$ $\underline{6}$ $\underline{8}$ **5**(+2) **7**(+4) **11**(+7) **18**(+10 [$\underline{8}$])**28**
22	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ $\underline{2}$ $\underline{4}$ $\underline{6}$ $\underline{8}$ **5**(+2) **7**(+4) **11**(+7) **18**(+10 [$\underline{8}$ $\underline{6}$])**28**
23	8 6 4 *2* 4 6 *12* $\underline{6}$ $\underline{4}$ $\underline{2}$ $\underline{4}$ $\underline{6}$ $\underline{8}$ **5**(+2) **7**(+4) **11**(+7) **18**(+10 [$\underline{8}$ $\underline{6}$ $\underline{4}$])**28**

[184] This analysis is an attempt to combine analytical rigour (for the purposes of this case study) with pragmatic value (for the purposes of performance). However, performers intending to use this analysis as the basis for a performance crib sheet may wish to simplify things further, and commit certain indications (such as the underlined inversion figures) to memory.

Regarding the analysis of 2nd basic-sub-unit-derived material, the numbers this time represent half the number of quavers in a symmetrical passage (eg '5' represents a 10-quaver passage, which consists of a 5-quaver passage followed by its inversion) The only exception to this is the number '5^1', which represents the (non-symmetrical) 5-quaver 2nd basic sub-unit itself (and features the superscript numeral to distinguish it from the symbol '5', which, as previously mentioned, represents a 10-quaver grouping, not a 5-quaver grouping). Also, in the interests of clarity, the additions that feature in the progression from (one half of) a symmetrical passage to the next are quantitatively represented in brackets.

In all cases, numbers that are underlined represent inversions of the passages that correspond to that number (eg '6' represents an inversion of the passage represented by '6'). Lastly, the iteration of the network of processes is represented in square brackets at Figures 21, 22 and 23.

This performance-oriented analysis of *Music in Contrary Motion* can potentially improve the technical execution of the work in a number of ways. For one, the entire analysis, like that of *Music in Fifths*, fits onto one side of A4 paper, allowing performers to take in whole (halves of) figures at a glance, freeing them from the shackles of sight-reading and the aforementioned negative consequences thereof (see [1.4, IV] and [2.2, II]).

Furthermore, if we combine this notational freedom with our understanding of the work as exhibiting a network of processes (as acquired from [2.5]), then we potentially take a huge step towards solving the Glass-specific challenge of maintaining accuracy in the face of a musical figure's seemingly arbitrary internal repetition. It is my contention that this challenge is best met by possessing a thorough knowledge of the processes that govern the work in question. Structurally, Glass's music is comparable to the binary numeral system in mathematics: without knowledge of the process at work, the steady iteration of identical figures can appear random and confusing. But with a comprehensive awareness of the process, the internal logic governing each string of iterated figures will become clear, as will each figure's place in the larger process governing the entire work. These seemingly arbitrary, repeated instances of musical 'vocabulary' are shown to be governed by a unifying 'grammar'. Thus words become sentences, sentences become paragraphs, and performers of Glass's music will be able to perform these phrases with a far greater ease and flow, lowering the likelihood of any Glass-specific 'clanger factor', and even increasing the possibility of memorization.

The above considerations are demonstrated by my progress as a performer of *Music in Contrary Motion* over the years. Since my initial notation-bound and technically flawed

encounter (see the Piano Circus ensemble arrangement of the work described at [2.2, I]), I have performed this work a further three times, and as a solo organ piece on each occasion. The first two of these (on the 12th March 2013 and the 23rd March 2017 respectively)[185] both exhibited a higher degree of technical proficiency, and were given with reference only to score fragments or crib sheets. My most recent performance – as part of my PhD Final Recital programme – was given entirely from memory, and demonstrated a constantly high quality of technical execution (apart from, notably, a small memory lapse towards the end of Figure 13, and a premature dominant pedal in Figure 18).[186] Indeed, I do not consider it a coincidence that my most recent rendition of *Music in Contrary Motion*, which occurred after I had constructed my analysis of the work, was performed from memory; for my knowledge of the work's processes meant that I only had to memorize the few *formulae for addition*, instead of the many individual additions. And with fewer entities to memorize, the prospect of performing the work from memory was not only made possible but was ultimately actualized. So although the purpose of my analysis was not to achieve memorization, but to demonstrate open form, I can say that the attainment of the former was a positive byproduct of my research. As was the case with my partial memorization of *Music in Fifths* (see [1.4, IV]), complete freedom from the score of *Music in Contrary Motion* enabled me to devote all my attention to the correct execution (in sound) of the work's figures, which in turn contributed to an increase in the performance quality of the work as a whole.

[185] Both performances took place at Deptford Town Hall, Goldsmiths, University of London
[186] Kean, 14th October 2019, <https://www.youtube.com/watch?v=8Apr_yg5ahA>

2.7 IMPLICATIONS & CONCLUSIONS

I. CASE STUDY #1: IMPLICATIONS FOR PERFORMANCE

The results of this chapter are potentially wide-ranging, in that the solutions to performance issues posed by *Music in Contrary Motion* can by extension be applied to other works by Glass. As mentioned in [2.1, I], *Music in Contrary Motion* is one of a number of published works also written in 1969, and the scores of the other works in this set – *Two Pages*, *Music in Fifths* and *Music in Similar Motion* – exhibit the exact same indeterminacy as that of *Music in Contrary Motion* in terms of instrumentation, dynamics, tempo and figure repetition. This means that the solutions to these issues as exhibited by *Music in Contrary Motion* (see [2.4]) can be applied, *mutatis mutandis*, to *Two Pages, Music in Fifths,* and *Music in Similar Motion.*

Also, the Glass-specific challenge of maintaining accuracy in the face of seemingly arbitrary internal repetition can potentially be met in the same fashion for these other 1969 works as it was for *Music in Contrary Motion* – by way of a detailed structural analysis of each work. Indeed, one possible consequence of such analyses could be the discovery that any of the other 1969 works also exhibits 'open form'; for if open form was discovered to be a feature of any of these works, then the validity of multiple stopping points would hold for the work in question.[187] Consequently, an infinite variety of 'correct' versions of that particular work would also be allowed, again giving performers greater freedom and flexibility in terms of staging or programming.

A further multiplicity of valid performance options for these other 1969 works would result if their interpretative issues – like those of *Music in Contrary Motion* – were also met with a plurality of arguably permissible solutions. For instance, I stated previously that I perform *Two Pages* as a two-hand solo keyboard rendition of the single-line work (see [1.3, VII]) with the right hand playing the score as written, and the left hand playing the score transposed down the octave. I can plausibly justify this decision with reference to the work's 'open instrumentation', and notable previous instances of appropriate octave-doubling (such as the Glass/Riesman recording for electric organ and piano).[188] To give another example, my PhD Final Recital performance of *Music in Fifths*

[187] Previous material in this chapter suggest that both *Two Pages* and *Music in Fifths* are prime candidates for exhibiting open form: in the case of the former, it was stated in [2.5, I] that the fifth and final part of *Two Pages* was an inversion of the first, suggesting that the entire process network at parts I – IV could proceed beyond the score (in inversion) from part V (and although York does not explicitly affirm the open form of *Two* Pages, nothing in his analysis prevents it from being inferred); in the case of the latter, a closer inspection of the analysis at Ex. 1.2 (see [1.4, IV] reveals a resemblance between the additions at the final three figures of *Music in Fifths* (Figs. 33 – 35), and those from Figure 15, suggesting that a version of the process that begins at Figure 15 is being iterated from Fig. 33 and could be continued beyond the score at least until its completion.
[188] Philip Glass, 'Two Pages' (Philip Glass, electric organ; Michael Riesman, piano), on Elektra Nonesuch 9 79326–2 (1994)/Shandar 83.515 (1975)

was performed as a solo piano piece, with the upper line transposed down two octaves, and the lower line transposed down three octaves.[189] In justifying these liberal choices, I would contend that the 'open instrumentation' of *Music in Fifths* implies that it is permissible to play the work as a solo piano piece, and that my chosen instrumentation commits me to interpreting and performing the work in a way that exploits that instrument's capabilities. Hence my transposition strategy is defensible because it makes fuller use of both the piano's gamut of pitches and its capacity for resonance. I would also state that abandoning the titular interval, and playing the two-part similar motion a twelfth apart in the low register, is in keeping with the spirit of Glass's music, in the sense that the combination of the compound fifth and the low register generates strong psychoacoustic effects, which Glass has previously stated are part of 'the content of [his] music'.[190][191]

II. CHAPTER CONCLUSION

The arguments and discoveries contained in this chapter could potentially foster two positive outcomes: first, by making known the plurality of permissible options available to performers of Glass's early works, there is likely to be a much-needed increase in the quantity of their performances,[192] as well as a considerable diversity in form and content exhibited by these performance as a whole. Second, any dissemination of my analytical findings, and any implementation by other performers of my recommendations, is likely to improve the performance quality of *Music in Contrary Motion* and its companion works.

[189] Paul David Kean, 'Philip Glass | Music in Fifths (1969) | Live Performance | Paul David Kean (Piano)' [recorded 28th June 2018], YouTube, 2019 (uploaded 15th October), <https://www.youtube.com/watch?v=saqtCLcDW5c> [accessed 30th December 2020]
[190] Kostelanetz, p.112
[191] It might also be objected that the low twelfth interval obscures the audibility of the process at work, although this objection could be countered with reference to Glass's statement that he became 'less interested in the purity of form than in the psychoacoustical experiences that happen while listening to the music' (Kostelanetz, p.111), and so my deviation is arguably in keeping with Glass's subsequent thinking and defensible as a result.
[192] The single Piano Circus performance of a Philip Glass composition during my ten years with the group (ie their performance of *Music in Contrary Motion* as described in [2.2, I]) speaks to infrequent inclusion of his early music on concert programmes.

3

STEVE REICH

3.1. CASE STUDY #2: *PIANO PHASE*

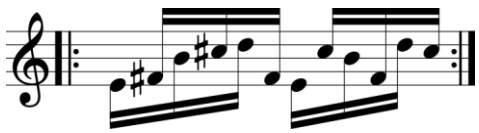
I. BASIC ANALYSIS

Composed in 1967, *Piano Phase* features the 'phasing' process which Reich first employed in his tape compositions *It's Gonna Rain* (1965) and *Come Out* (1966). This phasing technique – an example of the gradual processes employed in minimalism and almost exclusively associated with Reich – requires performers of (usually) identical patterns to 'gradually [move] out of synchronization with each other, creating rhythmic canons'.[193]

Piano Phase belongs to a set of compositions which all feature the execution of the gradual phase-shifting process by one or more live performers. It is the third of Reich's works to combine the phase-shifting process with some aspect of live performance – after *Melodica* (1966) and *Reed Phase* (1967) – and the first of his phase works to be realized solely by live performers. As such, *Piano Phase* paved the way for his remaining gradual-phase pieces – *Violin Phase* (1967), *Phase Patterns* (1970) and *Drumming* (1971) – all of which are fully realizable via live performance

The first of the work's three parts features a 12-semiquaver pattern of five pitch classes (E, F♯, B, C♯ and D) which is played by both pianists (see Ex.3.1). The 'moving pattern' pianist gradually increases the tempo against the 'static pattern' pianist until the downbeat of the moving pattern is one semiquaver ahead of – or 'out of phase' with – the static pattern's downbeat, whereupon it locks into the tempo of the static pattern. The moving pattern pianist then repeats this phasing process until all twelve semiquavers of their pattern have been matched against the static pattern's downbeat.

Example 3.1: *Piano Phase*, pattern from Part One

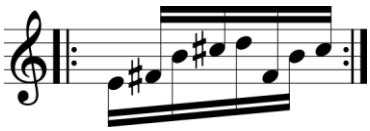


Part Two features two 8-semiquaver patterns: the first (played by the static pattern pianist) consists of the same five pitch classes as the pattern from Part One (see Ex.3.2); the second (played by the moving pattern pianist) consists of four pitch classes (A, B, D and E – see Ex.3.3). As in Part One, the moving pattern is gradually phased

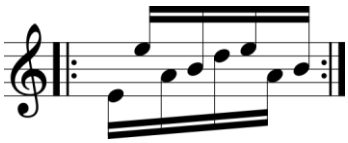
[193] Hartenberger, 2016, p.xxi

against the static pattern until all of its eight semiquavers have been matched against the static pattern's downbeat.

Example 3.2: *Piano Phase*, 1st pattern from Part Two

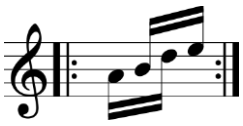


Example 3.3: *Piano Phase*, 2nd pattern from Part Two



Part Three features one 4-semiquaver pattern, composed of the same four pitch classes as Part Two's moving pattern, played by both pianists (see Ex.3.4). Again, the moving pattern is phased against the static pattern until all of its semiquavers have been matched against the static pattern's downbeat.

Example 3.4: *Piano Phase*, pattern from Part Three



II. LITERATURE REVIEW

Unlike case study #1, *Piano Phase* is well-represented in the available academic literature on minimalism. All of the commentaries generally relevant to minimalism which have been cited so far in this thesis (ie those provided by Mertens, Schwarz, Ross, Strickland and Potter) make some level of substantive biographical or analytical reference to the work.[194] In addition, the Hillier-edited collection of Reich's own writings features a chapter on *Piano Phase*.

[194] Potter's text contains extensive analytical information on *Piano Phase*. This information will be discussed in a separate literature review at [3.4, II] alongside other densely analytical sources.

Mertens describes the work's juxtaposition of moving patterns with static patterns as typifying the 'dualism of stasis and movement that is characteristic of repetitive music', In so doing, Mertens alludes to minimalism's 'fast-yet-slow' structural and textural trope as described by Fink in the previous chapter (see [2.4, V]). He also states that 'each time a new [phasing] cycle begins the basic [unit] is altered',[195] which points to the motivic overlap that occurs between the three phasing operations (ie Part Two's 1st Basic Unit is a variant of Part One's Basic Unit, and Part Three's Basic Unit is a variant of Part Two's 2nd Basic Unit – see [3.1, I] above).

Schwarz claims that the phasing process employed in the work 'always remains audible', and he also states that *Piano Phase* demonstrates how Reich's minimalism 'achieved a systematization worthy of serialism' under his intellectually rigorous compositional approach.[196] Alex Ross makes some pertinent comments regarding the harmony and tonality of *Piano Phase*: he conceives the pitch classes employed as 'the first six notes of the A-major scale', and while he claims that the patterns and configurations of Part One 'suggest the key of B minor', he also claims that the added A in Part Two has the effect of 'nudging the harmony toward A major.'[197]

From the writings of Potter, Strickland and Reich it is possible to construct a coherent narrative on the origins of *Piano Phase.* The work's composition initially involved a 'transitional process of combining live performance and tape'. Practically speaking, this transitional stage was necessary simply because Reich 'didn't have two pianos, nor did [his duo partner] Arthur Murphy'.[198] Reich began by 'recording and tape-looping one piano part', and then both Reich and Murphy 'began to practice with the tape rather than with each other'. [199] Rehearsing separately against tape loops allowed each player 'to judge his own accuracy as a performer, and thus also to estimate the potential of live phasing.'[200] It was only after finally rehearsing the work together on two pianos (the night before its premiere) that Reich and Murphy 'found, to our delight, that we could perform this process without mechanical aid of any kind'.[201]

[195] Mertens, p.49
[196] Schwarz, 1996, p.66
[197] Ross, p.545
[198] Potter, 2000, p.182
[199] Strickland, p.197.
[200] Potter, 2000, p.182.
[201] Reich ed. Hiller, 2002 [1967], p.24

III. *PIANO PHASE* AS MINIMALISM

Piano Phase is a paradigmatic example of process-based minimalist music, exhibiting many of its salient characteristics as listed in [1.2, II]. The work exhibits minimization or reduction, in terms of the mere six pitch classes employed (E, F♯, A, B, C♯, D). The work also exhibits numerous examples of minimalism's static means: most notably, as a gradual-phase work *Piano Phase* consists of a 'static' component with an ostensibly unchanging tempo, against which a 'moving' part gradually shifts out of phase. The static part provides an apparently fixed foundational tempo over which the periodically changing tempi of the moving parts are superimposed.

The primary static means – the 'musical continuum' – manifests exclusively in *Piano Phase* as repetition. Reich's employment of repetition is such that, while each phasing operation exhibits a certain variety in its differently-configured individual parts from one figure to the next, the individual parts themselves are unchanging. For instance, Part Two exhibits eight different figure configurations in its 9-figure phasing operation (see [3.4, IV]), yet the patterns executed by players 1 and 2 remain constant.

Piano Phase exhibits the 'formal rigour' which typifies the process-based variety of minimalism, and which is demonstrated by the work's three gradual phase-shifting operations, each one audibly played out via the static means of repetition. These processes are 'audible' according to the understanding of audibility as described in [1.4, II], in that the sonic events that make up the process are always aurally available to the listener, even if not always discerned. The graduality of these processes gives *Piano Phase* a 'maximal' duration typical of process-based minimalism: Reich indicates in the score that the duration of performance 'should be about 20 minutes',[202] which is significant given the work's reduced musical means.

Piano Phase also exhibits psychoacoustic effects, in terms of the hocketed melodic fragments and the metric ambiguities implied by the phased material's various canonic configurations. These features are 'psychoacoustic' because they often involve an act of perceptual will on the part of the listener in order to be heard. Finally, *Piano Phase* is a paradigmatic example of minimalist keyboard music, as its performers are required to execute a strict 'left-right-left-right' alternation of the hands, typifying the percussive, vertical keyboard-playing technique prominent in minimalist keyboard music.

So if *Piano Phase* represents the paradigm of process-based, keyboard-oriented minimalism, then it is reasonable to expect its performers to face challenges typically associated with this music. These challenges will be discussed in the next section.

[202] Steve Reich, 'Directions for Performance', in *Piano Phase* (London: Universal Edition, 1980 [1967]), p.1

3.2 *PIANO PHASE*: PERFORMANCE CHALLENGES

I. PRE-INTERPRETATIVE DIFFICULTIES

Because *Piano Phase* is a typical example of process-based minimalism, it follows that renditions of this work can frequently fail to meet certain pre-interpretative performance requirements, even when performed by experienced practitioners of minimalism (see [1.3, I]). On the 18th May 2014 I witnessed a high-profile yet less-than-perfect live performance of the work. The two-piano concert at London's Milton Court was given by Timo Andres and Dave Kaplan and featured a performance of *Piano Phase*. I was expecting an accomplished rendition of the work, as Andres and Kaplan are considerably experienced in performing minimalist two-piano repertoire. Andres had even stated prior to the concert that *Piano Phase* was one of his 'favorite pieces ever', so I hoped that this enthusiasm would contribute to a high-quality performance.[203] However, the duo's gradual-phasing operation went 'too far' on numerous occasions – whole figures were inadvertently phased through and missed out. So instead of giving the performance I had expected, Andres and Kaplan's rendition of *Piano Phase* failed to meet a crucial pre-interpretative requirement (namely, the reproduction of the score's notational content), which in turn had a negative impact on the quality of their performance.

My own performing career is a source of evidence for the challenges that *Piano Phase* presents to performers. The 2-pianos 2-hands performance that I gave at Goldsmiths on the 3rd October 2016[204] demonstrates the opposite pitfall to that to the 'phasing too far' exhibited by the Andres/Kaplan performance – that of 'not phasing far enough'. In Part One, while attempting to phase from Figure 5 to Figure 6, I gradually increased the tempo of the moving pattern, and the de-synchronization persisted for approximately 7 repetitions over around ten seconds, only for the tempo to lock back in at Figure 5's configuration. I had reverted to the place I was trying to phase away from, and only succeeded in gradually phasing to Figure 6 at the second attempt.

The numerous commercial recordings of *Piano Phase* serve as an additional source of evidence for the work's performance challenges: both the 1987 Double Edge recording (performed by Edmund Niemann and Nurit Tilles)[205] and the 1999 Ensemble Avantgarde recording (performed by Josef Christof and Steffen Schleiermacher)[206] demonstrate a tendency to lock in rather abruptly to the upcoming figure following an initial period of

[203] Timo Andres, 'Past Events 2013/14 season', <http://www.andres.com/?revid=5641&s=1&campaign=3064> [accessed 21st December 2019]
[204] Kean, 30th December 2016, <https://www.youtube.com/watch?v=sCKwbDcT10w>
[205] Steve Reich, *Early Works* (featuring *Piano Phase* – Edmund Niemann and Nurit Tilles, pianos), Elektra Nonesuch 9 79169–2 (CD, 1987)
[206] Steve Reich/Ensemble Avantgarde, *Phase Patterns/Pendulum Music/Piano Phase* (Josef Christof and Steffen Schleiermacher, pianos) */Four Organs*, WERGO 6630–2 (CD, 1999)

gradual phasing away from the previous one.[207] The Double Edge also exhibits instances of 'not phasing far enough' (most notably when phasing from Figures 9 to 10 in Part One). Far more curious an anomaly in this latter recording is the fact that, in Part Two, Figures 18 to 24 are phased through in *reverse order.* It is unclear whether this happens because the static pattern pianist (deliberately or accidentally) became the accelerating pattern pianist for Part Two only, or because the moving pattern pianist (accidentally or deliberately) achieved the various phased reconfigurations by *decelerating* for the entire piece.[208] Either way, the outcome is a rendition of *Piano Phase* in which the figures of Part Two are executed in the wrong sequence, and in the absence of any awareness or endorsement from Reich himself, this arguably amounts to a contravention of the work's pre-interpretative requirements.

II. GENERAL CHALLENGES ENCOUNTERED

Because *Piano Phase* exhibits many of minimalism's salient characteristics, its performers are likely to encounter the general pre-interpretative challenges (as described in [1.3]) which these salient characteristics produce: Hartenberger describes the physical challenge encountered when performing Reich's *Clapping Music* (1972), although he views this work as 'providing a blueprint for performance practice in the music of Steve Reich' more generally.[209] This means that statements about the physical challenge presented by *Clapping Music* can be applied, *mutatis mutandis*, to *Piano Phase.* For instance, Hartenberger states that 'the endurance necessary to play *Clapping Music*' partly consisted of ways with which to 'cope with the stress of the repeated clapping movements',[210] which is applicable to *Piano Phase* if one instead considers methods with which to cope with the repeated finger, hand and arm movements at the keyboard. Hartenberger also refers to the static means of unchanging dynamics and maximal duration as aspects of the physical challenge involved. Performers of *Clapping Music* – and, by extension, Reich's music generally – must develop ways 'to continue playing at a consistent volume for a sustained period of time'.[211]

The mental challenge presented by *Piano Phase* is a function of both the extreme repetition and maximal duration which generates this challenge in minimalism generally, and the particular way in which Reich employs repetition. It was stated in [3.1, III] that while the two-part configurations exhibit considerable variety, the individual parts do

[207] This difficulty is discussed further in [3.5, II].
[208] Either alternative would produce a reverse-order rendition of Part Two. Incidentally, it is worth noting that if the moving pattern pianist opted for an overall strategy of deceleration, the figure order of Parts One and Three would be preserved as they are palindromic – see [3.4, III and V].
[209] Russell Hartenberger, '*Clapping Music*: a performer's perspective', in *The Ashgate Research Companion to Minimalist and Postminimalist Music*, ed. by Kyle Gann, Keith Potter & Pwyll ap Siôn (Aldershot: Ashgate, 2013), 371-379 (p.379)
[210] *Ibid*.
[211] *Ibid*.

not. For instance, the static pattern pianist plays the same 12-semiquaver pattern for the first 15 figures of the 32-figure work, a procedure that usually takes around ten minutes. So the challenge, in Hartenberger's words, is to 'play the patterns for extended periods of time while not allowing the repetition to lull [one's] mind into a somnolent state'.[212] Otherwise, a lapse of concentration is likely to produce errors in pitch, pulse or rhythm, or the improper execution of the phasing operation.

When it comes to minimalism's general technical challenge of note accuracy, *Piano Phase* is prone to being a victim of the 'clanger factor', given its extreme repetition, maximal duration and 'static ends'. Although the work's motifs are not technically difficult in isolation (Reich states that they are simple enough to 'be learned and memorized in several minutes'),[213] the constant execution of these patterns for long durations is a fertile breeding ground for technical errors, especially if the preceding physical and mental challenges are not met. A mistake in a repeating pattern can both upset the established sonic stasis, and inflict a violent aural blow on the listener (given how accustomed they are to hearing the pattern played correctly). Thus for *Piano Phase*, like for minimalism generally, the bar for note accuracy is set extremely high.

These general physical, mental and technical pre-interpretative performance challenges that apply to *Piano Phase* can be addressed via the non-analytical solutions that are presented in [1.3, III], [1.3, V] and [1.3, VII] respectively. However, both aspects of the solution to minimalism's aural challenge (active listening and psychoacoustic awareness – see [1.3, IX]) arise in a more particular context, and are best discussed with reference to the most notable Reich-specific challenge exhibited by *Piano Phase* – the gradual phase-shifting technique. Active listening and psychoacoustic awareness are the skills primarily required to execute the phasing process successfully, although the active listening necessary for the gradual metric de-synchronization/canonic reconfiguration of musical patterns also entails that a certain mental challenge is met. According to Strickland, Reich discovered that 'the intense concentration necessary for the fine calibration' of his moving pattern's 'tempic separation' from the static pattern 'was difficult to achieve and satisfactorily approximated only when he literally closed his eyes to avoid distraction'.[214] It is this dual demand on the performer's mental and aural capacities that Reich refers to when he describes the psychological state required for phasing as 'total sensuous intellectual involvement.'[215] A detailed examination of the various challenges presented by gradual phasing can be found in the next section.

[212] Hartenberger, 2016, p.136
[213] Reich ed. Hiller, 2002 [1967], p.24
[214] Strickland, p.197
[215] Reich ed. Hiller, 2002 [1967], p.24

3.3. THE CHALLENGE OF PHASING

I. PREAMBLE

The gradual phase-shifting process can be regarded as a 'technique' both compositionally (ie as a structural device discovered 'when Reich attempted to synchronize tape loops'),[216] and from a performer's perspective (the execution of which amounts to a 'technically challenging process').[217] However, phasing is a performance technique that is best described in terms of the aural and mental challenges it presents (see 3.2, II]), rather than any conventional understanding of 'technique' as the physical execution of notes.[218] That said, gradual phasing remains a pre-interpretative performance challenge, which is specifically associated with Reich's music; and as per 'analysis/performance scenario #1' (see Introduction), this section will examine some of its non-analytical solutions.

II. PHASING DEFINED

As mentioned in [3.1, I], *Piano Phase* is one of four gradual-phase works by Reich that are fully realizable via live performance (alongside *Violin Phase*, *Phase Patterns* and *Drumming*). Each of these works features the gradual de-synchronization/reconfiguration of motivic patterns, and it is often assumed that the gradual aspect of this process is what we refer to when we talk of 'phasing'. But it is the reconfiguration itself that constitutes the phasing in Reich's music, not the gradual means of achieving it. As Reich understands it, phasing is the 'end result' of a 'pattern played against itself but one or more beats out of phase', and whereas in works such as *Piano Phase* this end result is indeed achieved via 'slow shifts in phase', his later works such as *Six Pianos* achieve the phasing result either by way of a sudden shift in phase, or by gradually constructing an out–of–phase configuration via 'a percussive build-up of beats in place of rests'.[219]

The liner notes to the 1990 Piano Circus recording of *Six Pianos* corroborate this, defining phasing (in terms similar to Reich's 'end result') merely as when 'simple rhythmic events are superimposed upon one another with a degree of relative displacement'. A distinction is made between the phasing in Reich's early work (in which 'the phase shifting was achieved by the performers playing identical or near-identical

[216] Hartenberger, 2016, p.107
[217] *Ibid*., p.97
[218] The technical demands of *Piano Phase* from a conventional note-execution perspective are not particularly high.
[219] Steve Reich, 'Six Pianos' [1973], in Steve Reich, ed. by Paul Hillier, *Writings on Music 1965 – 2000* (Oxford: Oxford University Press, 2002), 73-75 (p.73)

lines and then deliberately moving slightly apart in tempo') and that of his later work (in which build-up patterns achieve phasing by 'introducing a new phase fully-formed, so that it only gradually reveals itself to be a displaced copy of the original rhythmic structure').[220] Crucially though, both these processes are still regarded as instances of phasing.

The definition of phasing as the downbeat-displaced reconfiguration of motivic patterns gives urgency to Keith Potter's coining of the term 'fuzzy transitions',[221] which he uses to refer to the de-synchronized sections in between the phased reconfigurations. My subsequent adoption of this term allows me to refer to the gradual aspect of phase shifting without employment of the term 'phasing', which will hopefully avoid any confusion between the 'end' of phasing (displaced motivic reconfiguration) and its gradual 'means'.

III. TWO ASPECTS OF THE PHASING CHALLENGE

The first aspect demonstrates the 'active listening' dimension of the bipartite aural challenge of phasing (see [3.2, II]), and relates to the gradual dimension of the process: performers of *Piano Phase* must actively and carefully listen 'in order to hear if you've moved one beat ahead, or if you've moved two by mistake, or if you've tried to move ahead but have instead drifted back to where you started.'[222] Gradual phasing demands of its performers the acute aural ability to discern minute yet significant metrical details, perception of which is crucial to a successful performance of the work.

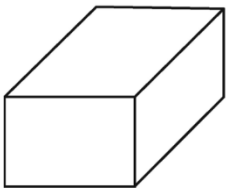
The second aspect demonstrates the 'psychoacoustic awareness' dimension of phasing's aural challenge (again, see [3.2, II]), and relates to the canonic reconfigurations of the phased figures. Often these composite patterns exhibit interesting harmonic, melodic and metric characteristics. For instance, the metrical ambiguity exhibited by some figures of *Piano Phase* are such that there is nothing inherent in the composite pattern determining that it should be heard in one particular time signature as opposed to another.

Regarding this phenomenon, Brian Dennis states that as with 'a flat drawing of a cube, one can oscillate between two separate "views"'.[223] This 'cube' metaphor bears striking resemblance to an illustration Wittgenstein employs (see Ex. 3.5) to convey his relevant concept of 'seeing': 'we can [...] *see* the illustration now as one thing now as another. —

[220] Piano Circus, 'Liner notes', *Steve Reich Six Pianos/Terry Riley In C*, Decca Argo 430 380–2 (CD, 1990)
[221] Potter, 2000, p.180
[222] Reich ed. Hiller 2002 [1967], p.24
[223] Brian Dennis, 'Repetitive and Systemic Music', *The Musical Times* 115/1582 (Dec., 1974), 1036-1038 (p.1037)

So we interpret it, and *see* it as we *interpret* it'.[224] This example can be applied to the figures in *Piano Phase* to elucidate the metric and harmonic ambiguity present, and to explain the potential that the listener has at their disposal for 'flip-flopping' between one metric 'view' and another.

Example 3.5: Cube illustration, *Philosophical Investigations*[225]



The cognitive exploitation of the harmonic, melodic and metric characteristics of the figures in *Piano Phase* is a requirement of performance: Reich states that progression from a particular figure of *Piano Phase* to the next should only occur after 'you hear [that figure's musical content] clearly and have absorbed it'.[226] So as part of the gradual-phasing technique, performers must identify and aurally exhaust the musical possibilities of each canonic reconfiguration, via the identification of its harmonic, melodic and metric characteristics.

IV. LITERATURE REVIEW

The publication containing the most comprehensive discussion of phasing found in the available literature is provided by Russell Hartenberger (percussionist with Steve Reich and Musicians, and Nexus Percussion). His book features an in-depth commentary on phasing's challenges (and their solutions), a commentary which combines his considerable experience of performing Reich's phase pieces with analytical research. Written within the specific context of phasing in Reich's *Drumming*, many of Hartenberger's descriptions and recommendations can nevertheless be applied, *mutatis mutandis*, to any of Reich's gradual-phase works that require live perfomers.

Hartenberger echoes Reich's previously-cited advice on the pitfalls of gradual phasing (see 3.3, III above) when he states that the 'most common mistake' in phasing is 'going too far in a phase and bypassing the next interlocking relationship'. He states that in

[224] Ludwig Wittgenstein, trans. by G.E.M. Anscombe, *Philosophical Investigations*, 3rd Edition (Oxford: Blackwell, 1953[2000]), p.193
[225] Reprinted from Wittgenstein, p.193
[226] Reich, 1980 [1967]), p.1

order to avoid this mistake (which featured in the Andres/Kaplan live performance described at [3.2, I]), 'it is important to know and be able to hear each interlocking relationship.'[227] This latter statement grants even more importance to the aforementioned task of identifying each phased figure via its harmonic, melodic and metric characteristics, as the recognition of each figure in these terms will secure performers' aural awareness of each 'interlocking relationship', and will in turn greatly reduce the chances of phasing too far. Hartenberger's practical recommendation for securing this aural awareness is to practise *'jumping in at next interlocking position'*[228] (ie without a fuzzy transition in between), which helps him to 'recognize the next [interlocked] relationship'[229] in the sequence.

Hartenberger again echoes Reich's advice when describes a second phasing mistake – namely, to think '*you have reached the next interlocking pattern when you have not*'.[230] Admittedly, Hartenberger's advice on how to avoid this mistake (which featured in my live 2-pianos 2-hands performance, and the Double Edge recording, both described at [3.2, I]) is not quite as incisive as before, consisting as it does of general recommendations to always 'know where you are in relation to the other player'.[231]

Far more illuminating is Hartenberger's discussion of the 'two mental attitudes' performers of the moving pattern should adopt when phasing: 'interlock mode and phasing mode.' The first mental attitude applies to the composite patterns, and facilitates the ability to 'stay solidly synchronized with the steady part'. He states that a 'clear delineation between interlock mode and phase mode' is then made via 'a conscious decision to begin the phase'. Hartenberger states that the start of 'phase mode' is not outwardly signalled by a 'move out of synchronization immediately', but by an inner mental act – 'I find it better to think about moving forward before I physically start changing my attack placements.'[232]

Significantly, these two mental attitudes necessary for the phasing process correspond to the two aspects of the phasing challenge as described above (see [3.3, III]). 'Interlock mode' is relevant to the 'psychoacoustic awareness' requirement: that performers cognitively exploit the harmonic, melodic and metric characteristics of the 'interlocked' figures in *Piano Phase.* And 'phase mode' relates to the 'active listening' requirement: that performers execute the 'fuzzy transitions' successfully and with an appropriate degree of graduality.

[227] Hartenberger, 2016, p.100
[228] *Ibid*., p.95
[229] *Ibid*., 96
[230] *Ibid*., p.100
[231] *Ibid*., p.101
[232] *Ibid*., p.96

In the next section I will provide a solution to the 'psychoacoustic awareness' dimension of the pre-interpretative phasing challenge, which corresponds to Hartenberger's 'interlock mode'. As per 'analysis/performance scenario #3' (see Introduction) this solution will involve an analysis of *Piano Phase* according to the harmonic, melodic and metric characteristics of its phased figures.

3.4. *PIANO PHASE*: INTERLOCK MODE & PATTERN RECOGNITION

I. LITERATURE REVIEW

Piano Phase has been the subject of numerous comprehensive structural analyses, some of which go considerably beyond the scope of what is relevant to performers. For instance, Robert D. Morris analyses the results of the phasing process in terms of 'rotational arrays' like those employed by Igor Stravinsky in his later, serial compositions.[233] Robert Fink presents evidence of Schenkerian 'prolongation', arguing that '*Piano Phase*, like most truly 'minimalist' music, uses pitch repetition to redefine prolongation, to *detach prolongation from* [the Schenkerian notion of] *hierarchy*'.[234] But while their insights may be of musicological benefit, Morris and Fink reach such heights of abstraction in their analyses that it is hard to see what concrete, practical application their findings could have to the performance of *Piano Phase*.

However, the following three authors – Paul Epstein, Keith Potter and Brian Dennis – have each provided an analysis of *Piano Phase* which contains information that is relevant and applicable to performance. As such, these analyses can be used by performers to attain a crucial, practical understanding of the work in terms of its figures' harmonic, melodic and metric characteristics. Restricting his analysis to Part One, Paul Epstein examines the 'musical events' of *Piano Phase* that are generated by the 'inherent structural characteristics' of the 12-semiquaver pattern once this pattern is phased against itself.[235] Potter's analysis (blow-by-blow at least as far as Part One is concerned) presents his own insights alongside some of Epstein's initial findings, furnishing the latter with more exhaustive explanatory detail; for instance, Potter cites Epstein's observation that the second half of Part One's phasing operation 'is a retrograde of the first', but supplements this with the claim that Part One's palindromic nature 'is unlikely to be noticed by the listener'.[236] Again with exclusive reference to Part One, Brian Dennis illustrates the 'considerable rhythmic variety' exhibited by various out-of-phase configurations of the Basic Unit.[237] All three of these texts will feature in my figure-by-figure analysis of *Piano Phase* presented below (see [3.4, III – V]).

It is interesting to note that all three authors cited in the paragraph above restrict their detailed analytical discussion to Part One of *Piano Phase*. Granted, the opening section of

[233] See Robert D. Morris, '*Generalizing rotational arrays*', *Journal of Music Theory* 32/1 (1988), 75–132
[234] Robert Fink, 'Going Flat: Post–Hierarchical Music Theory and the Musical Surface', in *Rethinking Music*, ed. by Nicholas Cook and Mark Everist (Oxford: Oxford University Press, 1999), 103-137 (p.128)
[235] Paul Epstein, 'Pattern Structure and Process in Steve Reich's *Piano Phase*', *The Musical Quarterly* 72/4 (1986), 494–502 (p.495)
[236] Potter, 2000, p.184
[237] Dennis, p.1036

the work has more scope for metric ambiguity than Parts Two and Three, owing to the fact that Part One features a 'twelve-unit rhythmic cycle'; and given that twelve is a 'highly composite number' (ie a number with more divisors than any number less than it has), this cycle 'can have an underlying pulse of six different subdivisions'.[238] The comparative wealth of metric possibilities that this produces in a twelve-semiquaver pattern might justify the three authors' decision to pay almost exclusive attention to Part One of *Piano Phase*. But to omit Part Two from discussion is to overlook the particularly abundant harmonic ambiguities that this latter section exhibits (and which will be demonstrated in [3.4, IV]).

Finally, it is worth noting (in anticipation of my analysis) some of the comments found in the literature regarding the work's overall harmonic motion. Reich himself describes *Piano Phase* as a work of three sections, with the first containing 'twelve [semiquaver] beats in B minor, the second eight beats forming an apparent E dominant chord, and the last is four beats in A (probably major but lacking a stated third degree).'[239] Potter assents to this 'progression from B to E to A' but as 'more suggested than achieved', although he does provide theoretical support for each stage of the progression. The B Minor tonality of Part One is 'established by two factors: the formation of iv-v-i in this key by the first three notes of the Basic Unit, and the rise and fall from B to D and back of the upper voice [on the 3rd, 4th, 5th, 8th and 9th semiquavers]'. In Part Two, the moving pattern features 'iv-v to the i of an E [on the 7th, 8th and 1st semiquavers] now strengthened by its representation in two registers'. In Part Three, factors that 'help to establish A as tonic' include its 'primacy of position as lowest note [of the Basic Unit]', and another instance of a 'iv-v-i progression [on the 3rd, 4th and 1st semiquavers of the Basic Unit]'.[240]

Now while both Reich and Potter might supplement their subscription to a 'B-E-A' model of the overall harmonic progression in *Piano Phase* with the concession that the harmony is 'ambiguous', I would contend that this doesn't go far enough, and that the harmony is *too* ambiguous to put forward the 'B-E-A' model even as a mere prevailing option amid plausible alternatives. Moreover, while Potter does provide cogent evidence for this harmonic model by citing certain features of the work's monophonic material (ie its various Basic Units), I feel that this doesn't quite get to the heart of the matter, as it is through the explicitly harmonic, dyadic content of the phased figures that the true harmonic narrative of *Piano Phase* is played out. It is my contention that, in each of the work's three sections, we see the various tonal centre candidates (B/E in Part One,

[238] Hartenberger, 2016, p.231
[239] Reich ed. Hiller, 2002 [1967], p.24
[240] Potter, 2000, p. 187

A/B/E/F♯ in Part Two, D/E in Part Three) vie for supremacy across the differently-configured phased figures but with no clear overall winner in each case. I hope to demonstrate this claim in the analysis presented later in this section.

II. THE MYTH OF AUDIBLE PROCESS

It was claimed in (1.4, II) that the notion of minimalist processes being fully and readily audible is an academic myth. Indeed, facts about *Piano Phase* that further debunk this 'myth of audible process' are not hard to find: like York's analysis of Glass's *Two Pages* (see [2.5], I]), Epstein's analysis of *Piano Phase* is analytically illuminating precisely because certain aspects of the work's structure elude us when we listen to it; Potter's claim that Part One's retrograde second half is 'unlikely to be noticed by the listener' only serves to reaffirm this. And if we recall that the 'reverse order' rendition of Part Two in the Double Edge recording of *Piano Phase* does not appear to have been noticed by the composer himself (see [3.2, I], we can reasonably deduce that the work's processes are far from fully and readily audible if even those individuals most familiar with these processes can be mistaken as to their correct continuation. Furthermore, having first listened to *Piano Phase* in 2000 and first practised it in 2002, it was only after I analysed the work in 2012 that I discovered many of its structural details (including the aforementioned retrograde in Part One). So again, merely engaging with the work aurally as both a performer and listener did not allow me to access the 'whole truth' as to its structure; and despite claims that the work's phasing 'always remains audible',[241] there are many facts about this process (such as those presented immediately below) that I have come to know only through analytical activity.

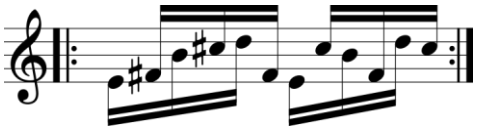
III. PATTERN RECOGNITION ANALYSIS: *PIANO PHASE* PART ONE

It was stated in [3.3, III] that performers of *Piano Phase* must identify and aurally exhaust the musical possibilities of each of the work's canonically reconfigured composite patterns, via the identification of their harmonic, melodic and metric characteristics. In order to facilitate these aspects of 'pattern recognition', and drawing on the aforementioned research conducted by Epstein, Potter and Dennis, I have constructed an analysis of the relevant figures of *Piano Phase* in terms of the harmonic, melodic or metric features that characterize these composite patterns.

To recap, Part One of *Piano Phase* features a 12-semiquaver pattern of five pitch classes (E, F♯, B, C♯ and D) which is played by both pianists (see Ex.3.6):

[241]Schwarz, 1996, p.66

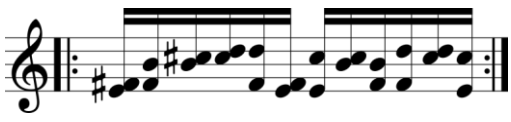
Example 3.6: pattern from Part One



The harmonic ambiguity of Part One is a consequence of the two competing chordal conceptions by which its phased composite patterns can generally be understood. On the one hand, the five pitch classes – B, C♯, D, E, F♯ – can be conceived as exhibiting a B Minor harmony, albeit with an added 9th and a rather aberrant E bass. The claim to a B Minor conception of Part One is primarily evidenced by the fact that this is the only triad that can be formed from the five pitch classes. On the other hand, the five pitch classes can also be understood as exhibiting an E Dominant 13th chord, albeit with the 3rd and 11th omitted. The claim to an E root chord conception is supported in part by the 'primacy of position as lowest note'[242] of this particular pitch class. The harmonic ambiguity between these two competing conceptions persists across all the phased figures of Part One, with no clear winner in any instance (although it should be said that decisions concerning tempo can appear to tip the scales in favour of one or other of these conceptions).[243] However, the various metric ambiguities exhibited by Part One are less applicable to all composite patterns, and will be described on a figure-by-figure basis in what follows.

The passage from Figures 3 to 13 exhibits an alternation between even-numbered figures which 'are almost entirely consonant', and odd-numbered figures which 'are significantly more dissonant'.[244] The dyads of Figure 3 (the first dissonant figure) are constructed entirely from overlapping pairs of repeated pitches (eg the second dyad consists of the second F♯ in that pair of F♯s, coupled with the first B in a pair of Bs – see Ex.3.7):

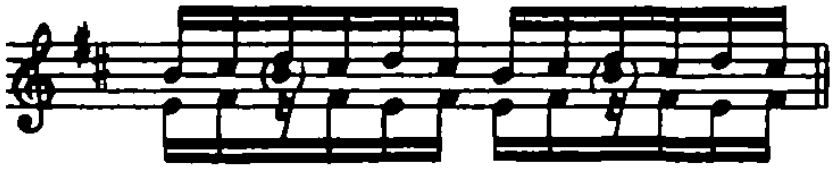
Example 3.7: composite pattern at Figure 3



[242] Potter, 2000, p.187
[243] Part One of the 1987 Double Edge recording is played at quaver = c.216, and to my ears tends towards a B Minor harmony. Part One of my 2016 2-pianos 2-hands performance is played at quaver = c.189, and to my ears tends towards an E Dominant 13th harmony. My own speculative explanation for this is that certain voice-leading relationships that suggest B Minor are more compelling at the faster tempo and less so at the slower one (eg the suggestion of a 'subdominant to dominant' voice-leading relationship exhibited by the E/F♯ 'lower voice' is only really persuasive beyond a certain minimum tempo – indeed, *any* voice-leading tendency will lose its horizontal motion and gravitational pull if the work in question is played too slowly).
[244] Epstein, p.496

At Figure 4 (the first consonant figure), the 'two-voice texture' is exhibited in such a way that 'the lower voice supports the upper homophonically'.[245] Another characteristic of this figure is that 'the two halves […] are identical'[246] (see Ex.3.8):

Example 3.8: composite pattern at Figure 4, two-voice re-scoring[247]



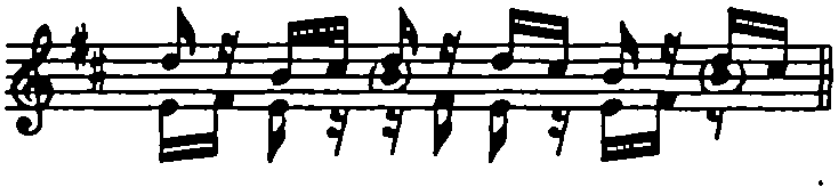
The dissonant Figure 5 features a 'strong triple rhythm'[248] which contributes to the metric ambiguity between a compound duple time of 6/8 suggested by the score (12 semiquavers in 2 groups of 6 which is the customary grouping for 6/8) and a compound quadruple time of 12/16 as illustrated below (see Ex.3.9). This ambiguity is partly the result of the implicit pulse provided by the four low Es in the lower voice, which can be perceived as strong-beat notes that occur at 3-semiquaver intervals.

Example 3.9: composite pattern at Figure 5, 12/16 re-scoring[249]

Figure 6 comprises a consonant pattern which, like Figure 4, exhibits a two-voice texture. However, not only is this texture 'strikingly polyphonic',[250] it also contributes to the metric ambiguity exhibited by the figure: the upper voice can be perceived as being either in the compound duple time of 6/8 suggested by the score, or a simple triple time of 3/4. The 3/4 is suggested by the three 3-note melodic fragments of the upper voice which end on the three beats of 3/4; this reinforces simple triple time and renders it a plausible alternative metric conception (see Ex.3.10):

[245] Epstein, p.498
[246] Potter, 2000, p.185
[247] Reprinted from Epstein, p.498
[248] Dennis, p.1036
[249] Reprinted from Dennis, p.1036
[250] Dennis, p.1036

Example 3.10: composite pattern at Figure 6, two-voice re-scoring[251]

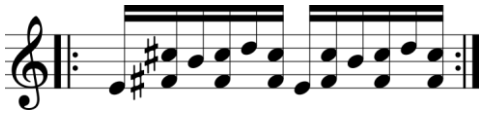


In the dissonant Figure 7, the configurations which 'supersede the two-voice structure'[252] are, namely, the pairing of identical dyads in 'sequences of repeating seconds alternat[ing] with sequences of repeating sixths and fourths'[253] (see Ex.3.11):

Example 3.11: composite pattern at Figure 7, six-quaver re-scoring[254]

In Figure 8, 'white-note unisons (E B D repeated) alternate with black-note fifths (F♯ C♯)', and so the consonance of the even-number figures 'reaches its point of maximum repose'.[255] Like Figure 4, the two halves of Figure 8 are identical (see Ex. 3.12):

Example 3.12: composite pattern at Figure 8



As stated earlier, the second half of Part One's phasing process (Figs. 9 – 13) is 'a retrograde of the first',[256] meaning that 'Figures 3 and 13, 4 and 12, etc. present identical combinations of the Basic Unit, but with different starting points'.[257] Consequently, there is no need to analyse Figs. 9 – 13, as the various features that characterize Figures 3, 4, 5, 6 and 7 (as described above) also characterize Figures 13,

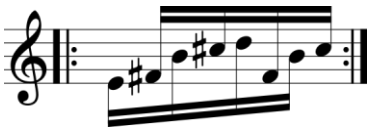
[251] Reprinted from Epstein, p.498
[252] Epstein, p.498
[253] Potter, 2000, p.184
[254] Reprinted from Epstein, p.498
[255] Potter, 2000, p.184
[256] Epstein, p.495
[257] Potter, 2000, p.184

12, 11, 10 and 9 respectively (Figure 8 'marks the mid-point of the cycle' and thus 'appears only once').[258]

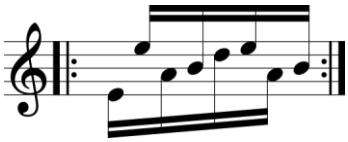
IV. PATTERN RECOGNITION ANALYSIS: *PIANO PHASE* PART TWO

To recap, Part Two features two 8-semiquaver patterns: the first (played by the static pattern pianist) consists of the same five pitch classes as the pattern from Part One (see Ex.3.13); the second (played by the moving pattern pianist) consists of four pitch classes (A, B, D and E – see Ex.3.14).

Example 3.13: 1st pattern from Part Two



Example 3.14: 2nd pattern from Part Two



Owing to its construction from 8-quaver patterns, Part Two of *Piano Phase* demonstrates little metric ambiguity, for eight is not a highly composite number and as such fewer underlying pulses are possible. However, owing to its introduction of a sixth pitch class (an A in the moving part),[259] Part Two does exhibit an abundance of harmonic ambiguity, with four different tonal centre candidates (A, B, E and F♯) vying for supremacy across the differently-configured phased figures.

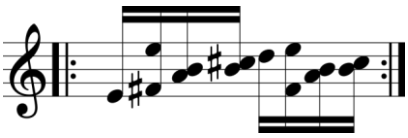
Part Two does not consist of a pattern being phased against itself, and so its phasing operation does not start with a unison configuration like that of Part One. A second contrasting feature of Part Two is that it does not alternate between consonant and dissonant figures. Unlike its unison counterpart from Part One, the starting point of Part Two's phasing operation – Figure 17 – is characterized by its dissonance, specifically it's

[258] Potter, 2000, p.184

[259] Alex Ross describes how a 'cool process stealthily takes on emotion', with the introduction of this pitch class, which 'never fails to have a brightening, energizing, gladdening impact on the mind' (Ross, 2007, p.545)

A/B and B/C♯ major 2nds which occur on the 3rd and 4th semiquavers and which repeat at the 7th and 8th semiquavers. Indeed, the two halves of Figure 17 closely resemble each other (only the 1st semiquaver of each half differs – see Ex. 3.15):

Example 3.15: composite pattern at Figure 17



In Figure 18 there is a metric ambiguity as to which of the figure's semiquavers constitutes the downbeat of its suggested 2/4 metre. Perceiving the downbeat as falling on the *second* semiquaver of the combined pattern as per the score (an F♯/A dyad – see Ex. 3.16) is, to my ears at least, more compelling than perceiving it as falling on the 1st semiquaver (an E4/E5 octave dyad). This ambiguity occurs because, for one, the F♯/A dyad is repeated 4 semiquavers later, so there is a certain *rhythmic* plausibility in conceiving these two dyads as downbeat/2nd beat markers in 2/4 metre. And for another, the lower-voice melody (featuring the 2 F♯s and the 2 Es) emphasizes a modal F♯ Minor (with the two 'seventh' Es resolving to the first F♯), so there is also a *harmonic* plausibility in conceiving the two F♯/A dyads (the root and third of the F♯ Minor triad) as downbeat/2nd beat markers.

Example 3.16: composite pattern at Figure 18 (score's 2nd semiquaver as downbeat)

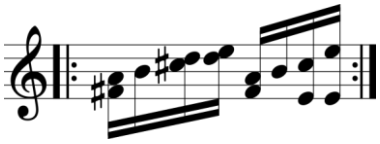


Figure 19 (to my mind, the most musically satisfying figure in the entire work) is characterized not only by its consonance (it consists of four perfect 4ths, three minor 3rds and a perfect 5th) but also by its shimmering A Major harmony. This harmony is emphasized by the fact that two C♯/E dyads (the third and fifth of A Major) are both followed by instances of the 'tonic' A on the 1st and 5th semiquavers. Granted, the A Major harmony is de-stabilized somewhat by the 'second inversion' bass note implied by the low E of the downbeat dyad (see Ex. 3.17):

Example 3.17: composite pattern at Figure 19

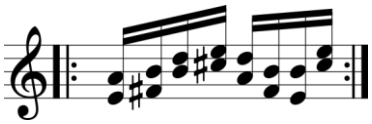
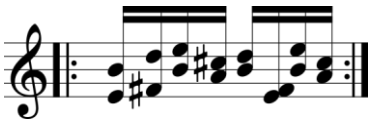


Figure 20 is characterized by a dyad couplet that occurs at the 3rd and 4th semiquavers and then repeats at the 7th and 8th semiquavers. The figure is also characterized by a steady pulse of Bs on the 'strong' semiquavers (the 1st, 3rd, 5th, and 7th – see Ex.3.18) It is plausible to conceive these four notes as a 'tonic pedal' in a figure which exhibits an admittedly unstable B Minor harmony:

Example 3.18: composite pattern at Figure 20



Unlike Part One, the second half of Part Two is *not* a retrograde of the first (as Part Two does not consist of a pattern being phased against itself). However, because each of Part Two's patterns exhibits a resemblance relation between its first and second half, it follows that the second half of Part Two's phasing operation will exhibit a parallel figure-to-figure resemblance relation with the first half (with Figure 21 resembling 17, Figure 22 resembling 18 etc.).

Figure 21's 2nd, 3rd, 4th, 6th, 7th and 8th semiquavers are identical to those of Figure 17, and so it is also characterized by its dissonance, specifically its A/B and B/C♯ major 2nds which, like Figure 17, occur on the 3rd/4th and 7th/8th semiquavers. However, an interesting additional feature of Figure 21 is that its two halves are identical. Harmonically, this figure emphasizes E as its tonal centre, as it is both the lowest and the most frequent pitch class (it occurs at four of the figure's eight semiquavers – see Ex. 3.19):

Example 3.19: composite pattern at Figure 21

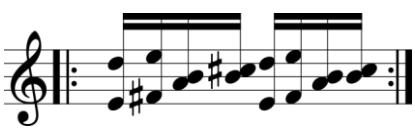


Figure 22's 1st, 2nd, 4th, 5th and 6th semiquavers are identical to those of Figure 18, and so it also exhibits a rhythmic and harmonic plausibility in conceiving the downbeat on the second semiquaver of the score's combined pattern. Like Figure 18, Figure 22 features two F♯/A dyads repeated at 4-semiquaver intervals, suggesting downbeat/2nd beat markers in a 2/4 metre. Moreover, its lower-voice melody provides an even stronger emphasis of the modal F♯ Minor, owing to the more evenly-spaced F♯s and Es that make up this melody (with the two seventh Es now resolving to *both* F♯s). As a result, there is even greater harmonic plausibility in conceiving the two F♯/A dyads as downbeat/2nd beat markers (see Ex. 3.20):

Example 3.20: composite pattern at Figure 22 (score's 2nd semiquaver as downbeat)

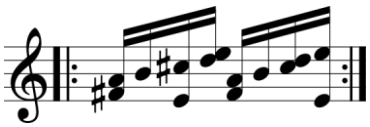


Figure 23's 1st, 2nd, 4th, 5th, 6th and 8th semiquavers are identical to those of Figure 19, and so this figure is also characterized by both its consonance, and by its A Major harmony, de-stabilized by the downbeat's 'second inversion' bass E note (see Ex. 3.21):

Example 3.21: composite pattern at Figure 23

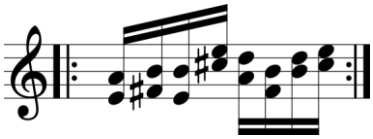
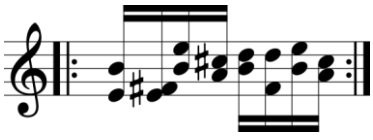


Figure 24's 1st, 3rd, 4th, 5th, 7th and 8th semiquavers are identical to those of Figure 20, and so it is also characterized by both a dyad couplet that occurs at the 3rd/4th and 7th/8th semiquavers, and a steady pulse of Bs on the 'strong' semiquavers (the 1st, 3rd, 5th, and 7th – see Ex.3.22) Again, it is plausible to conceive these four notes as the 'tonic pedal' of an unstable B Minor harmony:

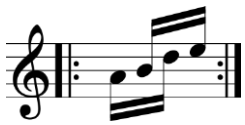
Example 3.22: composite pattern at Figure 24:



V. PATTERN RECOGNITION: *PIANO PHASE* PART THREE

To recap, Part Three features one 4-semiquaver pattern, composed of the same four pitch classes as Part Two's moving pattern, played by both pianists (see Ex.3.23).

Example 3.23: pattern from Part Three



There is little metric ambiguity in Part Three, as its 4-quaver pattern allows for few underlying pulses. Its harmonic ambiguity, to my ears, amounts to a contest between two different tonal centre candidates (D and E).[260] Like in Part One, Part Three's figures alternate between consonant and dissonant, but on a smaller scale. Following the Basic Unit's unison configuration at Figure 28, the dyads of Figure 29 (the first of only two dissonant figures) share a similarity with those at Figure 3 (the first dissonant figure in Part One), in that they are constructed entirely from overlapping pairs of repeated pitches: the first dyad of Figure 29 consists of the second A in a pair of As, coupled with the first B in a pair of Bs etc. (see Ex. 3.24). Harmonically, this figure can plausibly be understood as exhibiting E as its tonal centre: the dyads' 'upper voice' can be conceived as notes from the E Minor pentatonic scale, which resolve upwardly to their home note.

Example 3.24: composite pattern at Figure 29

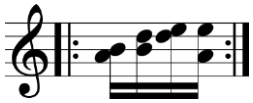
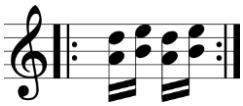


Figure 30 (Part Three's only consonant phased figure) is constructed entirely of perfect fourths, and features oscillating dyads of A/D and B/E. Like Figures 4, 8, 12 and 21, the two halves of Figure 30 are identical. Harmonically, this figure can plausibly be understood as exhibiting D as its tonal centre: the downbeat and 3rd semiquaver dyads can be conceived as the tonic and dominant of D (D and A respectively) which oscillate upwardly with supertonic/submediant dyads of E/B (see Ex. 3.25):

[260] I experience no aural grounds for Reich and Potter's designation of A as Part Three's tonal centre (see [3.4, I]).

Example 3.25: composite pattern at Figure 30



Like Part One, Part Three is palindromic, though on a smaller scale. Figure 31 is identical to Figure 29 (albeit with a different starting points), and so the features that characterize the former (as described above) also characterize the latter. Consequently, there is no need to analyse Figure 31 (Figure 30, the halfway point, appears once).

VI. SUMMARY

The above analysis of the figures of *Piano Phase*, and the increased facility for pattern recognition that it fosters, could potentially lead to three favourable outcomes. First, the increased intellectual awareness of the musical features brought about by this analysis gives rise to an increased perceptual awareness of these features, and so the performer's ability to identify and aurally exhaust the musical possibilities of each figure (as per the composer's instructions) also increases. Second, this awareness would have an added functional value, in that performers would be more likely to recognize the various 'interlocking' arrival points in each phasing operation, and so would be less likely to fall into the pitfalls of phasing too far or not phasing far enough. Thirdly, the above expansion of the metric and harmonic options (with which to conceive the composite patterns) enriches the practice of cognitively exploiting the work's musical ambiguities – one of the great joys available to performers and listeners alike when it comes to Reich's music. Indeed, it is recommended that performers actively partake in the cognitive exploitation of these ambiguities, as it is the best way to ensure that these metrical ambiguities also available to the listener. Such a recommendation entails certain prescriptions: Hartenberger states that performers should 'be comfortable with and enjoy the perceptual changes [...] while avoiding metrical accents that detract from a listener's options'.[261] And although this prescription refers directly to *Clapping Music*, (for which performers are explicitly advised 'to avoid metrical accents'),[262] its application to *Piano Phase* by performers will undoubtedly enrich the listening experience for all concerned.

[261] Hartenberger, 2013, p.379
[262] Steve Reich, 'Directions for Performance', in *Clapping Music* (London: Universal Edition, 1980 [1972]), p.1

3.5. THE SYSTEMATIC EXECUTION OF GRADUAL PHASING

I. PREAMBLE

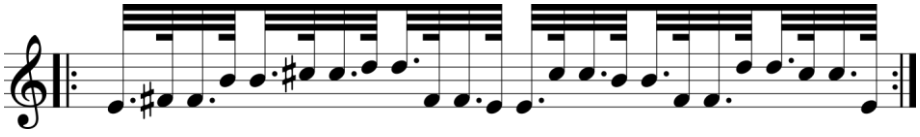
As per 'analysis/performance scenario #3' (see Introduction), this section features an analysis-based solution to the 'active listening' dimension of the pre-interpretative phasing challenge, a dimension which corresponds to Hartenberger's 'phasing mode'. This mode is applicable to the material contained between the figures of *Piano Phase*, where the moving pattern gradually phases ahead of the static pattern.

II. REFERENCE POINTS: ANALYSIS OF 1ST FUZZY TRANSITION

Hartenberger states that, when performing *Piano Phase* on two marimbas with duo partner Bob Becker (his colleague in Steve Reich and Musicians and Nexus Percussion), he is now capable of holding the tempo of the moving pattern (against Becker's static pattern) at precise points in the 'fuzzy transitions' (to recap, those sections in between the figures during which the parts are no longer aligned).[263]

Hartenberger and Becker are able to hold the tempo at the quarterway point (see Ex.3.26), the halfway point (see Ex.3.27), and the threequarter way point (see Ex.3.28) of each transition. On the relative difficulty of holding the tempo at these three points, Hartenberger states that 'the 1/2 position is the easiest to maintain while the 3/4 position is the most difficult since the pull to the next interlocking pattern is strong'.[264] In what follows I use the work's 1st fuzzy transition (between Figures 2 and 3) to present the three stages:

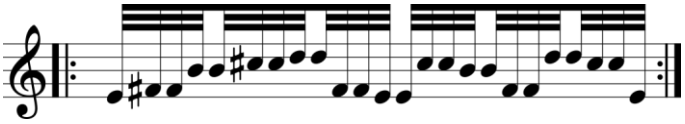
Example 3.26: Figures 2 – 3, fuzzy transition quarterway point
(configuration of patterns as 1 voice, downbeat static pattern)



(The quarterway point is conceived as 12 pairs of 'quasi-swung' notes, with the static-part notes constituting the 1st of each pair.)

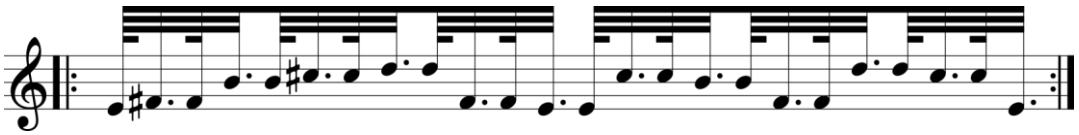
[263] Information obtained via email correspondence with Hartenberger (17th and 29th May 2012), with specific reference to phasing in *Piano Phase*. Similar statements (with reference to phasing in *Drumming*) are found in Hartenberger, 2016, p.97.
[264] Russell Hartenberger, email correspondence, 29th May 2012 – as previously discussed, this difficulty is exhibited by both the Double Edge recording and the Ensemble Avantgarde recording (see [3.2, I]).

Example 3.27: Figures 2 – 3, fuzzy transition halfway point
(configuration of patterns as 1 voice, downbeat static pattern)



(The halfway point is conceived as 24 demisemiquavers, with the static-part notes being the odd-numbered demisemiquavers.)

Example 3.28: Figures 2 – 3, fuzzy transition threequarterway point
(configuration of patterns as 1 voice, downbeat static pattern)



(The point is conceived as 12 'Scotch snaps', with the static-part notes constituting the 1st note of each 'snap'.)

On whether this 'systematic execution' of the phasing technique was something that he had developed methodically, or whether it was something that just came about after years of experience, Hartenberger states that 'the "system" came after the fact. My experience in phasing led me to realize the elements I could control more easily than others'.[265] Hartenberger's systematic phasing ability emerged fortuitously, after years of experience performing Reich's phase pieces. However, I was interested in discovering a *method* for achieving this systematic execution of gradual phasing, which was theoretically applicable to all performers, and which delivered results within a much shorter timeframe.

III. A METHOD FOR SYSTEMATIC PHASING: *SOLO PIANO PHASE*

Around the same time as I discovered Hartenberger's capacity for systematic execution of the gradual-phasing technique, I encountered documentary evidence of three separate occasions when *Piano Phase* was performed by a single pianist on two pianos. In each case, the solo pianist plays the moving part (entirely with one hand) on one of the pianos, and gradually phases it against the other hand's static part (which is played on the second piano). The first person to attempt this successfully was American pianist

[265] Russell Hartenberger, email correspondence, 17th May 2012.

Rob Kovacs, in a concert held at Baldwin Wallace University in 2004.[266] Subsequent solo performances by Russian pianist Peter Aidu[267] and Polish pianist Leszek Mozdzer[268] have been documented.

It struck me that a methodical approach to systematic phasing might be most fruitful when applied to this 2-pianos 2-hands instrumentation of *Piano Phase*. Indeed, part of the work's difficulty is the fact that the parts involved in the gradual-phasing operation are executed by separate, mutually mind-independent individuals. But in a 2-pianos 2-hands performance, a single player has control over the work's two component parts, and the execution of these parts by one mind could potentially result in their greater co-ordination. It was my belief that this potential could most plausibly be realized by the application of a method for systematic phasing. So it was that I formulated the following research hypothesis: that a method for systematically executing the gradual-phasing technique would best improve the performance quality of *Piano Phase* when applied to a 2-pianos 2-hands transcription of the work.

IV. *SOLO PIANO PHASE*: SOME PRELIMINARY TECHNICAL CONSIDERATIONS

Preparing *Piano Phase* as a solo work on two pianos will invariably involve decisions on how best to assign material to each hand, and on the fingering employed. The work itself does not suggest that there is one particular approach to either of these technical questions, and this is reinforced by the plurality of approaches taken by those who have performed *Piano Phase* as a solo work.

On the matter of distributing the musical material between the hands, both Peter Aidu and Leszek Mozdzer play the moving part in the right hand, and the static part in the left.[269][270] This, incidentally, is the same distribution that I employ in my own solo performances of *Piano Phase*. I chose this distribution of material because my right hand is stronger and technically more adept than my left hand. I also conceive *Piano Phase* as being 'led' by the moving part, so it made sense for me to 'play to my strengths', and to assign the dominant moving part to my technically dominant hand.

In contrast, Rob Kovacs plays the *static* part in his right hand, and the moving part in his left.[271] Kovacs initially opted to distribute the parts in the same fashion as Aidu, Mozdzer

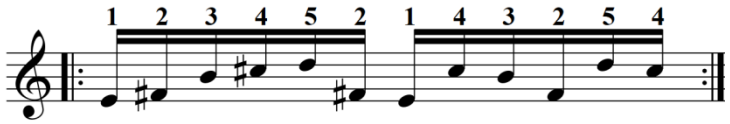
[266] Rob Kovacs, 'Piano Phase (solo) – First solo performance ever' [recorded 28th March 2004], YouTube, 2011 (uploaded 27th January), <https://www.youtube.com/watch?v=AnQdP03iYIo>[accessed 21st December 2019]
[267] Peter Aidu, 'Unique performance of Steve Reich – 1 musician on 2 pianos', YouTube, 2007 (uploaded 2nd October), <https://www.youtube.com/watch?v=qKXy1FPTdvg>[accessed 21st December 2019]
[268] Tomasz Handzlik, 'Final Sacrum Profanum: Muzyczne i laserowe fajerwerki', *Gazeta Wyborcza*, 19th September 2011, <http://wyborcza.pl/1,75410,10311026,Final_Sacrum_Profanum__Muzyczne_i_laserowe_fajerwerki.html> [accessed 21st December 2019]
[269] Aidu, <https://www.youtube.com/watch?v=qKXy1FPTdvg>
[270] Information obtained via email correspondence with Mozdzer, 22nd January 2020
[271] Kovacs, <https://www.youtube.com/watch?v=AnQdP03iYIo>

and myself, but eventually switched the parts around 'because it was physically harder to rush my [left hand] but that allowed me to make the phasing last a bit longer'.[272] So whereas my decisions on material distribution played straightforwardly to my technical strengths, Kovacs turns a perceived technical deficiency into an asset which produces musically beneficial results.

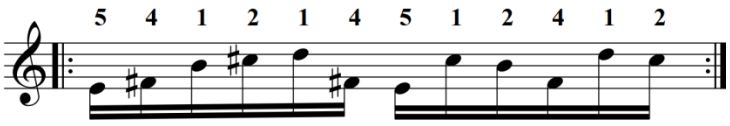
A plurality of approaches is also exhibited by the different fingering strategies employed. In Part One of *Piano Phase*, Peter Aidu uses the finger sequence '1, 2, 3, 4, 5, 2, 1, 4, 3, 2, 5, 4' to play the Basic Unit with the right hand (see Ex. 3.29), and '5, 4, 1, 2, 1, 4, 5, 1, 2, 4, 1, 2' when playing it with the left (see Ex. 3.30).[273] Aidu's rather orthodox approach is to play each pitch with one particular finger every time that pitch occurs (eg whenever the right hand F♯ occurs, it is always played by the 2nd finger). The right-hand sequence employed by Aidu is also used by Leszek Mozdzer, who employs '5, 4, 2, 1, 1, 4, 5, 1, 2, 4, 1, 2' for the left hand (see Ex. 3.31).[274]

Rob Kovacs uses the finger sequence '1, 2, 3, 4, 5, 2, 1, 4, 3, 1, 5, 4' to play Part One's Basic Unit with the right hand (see Ex. 3.32), and, like Aidu, '5, 4, 1, 2, 1, 4, 5, 1, 2, 4, 1, 2' when playing it with the left. And although the left-hand finger sequence I use in Part One ('5, 4, 3, 2, 1, 4, 5, 1, 2, 4, 1, 2') differs slightly from Kovacs' (see Ex. 3.33), the right-hand sequence I use is identical.[275]

Example 3.29: *Solo Piano Phase* Part One, right-hand fingering (Aidu, Mozdzer)

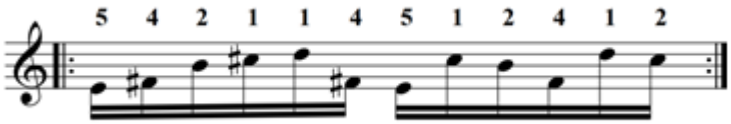


Example 3.30: *Solo Piano Phase* Part One, left-hand fingering (Aidu, Kovacs)

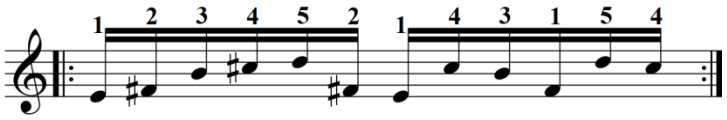


[272] Rob Kovacs, email correspondence, 18th September 2016
[273] Aidu, <https://www.youtube.com/watch?v=qKXy1FPTdvg>
[274] Information obtained via email correspondence with Mozdzer, 22nd January 2020
[275] Rob Kovacs, telephone interview, 29th December 2017

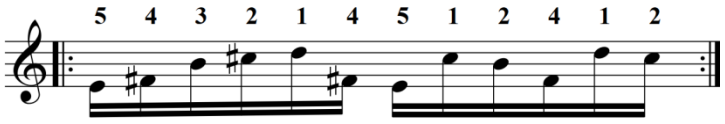
Example 3.31: *Solo Piano Phase* Part One, left-hand fingering (Mozdzer)



Example 3.32: *Solo Piano Phase*, right-hand fingering (Kovacs, Kean)



Example 3.33: *Solo Piano Phase*, left-hand fingering (Kean)



Another similarity that Kovacs and I share (and which is also exhibited by Mozdzer's left-hand sequence) is the practice of playing different instances of the same pitch with different fingers. For instance, Kovacs and I play the 1st and 2nd right-hand F♯s with the 2nd finger, and then play the 3rd instance of this F♯ with the 1st finger. One reason for my own adoption of this practice is that varying the 'fingering-per-pitch' will keep my hand position mobile, and this constant motion will help me stay relaxed (my playing technique is quite dynamic, and I am more likely to be relaxed if there is a certain amount of physical kinesis involved).

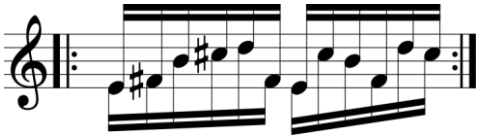
So we can see that performing *Piano Phase* as a solo, 2-piano work does not entail a single prescriptive approach to matters such as material distribution or the fingering employed. Instead, a plurality of approaches is available to the performer, and the particular approach chosen may be determined by the individual's technical strengths, weaknesses or preferences, along with their musical understanding of the work.

V. THE PHASING METHOD (*SOLO PIANO PHASE*)

Using the gradual-phase shift of the 12-note pattern from Figures 2 to 3 as an example, here is my 8-stage method for the systematic execution of phasing in *Piano Phase*, when performed as a solo work on two pianos:

1. *Play the figure in its unison configuration, perceiving the downbeat in* ***both*** *hands/parts as falling on the figure's first dyad* (see Ex. 3.34):

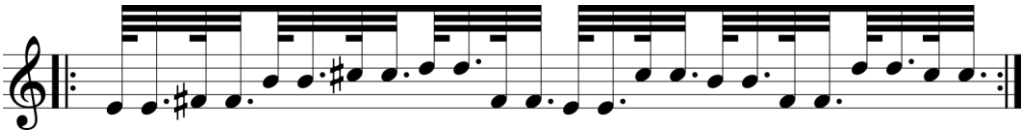
Example 3.34: Figure 2 (unison configuration of patterns as 2 voices)



(This and every subsequent stage of the phasing method should initially be executed at one half of performance tempo: a metronome mark of quaver = 108.)

2. ***Accelerate*** *the* ***moving*** *hand/part, until the* ***quarterway*** *point of the fuzzy transition has been reached. Perceive the downbeat as falling on the first note of the* ***moving*** *hand/part* (see Ex. 3.35):

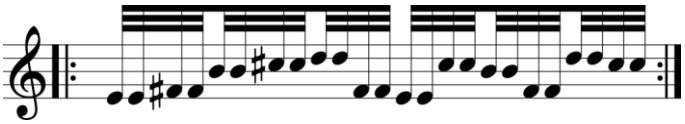
Example 3.35: Figures 2 – 3, fuzzy transition quarterway point
(configuration of patterns as 1 voice, downbeat moving pattern)



(Unlike the 'quasi-swung' quarterway point at Ex. 3.26 above, the quarterway point at 3.35 is conceived as 12 'Scotch snaps', with the moving hand/part notes constituting the 1st note of each 'snap'. The justification for this reconception of the quarterway point is that it is much easier to play Scotch snaps between the hands than it is to play fast 'quasi-swung' notes.)

3. ***Decelerate*** *the* ***'static'*** *hand/part, until the* ***halfway*** *point of the fuzzy transition has been reached. Perceive the downbeat as falling on the first note of the* ***moving*** *hand/part* (see Ex. 3.36):

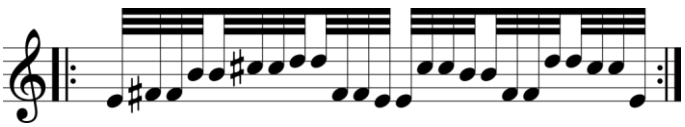
Example 3.36: Figures 2 – 3, fuzzy transition halfway point
(configuration of patterns as 1 voice, downbeat moving pattern)



(The 24 demisemiquavers of the halfway point at 3.36 features the moving hand/part notes on the odd-numbered demisemiquavers. The instruction to decelerate the static hand/part contradicts the score's instruction to accelerate the moving hand/part, although I would contend that the correct configuration of the two hands/parts is what matters, and that exactly how this configuration is achieved is of secondary importance. This contention is corroborated by Hartenberger, who states that phasing 'is not necessarily a constant accelerando by one player', that there 'can be pushes and holds throughout the phase', and that a 'good steady player, like Bob Becker, will push the tempo slightly during a phase to provide resistance for the person phasing'.[276] In the instance above, my reasons for proceeding to the halfway point via a deceleration of the static part is that it is easier for me to execute this stage of the process if there is an underlying metric stability that follows from my downbeat remaining fixed and in strict tempo. And in order for my downbeat to remain fixed – that is, to remain in the moving hand/part – and in strict tempo, the only way I can proceed from the quarterway point to the halfway point is by decelerating the static hand/part.)

4. *Continue playing the halfway point of the fuzzy transition, but perform a* ***'perceptual flip'*** *so that the downbeat is now perceived as falling on the first note of the* ***static*** *hand/part* (see Ex. 3.37):

Example 3.37: Figures 2 – 3, fuzzy transition halfway point
(configuration of patterns as 1 voice, downbeat static pattern)

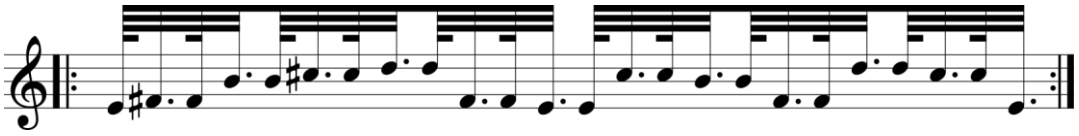


[276] Hartenberger, 29th May 2012

(I observed that the successful execution of this fuzzy transition was facilitated by a 'perceptual flip' – a perceptual shift of downbeat – during the halfway point of the transition. After conceiving the halfway point as 24 demisemiquavers with the downbeat in the right-hand moving part – see Ex.3.36 – I then shift my perception of the downbeat to that of my left-hand static part, so that the 24 demisemiquavers of the halfway point at 3.37 features the static hand/part notes on the odd-numbered demisemiquavers. The halfway point is now conceived as it was originally at Ex. 3.27.)[277]

5. ***Accelerate*** *the* ***moving*** *hand/part, until the* ***threequarterway*** *point of the fuzzy transition has been reached. Perceive the downbeat as falling on the first note of the* ***static*** *hand/part* (see Ex. 3.38):

Example 3.38: Figures 2 – 3, fuzzy transition threequarterway point
(configuration of patterns as 1 voice, downbeat static pattern)

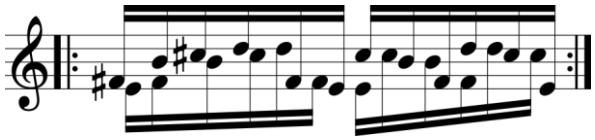


(With the perceived downbeat at Ex. 3.37 now matching that at Ex. 3.27, it follows that acceleration of the moving hand/part results in a threequarterway point at Ex. 3.38 identical in conception to that at Ex.3.28: 12 'Scotch snaps', with the static part/left-hand notes constituting the 1st note of each snap. It should be noted that without the perceptual shift of downbeat mid-fuzzy transition, the threequarterway point would be conceived as 12 pairs of 'quasi-swung' notes, which are much harder to play than Scotch snaps. As stated earlier, the threequarterway point is the hardest to hold, so it is this point that would benefit most from an easier method of execution. And sure enough, after the 'perceptual flip', the threequarterway point is conceived as 12 Scotch snaps and is therefore easier to execute.)

6. ***Accelerate*** *the* ***moving*** *hand/part, until the unison configuration of the next figure has been reached. Perceive the downbeat in* ***both*** *hands/parts as falling on the figure's first dyad* (see Ex.3.39):

[277] The 'perceptual flip' is identical to the 'gestalt flip' that Hartenberger describes as an ability to 'change the underlying pulse of the music in [his] mind'. See Hartenberger, 2016, p.137

Example 3.39: Figure 3 (configuration of patterns as 2 voices)



(At each stage examined so far, it is recommended that the configuration be executed for a predetermined and uniform number of repetitions: the ability to hold the phase at the quarterway, halfway and threequarterway points – for, say, 4 repetitions each – will be evidence of the control necessary for a systematic execution of gradual phasing.)

7. *Once the above stages have been mastered,* ***repeat*** *the process at* ***successively faster*** *tempos according to the following schema:*

- Metronome mark #1: quaver = 108 (one-half of performance tempo)[278]
- Metronome mark #2: quaver = 132 (c. three-fifths of performance tempo)
- Metronome mark #3: quaver = 144 (two-thirds of performance tempo)
- Metronome mark #4: quaver = 162 (three-quarters of performance tempo)
- Metronome mark #5: quaver = 189 (seven-eighths of performance tempo)

(One should not progress to a faster tempo until the method has been successfully executed at its preceding slower tempo. Also, it should be noted that this schema falls short of the actual performance tempo which translates as quaver = 216. I was not able to implement my method beyond quaver = 189 without the configuration between the hands becoming a physical and technical impossibility.)

8. *Once the previous stages have been successfully achieved in relation to the phase from Figure 2 to Figure 3, apply these stages,* ***mutatis mutandis****, to* ***the remaining 23 fuzzy transitions*** *contained within the work.*

(It is recommended that the number of predetermined repetitions applied to each stage of the method is higher for the 8-note pattern of Part Two, and higher still for the 4-note pattern of Part Three. This is to ensure that sufficient time is spent holding the phase at the relevant stages, which in turn will count as a further indication that the control necessary for a systematic execution of gradual phasing is successfully being developed.)

[278] The metronome mark for the first attempt at mastering the method, before any tempo increase is pursued – see Ex.3.34

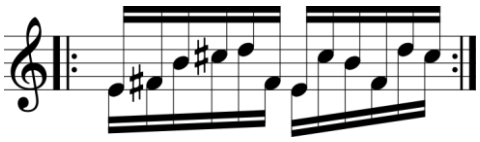
3.6. ADAPTATIONS

I. PHASING METHOD FOR ORIGINAL INSTRUMENTATION (MOVING PATTERN ONLY) AND PIANO-AND-TAPE VERSION

The 8-stage phasing method presented in [3.5, V] is specifically tailored to the 2-pianos 2-hands instrumentation of *Piano Phase*, and in this form it is only really beneficial to anyone endeavouring to give such a solo rendition of the work. However, the phasing method can be adapted to other versions of *Piano Phase*. For instance, it can be adapted to any piano-and-tape arrangement of the work (with the 'live' pianist playing the moving part against the pre-recorded tape's static part, as per the audio dimension of *Piano/Video Phase*, arranged by American percussionist David Cossin).[279] What's more, the adapted piano-and-tape phasing method (as presented below) can be used *verbatim* as a practice regime for any pianist intending to rehearse the moving part of the original, 2-pianos 4-hands version of the work. This is because the relation of the live moving part and the pre-recorded static part is identical to the relation between the live moving-part pianist and their live static-part duo partner.

1. *Play the moving part with the pre-recorded static-part pattern in the figure's unison configuration, perceiving the downbeat in* ***both*** *parts as falling on the figure's first dyad* (see Ex.3.40):

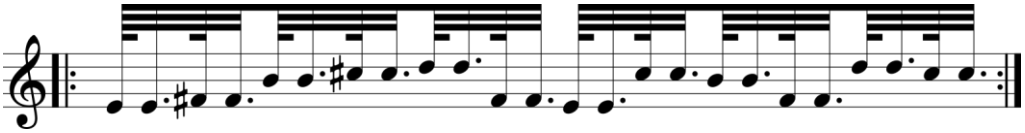
Example 3.40: Figure 2 (unison configuration of patterns as 2 voices)



2. ***Accelerate*** *the* ***moving*** *part, until the* ***quarterway*** *point of the fuzzy transition has been reached. Perceive the downbeat as falling on the first note of the* ***moving*** *part* (see Ex. 3.41):

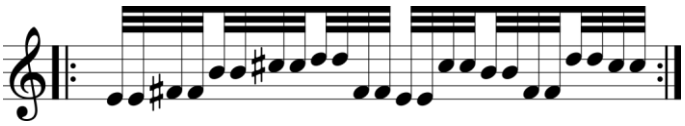
[279] David Cossin, 'Piano/Video Phase by Steve Reich/David Cossin', YouTube, 2011 (uploaded 21st September), <https://www.youtube.com/watch?v=8zAcUBZ2yvc>[accessd 8th January 2020]

Example 3.41: Figures 2 – 3, fuzzy transition quarterway point
(configuration of patterns as 1 voice, downbeat moving pattern)



3. ***Accelerate*** *the* ***moving*** *part, until the* ***halfway*** *point of the fuzzy transition has been reached. Perceive the downbeat as falling on the first note of the* ***moving*** *part* (see Ex. 3.42):

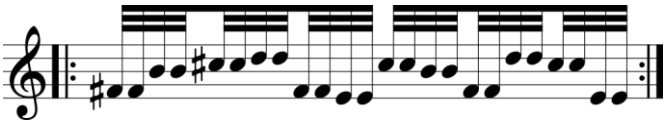
Example 3.42: Figures 2 – 3, fuzzy transition halfway point
(configuration of patterns as 1 voice, downbeat moving pattern)



(Here the correct configuration is achieved via the acceleration of the live pianist's moving part, as opposed to the deceleration of the static hand/part advised by Stage 3 of the solo 2-piano method.)

4. *Continue playing the halfway point of the fuzzy transition, but perform a* ***'perceptual flip'*** *so that the downbeat is now perceived as falling on the* ***second*** *note of the* ***moving*** *part – or, the* ***first*** *note of the* ***moving*** *part as per the* ***approaching*** *figure in the score* (see Ex. 3.43):

Example 3.43: Figures 2 – 3, fuzzy transition halfway point
(configuration of patterns as 1 voice, downbeat moving pattern)

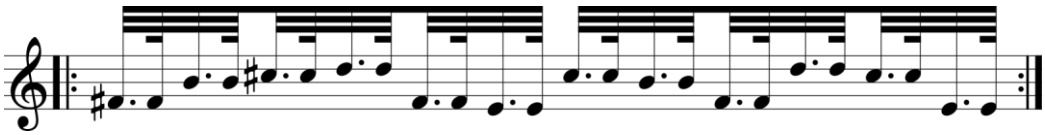


(The configuration of the parts here is the same as at Stage 3 of the solo 2-piano method – see Ex.3.36 – but the downbeat, while still played in the moving part, is perceived in a different location. Again I observed that the successful execution of this fuzzy transition was facilitated by a 'perceptual flip' during its halfway point, but this

time I shift my perception of the downbeat to that of the moving part's 2nd note – or its 1st note as per the approaching figure.)[280]

5. ***Accelerate*** *the* ***moving*** *part, until the* ***threequarterway*** *point of the fuzzy transition has been reached. Perceive the downbeat as falling on the* ***second*** *note of your* ***moving*** *part – or, the* ***first*** *note of the* ***moving*** *part as per the* ***approaching*** *figure in the score* (see Ex. 3.44):

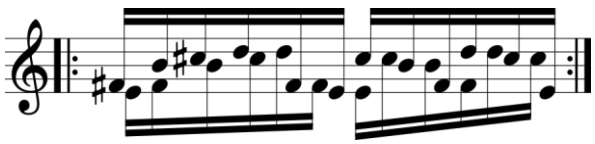
Example 3.44: Figures 2 – 3, fuzzy transition threequarterway point
(configuration of patterns as 1 voice, downbeat moving pattern)



(As stated earlier, the threequarterway point is the hardest point to hold, and this was exactly what I was experiencing when practising the phasing process against the tape. However, my execution of the threequarterway point seemed to improve when I conceived it as 'dragging behind' the *approaching* figure, rather than 'pulling away' from the *preceding* one. So by way of the perceptual flip in the previous stage, I chose to conceive my moving part at the threequarterway point as being one hemidemisemiquaver behind the approaching figure.)

6. ***Accelerate*** *the* ***moving*** *part, until the unison configuration of the next figure has been reached. Perceive the downbeat in* ***both*** *parts as falling on the figure's first dyad* (see Ex.3.45):

Example 3.45: Figure 3 (configuration of patterns as 2 voices)



[280] This might appear to contradict Hartenberger's advice to maintain a 'sense of "one" on the first note of [the] basic pattern' (see Hartenberger, 2016, p.95). However, this advice – which, incidentally, is not supported by any argument in the text – is imparted in a discussion on interlocking patterns, and so there is no reason to assume it applies to the patterns when gradually phased.

7. *Once the above stages have been mastered,* ***repeat*** *the process at* ***successively faster*** *tempos according to the following schema:*

- Metronome mark #1: quaver = 108 (one-half of performance tempo)
- Metronome mark #2: quaver = 132 (c. three-fifths of performance tempo)
- Metronome mark #3: quaver = 144 (two-thirds of performance tempo)
- Metronome mark #4: quaver = 162 (three-quarters of performance tempo)
- Metronome mark #5: quaver = 189 (seven-eighths of performance tempo)
- Metronome mark #6: quaver = 216 (performance tempo)

(As the moving part is now being played between the hands – a more technically straightforward method of execution – the schema at Stage 3 of the solo 2-piano method is extended to include Reich's original performance tempo of quaver = 216.)

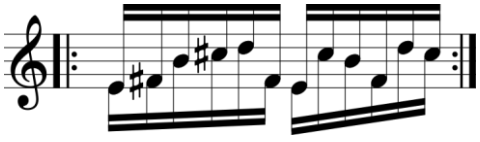
8. *Once the previous stages have been successfully achieved in relation to the phase from Figure 2 to Figure 3, apply these stages,* ***mutatis mutandis****, to* ***the remaining 23 fuzzy transitions*** *contained within the work.*

II. PHASING METHOD FOR ORIGINAL INSTRUMENTATION (STATIC PATTERN ONLY)

The phasing method adapted for a piano-and-tape performance of *Piano Phase* can itself be adapted to form a 7-stage practice regime for any pianist intending to rehearse the static part of the original version of the work. The adapted method presented below replicates the relation between the moving part and the static part but with the live pianist executing the static part for each configuration.

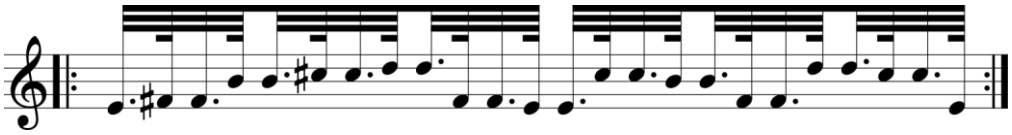
1. *Play the static part with the pre-recorded 'moving' part in the figure's unison configuration, perceiving the downbeat in* ***both*** *parts as falling on the figure's first dyad* (see Ex.3.46):

Example 3.46: Figure 2 (unison configuration of patterns as 2 voices)



2. ***Decelerate*** *the* ***'static'*** *part, until the* ***quarterway*** *point of the fuzzy transition has been reached. Perceive the downbeat as falling on the first note of the* ***'static'*** *part* (see Ex. 3.47):

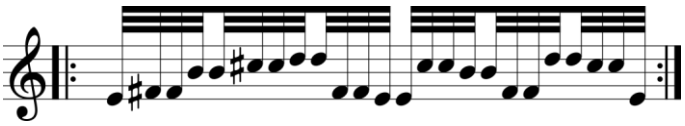
Example 3.47: Figures 2 – 3, fuzzy transition quarterway point
(configuration of patterns as 1 voice, downbeat 'static' pattern)



(At Stages 2, 3 and 4 of this current method, the configuration of the parts is the same as it is, respectively, at Stages 2, 3, and 4 of the previous 'moving part' piano-and-tape method, although the downbeat is now located in the 'static' part of the live pianist. For the current method, the configurations at Stages 2 – 5 can only be achieved via the deceleration of the 'static' part, as the 'moving' part is this time being realized by a pre-recorded, automatic, 'immovable' tape.)[281]

3. ***Decelerate*** *the* ***'static'*** *part, until the* ***halfway*** *point of the fuzzy transition has been reached. Perceive the downbeat as falling on the first note of the* ***'static'*** *part* (see Ex. 3.48):

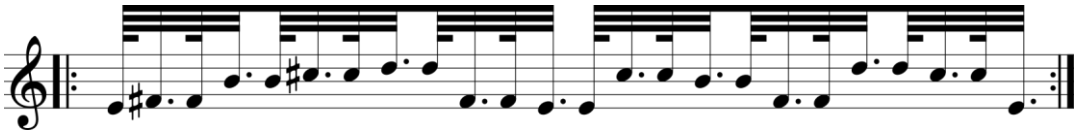
Example 3.48: Figures 2 – 3, fuzzy transition halfway point
(configuration of patterns as 1 voice, downbeat 'static' pattern)



[281] There is a precedent for this 'deceleratory' approach to live gradual phasing, as Hartenberger states that the phase in the transition from Part II to Part III of *Drumming* was 'usually made by slowing down.' – see Hartenberger, 2016, p.79

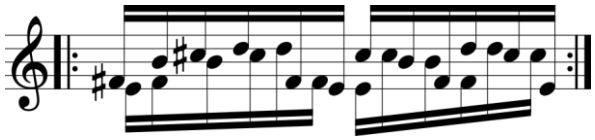
4. ***Decelerate*** *the* ***'static'*** *part, until the* ***threequarterway*** *point of the fuzzy transition has been reached. Perceive the downbeat as falling on the first note of the* ***'static'*** *part* (see Ex. 3.49):

Example 3.49: Figures 2 – 3, fuzzy transition threequarterway point
(configuration of patterns as 1 voice, downbeat 'static' pattern)



5. ***Decelerate*** *the* ***'static'*** *part, until the unison configuration of the next figure has been reached. Perceive the downbeat in* ***both*** *parts as falling on the figure's first dyad* (see Ex.3.50):

Example 3.50: *Piano Phase* Figure 3 (configuration of patterns as 2 voices)



Stages 6 and 7 of this adapted method are identical to Stages 7 and 8 of the previous piano-and-tape method (respectively, the tempo-increase schema and the method's application to all fuzzy transitions). They therefore do not need to be repeated here.

III. PHASING METHOD FOR ORIGINAL INSTRUMENTATION (BOTH PATTERNS)

The moving-part method presented at [3.6, I] and the static-part method presented at [3.6, II] can be combined to form a 7-stage, 2-player rehearsal method for the original 2-pianos 4-hands version of *Piano Phase*.[282]. In order to arrive at the various configurations (which the two pianists will often perceive differently in terms of downbeat location) the players should adjust their tempos accordingly. This may mean the acceleration of the moving part, or it may mean the deceleration of the static part, or it may mean a combination of both. Indeed, Hartenberger was cited earlier as stating

[282] Stages 1, 2, 3, 5, 6 and 7 of the static-part method correspond respectively to Stages 1, 2, 3, 6, 7 and 8 of the moving-part method. Stage 4 of the static-part method corresponds to both Stages 4 and 5 of the moving-part method (the latter being the halfway point's 'perceptual flip' stage that has no equivalent in the static-part method).

that a good steady player 'will push the tempo slightly during a phase'[283] in order to prolong the fuzzy transitions. This implies, as Hartenberger explicitly claims, that the 'steady' part is 'only nominally steady', and that two-player gradual phasing 'is not a process generated entirely by the person playing the moving part but is a give-and-take maneuver between both players'.[284] So the two pianists have a wealth of gradual-phasing strategies at their disposal, and in fact any approach at all would be justified, so long as a certain end result obtains – namely, secure and systematic execution of gradual phasing.

[283] Hartenberger, 29th May 2012
[284] Hartenberger, 2016, p.106

3.7. IMPLICATIONS & CONCLUSIONS

I. PHASING AS BOTH INTERPRETATION *AND* EXECUTION?

It was stated in [3.3, I] that the challenge of phasing can be understood as a pre-interpretative performance challenge. However, there are reasons to contend that the matter is not entirely straightforward. Hartenberger states that although phasing 'is a technically challenging process, the primary consideration should always be musicality'.[285] Indeed, decisions concerning phase duration affect the overall shape of the work, and so turn out to be decisions with an interpretative dimension. In addition, Hartenberger's earlier prescription that the 'interlocked' figures be played 'without metrical accents that detract from a listener's [metric ambiguity] options'[286] becomes an interpretative matter if applied to *Piano Phase*, not least because no such prescription features in the work's score or performance directions. So we can see that interpretative considerations have crept into both aspects of the supposedly 'pre-interpretative' phasing challenge. And whereas the previous case study demonstrated a more clear delineation between interpretative and pre-interpretative performance issues, the challenge of gradual phasing constitutes an instance for which the interpretative and pre-interpretative domains overlap, demonstrating that the conceptual boundary between the two categories can sometimes blur. But this conceptual vagueness may turn out to be no bad thing: indeed, the suggestion of freedom that 'interpretation' connotes might encourage performers to exercise their autonomy and devise independent solutions to the phasing challenge.

II. CASE STUDY #2: IMPLICATIONS FOR PERFORMANCE

The impact that the findings of this chapter could have on the performance practice of *Piano Phase* are considerable. First, the phasing method and the technical considerations related to the 2-piano 2-hands version of the work could provide a starting point for other performers to pursue this solo strategy, and to improve upon the performances given by Kovacs, Aidu, Mozdzer and myself. And there certainly is scope for progress: despite the increased technical difficulty of the solo version, Kovacs' performance admirably achieves the score's tempo direction, although its fuzzy transitions are brief, something which accounts for the performance's rather short running time of approximately thirteen minutes; and while my own 2016 performance features figures and fuzzy transitions of requisite length (with gradual phases notable for their resisting

[285] Hartenberger, 2016, p.97
[286] Hartenberger 2013, p.379

of the pull from the threequarterway point to the next interlocking figure), the undertempo playing, frequent metrical accents and often-abrupt commencement of fuzzy transitions leaves ample room for improvement. Ultimately, my research hypothesis – that a method for systematically executing the gradual-phasing technique would best improve the performance quality of *Piano Phase* when applied to its 2-pianos 2-hands version – has been proved inconclusive by the results of my performance. It is my hope that future performances, given by myself or others, and which build on the findings of this chapter, eventually prove my hypothesis to be true.

A second outcome of this chapter's findings is their wider potential application to Reich's gradual-phase pieces. It was demonstrated how the 'solo' phasing method could be adapted to the original 2-pianos 4-hands version of *Piano Phase*, via intermediary piano-and-tape adaptations for each player. This method for the systematic execution of phasing in the 2-pianos 4-hands version can be applied, *mutatis mutandis*, to *Violin Phase* (four-violin version)*,*[287] *Phase Patterns* and *Drumming*, given that they all also feature gradual phasing between live musicians. Thus my method for systematic phasing in *Piano Phase* could potentially function as a blueprint for systematic gradual phasing in Reich's music more generally.

A third potential outcome of this chapter stems from its presentation of the 2-pianos 2-hands instrumentation. Awareness of this idiom may inspire enterprising performers to construct 'solo' versions of appropriate two-piano or 'non-instrument-specific' works. My 2018 PhD Final Recital is a case in point: before my solo rendition of *Piano Phase*, I performed Terry Riley's *Keyboard Study #1* (1964) as a 2-pianos 2-hands solo work. This arrangement made good use of the idiom's potential by utilizing two separate instruments to execute component parts of *Keyboard Study #1* which are to be played at the same octave register, and by allowing me to employ different pedalling strategies for each instrument. Both these factors made for a unique and engaging performance of the work. Indeed, it is my hope that by raising awareness as to the value of the 2-pianos 2-hands idiom, present and future composers will be inspired to create original music for this instrumentation which fully exploits its distinctive musical capabilities.

[287] *Violin Phase* is the only one of Reich's phase pieces to have an 'official' live performer-and-tape option, and thus the piano-and-tape phasing method (see [3.6, I] can be adapted to this option.

III. CHAPTER CONCLUSION

The analysis-based solutions to the (primarily pre-interpretative) challenge of gradual phasing constitute further evidence for the central claim of this thesis: that the analysis of process-based minimalist works is beneficial to their performance quality, commonly at the pre-interpretative level. By demonstrating that the systematic execution of the gradual-phasing process is something that can be attained via a method, it is my contention that gradual phasing is something that can be learned and perfected methodically like any other performance technique. Finally, it is my hope that the dissemination of this method for systematic execution of gradual phasing will contribute to a greater number of high-quality performances of *Piano Phase*, in which both the composite patterns and the fuzzy transitions are consistently executed with control, regularity, and for their intended duration.

4

JOHN ADAMS

4.1. POSTMINIMALISM & ANALYSIS

I. LITERATURE REVIEW: WHAT IS POSTMININALISM?

The term 'postminimalism' suggests (at the very least) music that chronologically succeeds the minimalism of the late 1960s and early 1970s. However, Kyle Gann's first attempt at defining postminimalist music reveals a second connotation, with 'postminimalism' denoting music that is in some way *indebted* to minimalism. Gann states that postminimalism's 'connection' to minimalism is 'its tendency towards diatonic tonality […] and its inheritance of numerical, often additive, rhythmic structures from Reich's and Glass's early works'.[288] In making this claim, Gann alludes to the sonic and structural influence of minimalism on its successor. It is in this sense that Jelena Novak describes postminimalism as 'a "child" of musical minimalism'[289] – a music that was not simply preceded by minimalism, but begotten by it.

As a consequence of minimalism's sonic influence, postminimalism often exhibits features that are salient to its predecessor (as described in [1.2, II]). Like minimalism, postminimalism tends to exhibits minimization or reduction, tonality or modality, and some 'static means' such as fixed tempo and rhythmic stasis: Gann states that many postminimalist works are fashioned from a 'small, circumscribed set of materials',[290] are 'overwhelmingly diatonic in [their] scales and harmonies', and exhibit a 'grid of steady beats [which is] almost always maintained – often throughout an entire work or movement – and without change of tempo'.[291] Repetition, the primary static means of minimalism and the feature by which the movement is frequently defined, is, unsurprisingly, almost always employed in postminimalist music.

As well as exhibiting sonic similarities, works of postminimalism often evoke a third connotation, with the term 'postminimalism' denoting a *distinction* from its predecessor. Novak claims that postminimalist composers 'comment on, reinterpret and question minimalist music',[292] and their works constitute a deviation from the minimalist paradigm in their employment of minimalist devices alongside other compositional 'techniques'.

[288] Kyle Gann, 'Enough of Nothing', *Village Voice* 36/18, 30th April 1991, p.82
[289] Jelena Novak, 'From Minimalist Music to Postopera: repetition, representation and (post)modernity in the operas of Philip Glass and Louis Andriessen', in *The Ashgate Research Companion to Minimalist and Postminimalist Music*, ed. by Kyle Gann, Keith Potter & Pwyll ap Siôn (Aldershot: Ashgate, 2013), 129-140 (p.130)
[290] Kyle Gann, 'A Technically Definable stream of Postminimalism, Its Characteristics and Its Meaning', in *The Ashgate Research Companion to Minimalist and Postminimalist Music*, ed. by Kyle Gann, Keith Potter & Pwyll ap Siôn (Aldershot: Ashgate, 2013), 39–60 (p.52)
[291] *Ibid*., p.39
[292] Novak, p.130

The 'minimalism' of postminimalist works consists of 'certain features that compositions include, even if they incorporate other compositional aspects as well'.[293]

Postminimalism's 'paradigmatically distinct' nature is often demonstrated by the presence of characteristics which minimalism is explicitly described as lacking. For instance, postminimalism frequently displays the kind of traditional goal-oriented motion that is typically absent from minimalism: Robert Fink describes how, in Section V of his 'postminimal' work *Music for 18 Musicians*,[294] Reich diverges from a system-governed bass line to 'indulge in the most traditional kind of teleology – tonic-dominant polarity – that Western music has to offer'.[295]

When postminimalist composers do employ features common to minimalism, very often there is a difference in their *mode* of employment: Jon Pareles describes the repetition of postminimalist music as being used 'for texture rather than structure'.[296] In other words, postminimalist repetition contributes texturally to the formation of the 'unified rhythmic grid'[297] over which the other musical elements are superimposed, rather than providing the sonically static surface area upon which the gradual processes of minimalism are presented to the listener.

Postminimalism does still display the structural influence of minimalism in the form of processes, although like postminimalist repetition, the modes by which these processes are employed differ. First, unlike the macro-audible processes found in minimalism which were 'generally meant to be obvious to the listener', Gann also states that 'it is one of the primary changes wrought by [postminimalism] that it used them in a more underlying, even occult manner'.[298] [299] Second, postminimalist processes are often 'not carried out with complete strictness and this is a telling departure from minimalism'.[300]

Postminimalist keyboard music does commonly demand employment of the 'horizontal' and 'vertical' keyboard-playing techniques that are frequently used by performers of minimalism. However, performers of postminimalist keyboard music are also much more likely to demonstrate these minimalist techniques alongside a variety of others. These other techniques may be drawn from the 'extended techniques' demonstrated by the broader 'contemporary classical' keyboard repertoire (of which minimalist and postminimalist keyboard music are subsets), or perhaps from the familiar and

[293] Johnson, 1994, p.750
[294] 'Postminimalism' is applied, with equal validity, to relevant works from the original minimalist composers' later output, and to those written by the succeeding generation of postminimalist composers.
[295] Fink, 2006, p.52
[296] John Pareles, 'Music: Six at La Mama', *New York Times*, 6th March 1983, p.64
[297] Gann, 2013, p.57
[298] *Ibid*., p.40
[299] Discussions concerning the 'myth of audible process' (see [1.4, II]) are not applicable to postminimalism, as it has never been claimed that postminimalist processes are necessarily or intentionally audible.
[300] Gann, 2013, p.43

established techniques of the even broader category of 'standard classical' keyboard repertoire.

Finally, and unlike the open instrumentation exhibited by many minimalist works, postminimalism is, according to Gann, 'almost always written in standard notation', and with the instrumentation specified. Most of the postminimalist music Gann refers to is specifically 'for chamber ensembles or solo instrument'.[301]

II. ANALYSIS, PERFORMANCE AND POSTMINIMALISM

If postminimalism has a tendency to incorporate traditional features of Western classical music, then previously-cited claims (see [1.1, I]) that analysis can positively inform performance at an interpretative level – claims founded on certain Western classical tropes – might indeed be applicable to some postminimalist works. For instance, it is quite possible that the 'sense of directed motion' which can 'form an interpretative foundation for the performer'[302] will be displayed by a work of 'goal-oriented' postminimalism, which would in turn render such an 'interpretative foundation' possible.

But any increased relevance of the 'interpretative' claims discussed in [1.1, I] would not necessarily cause a decrease in relevance of 'pre-interpretative' considerations when it comes to postminimalism. Indeed, the central claim of this thesis – that analysis can benefit performance at the pre-interpretative level – is, to my mind, categorically applicable to postminimalism. In the remainder of this chapter I hope to demonstrate this, with particular reference to a third case study – *Phrygian Gates* by John Adams.

[301] Gann, 2013, p.40
[302] Wintle, p.86

4.2 CASE STUDY #3: *PHRYGIAN GATES*

I. BASIC ANALYSIS

Adams states that his two solo piano works *Phrygian Gates* and *China Gates* (both 1977 – 78) can be regarded as his his 'opus one', given that they constitute his 'first coherent statements in a new [musical] language'. He describes *Phrygian Gates* as comprising 'a 'tour of half of the cycle of keys, modulating by the circle of fifths'. While the use of the diatonic term 'keys' to describe a modal work is a little misleading here, *Phrygian Gates* does exhibit the use of 7 of the chromatic scale's 12 pitches – slightly more than the 'half' referred to by Adams – as modal finals. The sections that are built on each of these finals present material in two different modal states – 'one state in the Lydian mode and the other in the Phrygian mode' – with the material shifting abruptly between these states. The abrupt shifts constitute the 'Gates' of the title, a term 'borrowed from electronics' and employed figuratively to describe the sudden change in output from one mode to the other.[303] The work does indeed progress from one section to the next by way of the circle of fifths, with the consecutive sections' finals admitting the pitch sequence 'A, E, B, G♭/F♯, D♭/C♯, A♭/G♯, E♭/D♯'. Adams describes the proportionality of the Lydian/Phrygian material on each modal final:

> As the piece progresses the amount of time spent in the Lydian gradually shortens while that given over to the Phrygian lengthens. Hence the very first section, on A Lydian, is the longest in the piece and is followed by a very short passage on A Phrygian. In the next pair (E Lydian and Phrygian) the Lydian section is slightly shorter while its Phrygian mate is proportionally longer, and so on until the tables are turned.[304]

The exception to this single pairing of mode-specific Lydian/Phrygian passages occurs in the 'coda', in which 'the modes are rapidly mixed, one after the other':[305] the sections built on the modal finals 'A♭/G♯' and 'E♭/D♯' each consist of multiple Lydian passages and multiple Phrygian passages oscillating between each other until the conclusion of the work.

When describing the textural character of the work, Adams states that many of the keyboard ideas employed in the *Phrygian Gates* 'suggest the rippling of waveforms', and that each hand is treated 'as if it were operating in a wave-like manner, generating

[303] John Adams, 'Phrygian Gates and China Gates', John Adams official website, <https://www.earbox.com/phrygian-gates-china-gates/> [accessed 3rd December 2019]
[304] *Ibid*.
[305] *Ibid*.

patterns and figurations that operate in continuous harmony with the other hand'.[306] The term 'waveforms' to describe the horizontal patterns is also borrowed from electronics, and is used figuratively to describe the music's intertwined motion, exhibited by the two-hand texture and not unlike that of an electromagnetic wave. A homophony of sorts is then created in the work via the superimposition of vertical punctuations, 'short "pings" of sound' that occur outside the central two-hand waveform texture.[307]

II. LITERATURE REVIEW: *PHRYGIAN GATES* AS POSTMINIMALISM

Postminimalism's characteristic of being at once indebted to, but distinct from minimalism is embodied by *Phrygian Gates*. Adams states that the work 'shows a strong influence of Minimalist procedures',[308] although Schwarz cites the presence of certain antithetical features (such as 'its harmonic variety and its impassioned climaxes') as evidence that even Adams' earliest output had 'left minimalism behind'.[309]

As a typical postminimalist work, *Phrygian Gates* exhibits many aspects of minimalism's sonic influence. Catherine Pellegrino speaks of the tonal/modal aspects of *Phrygian Gates* – as well as its minimized musical ingredients – when she states that 'pitch materials are drawn almost exclusively from the diatonic scales indicated by the [Lydian and Phrygian] modes'.[310] The work's rhythmic stasis and fixed tempo are conveyed by Schwarz's description of the work's exposition as 'a nearly unbroken chain of pulsating eighth notes'.[311]

Phrygian Gates attests to postminimalism's paradigmatic distinction from its minimalist predecessor. For instance, the juxtaposition of repeated horizontal patterns and insistent vertical 'pings' demonstrates the textural – rather than structural **–** impact of the repetition in *Phrygian Gates*. The work also highlights Adams's rejection of minimalism's static ends: Schwarz describes the work's 'directionalized motion that sweeps towards climaxes – a motion far removed from the stasis of minimalism'.[312] Adams's rejection of static ends is also indicated by his decision to alter or remove the steady pulse in certain sections of *Phrygian Gates*. This substantiates Jonathan W. Bernard's assertion that 'Adams's distance from minimalism as an aesthetic enabled him to turn off the

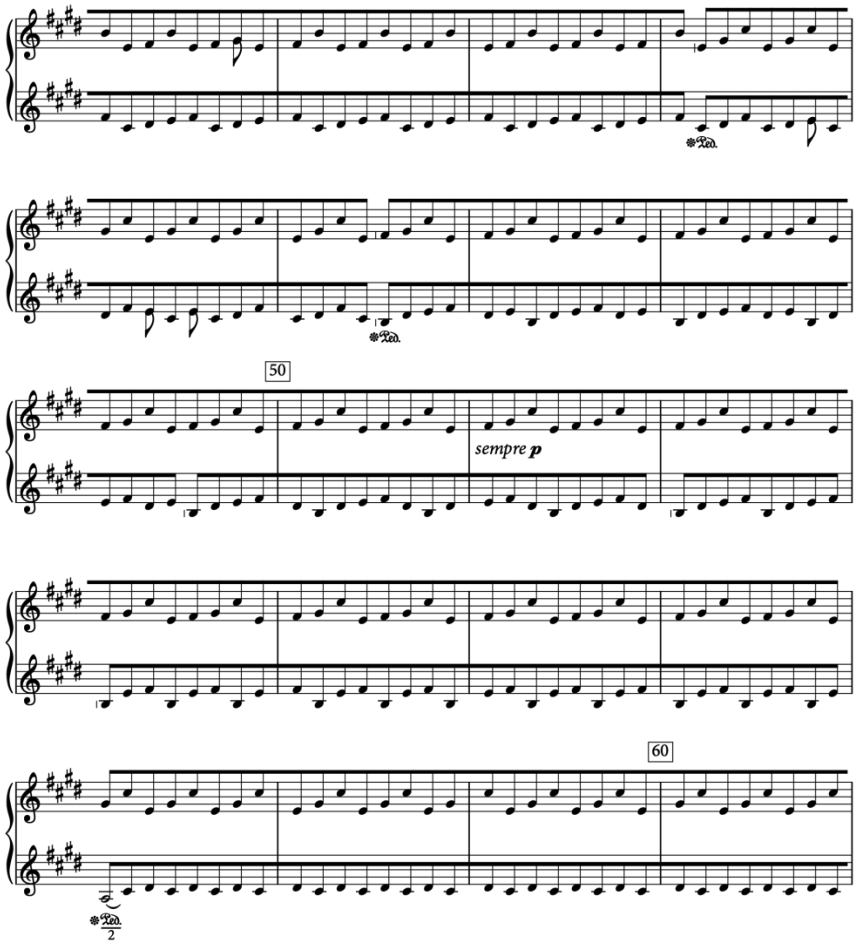
[306] Adams
[307] *Ibid*.
[308] *Ibid*.
[309] Schwarz 1996, p.178
[310] Catherine Pellegrino, 'Aspects of Closure in the Music of John Adams', *Perspectives of New Music* 40/1 (Winter, 2002), 147-175 (p.150)
[311]Schwarz 1996, p.178
[312] K. Robert Schwarz, 'Process vs. Intuition in the Recent Works of Steve Reich and John Adams', *American Music* 8/3 (Autumn, 1990), 245-273 (p.258)

minimalist pulse from time to time, as if in the service of conventional contrast and dramatic effect'.[313]

Adams's figurative and anthropomorphic description of the modes employed in *Phrygian Gates* testifies to the antithetical presence of representational content in postminimalism. He describes the work as a battle between the Lydian mode's 'light, sensual resonant personality' and the Phrygian mode's "volatile, unstable, but often heroic qualities'.[314]

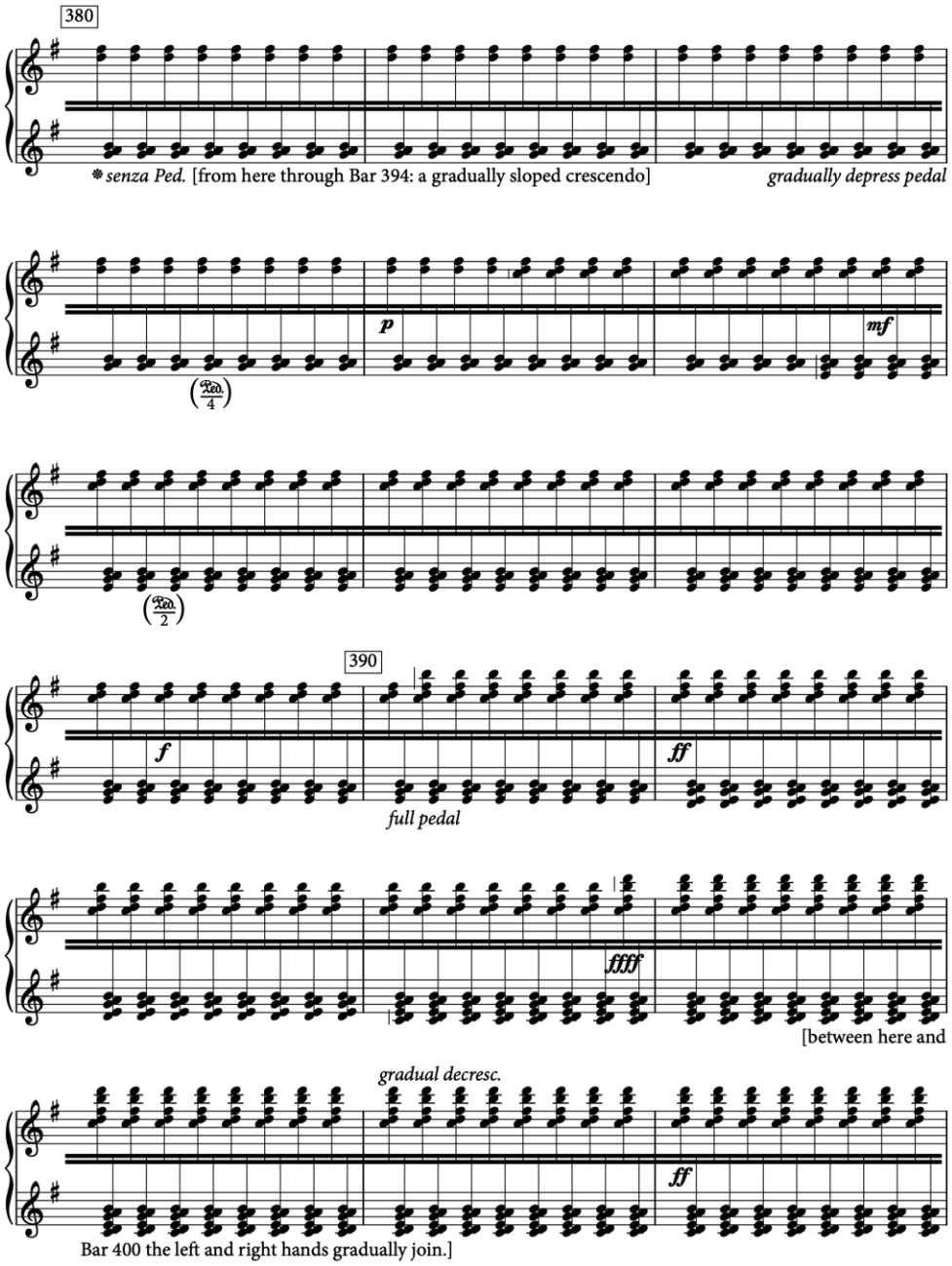
Both the vertical and horizontal (post)minimalist keyboard techniques are required for performances of *Phrygian Gates*. At bb. 41 – 60 (see Ex. 4.1) there are horizontal scalic and arpeggiated figurations played in both hands; at bb. 380 – 397 (see Ex. 4.2) there are tremolo semiquavers that require a rapid, vertical, 'left-right-left-right' execution.

Example 4.1: *Phrygian Gates* bb. 41 – 60



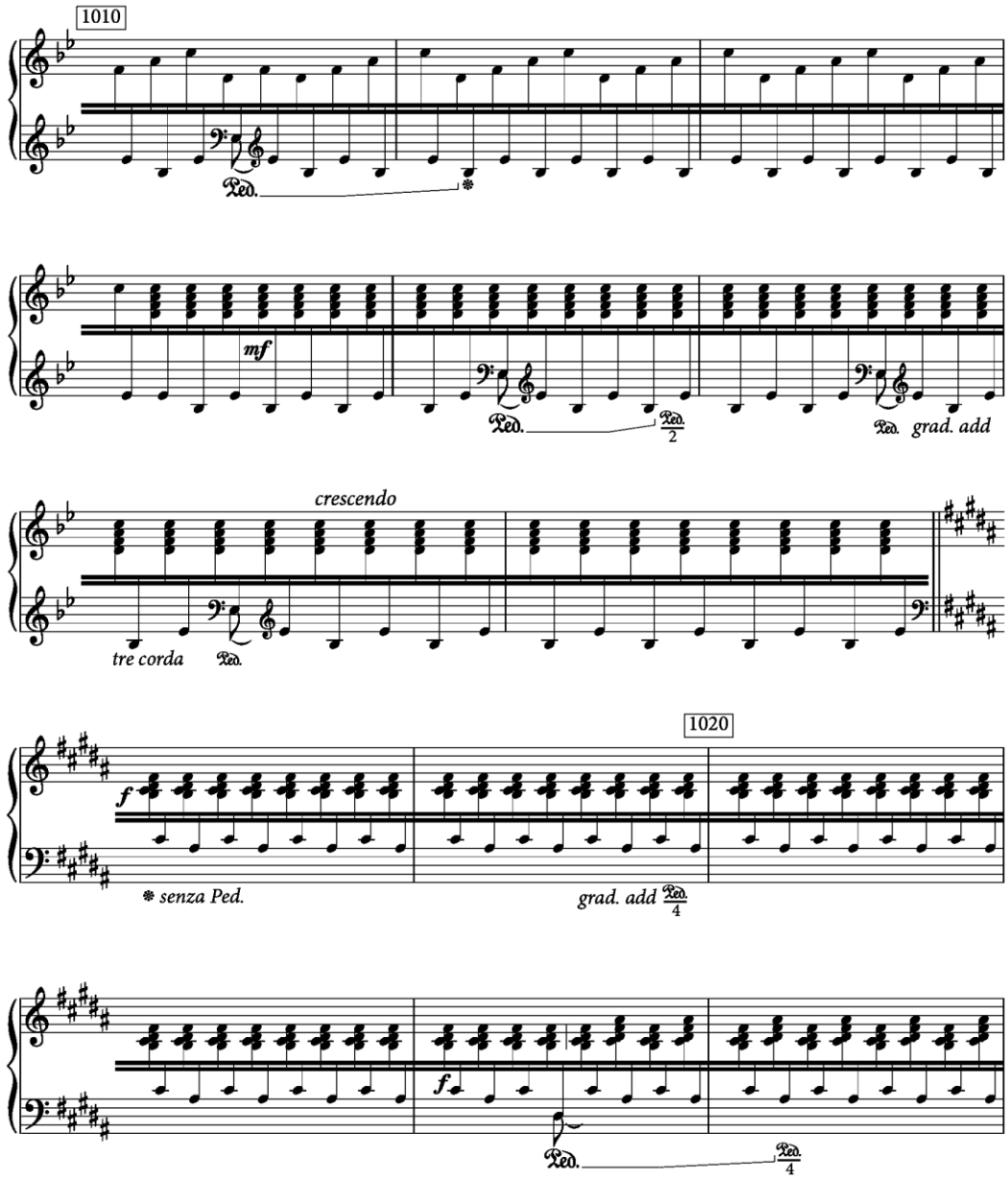
[313] Jonathan W. Bernard, 'Minimalism, Postminimalism, and the Resurgence of Tonality in Recent American Music', *American Music* 21/1 (Spring 2003), 112-133 (p.117)
[314] John Adams, 'Liner Notes', *John Adams: Phrygian Gates/Shaker Loops*, 1750 Arch Records, S–1784 (LP, 1980)

Example 4.2: *Phrygian Gates* bb. 380 – 397



However, *Phrygian Gates* also exhibits postminimalism's tendency to employ minimalist performance techniques alongside a variety of others: bb. 1010 – 1023 (see Ex. 4.3) present an example of an extended technique in the form of fractional pedalling (see the half-pedal marking at b.1014, for instance). More significantly, this passage also evokes the standard classical keyboard repertoire – specifically the toccata, one of the oldest compositional forms for showcasing keyboard virtuosity, typically involving rapid passagework between alternating hands in close proximity.

Example 4.3: *Phrygian Gates* bb.1010 – 1023



Phrygian Gates embodies both the specific instrumentation of postminimalism, and its adherence to standard notation: the work is written for solo piano, and its score (for the most part) adheres to standard notational conventions (regular metre, key signatures, great stave etc.). Finally, the work demonstrates postminimalism's structural tropes, albeit via Adams' employment of 'underlying' processes which do not exhibit 'complete strictness'.

4.3. *PHRYGIAN GATES*: PERFORMANCE CHALLENGES

I. PRE-INTERPRETATIVE DIFFICULTIES

There is a comparatively large number of pianists who have performed *Phrygian Gates*: In sharp contrast to the mere three available commercial recordings of case study #1 for example, *Phrygian Gates* has been recorded by twelve different pianists – Emanuele Arciuli, Bruce Brubaker, Gloria Cheng, Rolf Hind, David Jalbert, Hermann Kretzschmar, Mack McCray, Ursula Oppens, Christopher O' Riley, Ralph van Raat, Andrew Russo, and Jeroen van Veen. The work also features in the live repertoire of many more concert artists (British pianists Ben Smith and Andrew Zolinsky to name but two).

Because of minimalism's sonic influence, performances of *Phrygian Gates* can frequently exhibit the same kind of pre-interpretative deficiencies which, as previously discussed, are associated with performances of minimalism. Furthermore, the collection of recordings by the pianists named above can serve as evidence for the claim that the frequency of such deficiencies obtains even when we consider performances by experienced practitioners (see 1.3, I).

Some of these deficiencies consist of simple rhythmic errors: in the Hind recording,[315] the right-hand C octave in b.116 occurs one quaver early, as does the right-hand A♯ octave of b.296 in the Oppens recording.[316] Others consist of notational omissions: in b.336 of the Jalbert recording,[317] the nine tremolando semiquavers situated between two C bass notes are not played, while in the Russo recording,[318] b.377 is missed out completely. There are also deficiencies which amount to mis-readings of the score: in the Arciuli recording,[319] b.596 is repeated when no instruction to do so is given, and in bb.253 – 254 of the Russo and van Veen recordings,[320] the 20-quaver bass grouping is played one octave lower than written (with both pianists presumably missing the termination of the *ottava bassa* instruction at b.253). A more severe instance of mis-reading occurs in bb.266 – 282 of the van Veen recording: in contravention of both the 6-sharp key signature and the work's 'cycle of fifths' process, van Veen executes this passage as if it were E Lydian (instead of the notated B Lydian), playing E naturals throughout.

[315] John Adams, *Road Movies* (featuring *Phrygian Gates* – Rolf Hind, piano), Nonesuch 7559796992 (CD, 2004)
[316] Ursula Oppens, *American Piano Music of our Time* (featuring *Phrygian Gates*), Music & Arts MACD4862 (CD, 1995)
[317] David Jalbert, *Adams – China Gates, Phrygian Gates; Glass – Orphée Suite*, Atma Classique ACD2 2556 (CD, 2010)
[318] John Adams, *Road Movies* (featuring *Phrygian Gates* – Andrew Russo, piano), Black Box BBM 1098 (CD, 2005)
[319] Emanuele Arciuli, *Rzewski – Four Pieces; Adams – Phrygian Gates,* Stradivarius STR 33735 (CD, 2006)
[320] Jeroen van Veen, *Adams: Piano Music* (featuring *Phrygian Gates*), Brilliant Classics 95388 (CD, 2017)

Pre-interpretative issues of tempo also crop up: in the van Veen recording, bb.1 – 401 are played at minim = 70, barely three quarters of the indicated tempo marking (minim = 90, applicable to the entire section), and which is arguably too far below this prescribed metronome mark to be justified by appeal to interpretative considerations. In the same section of the work, both the Hind and the Oppens recordings exhibit episodic fluctuations of tempo, most notably the sudden drops in speed that tend to occur when the music becomes more technically demanding. This fact would suggest that such reductions in tempo are necessitated by the executive difficulty of the material, and are not the result of interpretative decisions.

Now it might be objected that we shouldn't rely on recordings to furnish us with exemplary performance anyway, especially once potentially less-than-optimum 'economic and social factors are reckoned into the product'.[321] But an explanation by appeal to social or economic factors do not stop these flaws from being flaws, and many of them cannot reasonably be excused away with hypothetical reference to inadequate practice or recording time. Thus they remain valid items of evidence for the pre-intepretative difficulties presented to performers of *Phrygian Gates*, difficulties that can be attributed to minimalism's sonic influence.

II. GENERAL CHALLENGES ENCOUNTERED

If a work of postminimalist keyboard music exhibits any of minimalism's salient characteristics (by virtue of the latter's influence), then its performers are likely to encounter the general pre-interpretative challenges (as described in [1.3]) which these salient characteristics produce. With the exception of bb.640 – 808, *Phrygian Gates* consists of near-continuous quaver or semiquaver motion, with many lengthy passages played at constantly loud dynamic. As a result, the work presents a significant physical challenge to its performers (see [1.3, II]), and is rightly described by Adams as 'a behemoth of sorts [which] requires a pianist capable of considerable physical endurance'.[322] Indeed, American pianist and musicologist Kyle Fyr states that when performing *Phrygian Gates* he 'frequently reached the end of the piece in a state of exhaustion with pain in my forearms'.[323]

[321] Thomas, 2007, p.138
[322] Adams
[323] Kyle Fyr, *Proportion, Temporality, and Performance Issues in Piano Works of John Adams* (PhD dissertation, Indiana University, 2011), p.166

The typically postminimalist 'textural' repetition featured in *Phrygian Gates* demonstrates a fair amount of motivic and dynamic variety, and this means that minimalism's mental challenge (as described in [1.3, IV) is not particularly relevant to the work (as there is no sustained and unmitigated repetition to necessitate either 'object-focus-variation' or the 'meditative' approach as recommended in [1.3, V]). Conversely, the technical challenge (as described in 1.4, VI) *is* applicable to *Phrygian Gates*, and further reference to the available commercial recordings can demonstrate this: in the Arciuli recording, an error in b.141 displaces the right-hand pattern and readjustment doesn't occur until b.143; and there are similar occurrences in both the Oppens and the Russo recording (at bb. 535 – 538 and bb.539 – 543 respectively). So while it might not be the case that 'recovery is next to impossible',[324] these instances demonstrate that a single wrong note in *Phrygian Gates* can give rise to further flaws until such 'recovery' is eventually achieved.

The 'psychoacoustic' aspect of the aural challenge (see [1.3, VIII]) is relevant to *Phrygian Gates*, although whether this constitutes a 'pre-interpretative' challenge is debatable. There are sections of the work (most notably bb.809 – 922) in which the rapid, pedalled semiquaver figurations generate the impression of sustained drones hovering above the texture, and Adams's own statement that pianists must be able 'to sustain long arches of sound'[325] could arguably be understood as a pre-interpretative recommendation to prioritize these psychoacoustic drones over the notated material. But without explicit instructions in the score to do so, the 'pre-interpretative' status of this psychoacoustic dimension is left uncertain.

But regardless of its status, this psychoacoustic aspect of the aural challenge can still be addressed via the non-analytical solutions presented in [1.3, IX]. And as per 'analysis/performance scenario #1' (see Introduction), the general physical and technical pre-interpretative performance challenges that apply to *Phrygian Gates* can be addressed via the non-analytical solutions that are presented in [1.3, III] and [1.3, VII] respectively.

III. INTERPRETATIVE CHALLENGES

The current focus on the pre-interpretative performance challenges presented by *Phrygian Gates* in no way implies that challenges of interpretation are absent from the work. Indeed, many of the assertions from the literature examined in [1.1, I] can be applied to the work's interpretative issues. One such issue is alluded to by Adams

[324] Cahill, 2013, p.386
[325] Adams

himself when he states that 'it's astonishing to hear how many pianists struggle either consciously or unconsciously to "prepare" the listener for each new "gate"'.[326] Kyle Fyr states that this comment 'seems odd in the context of his score indications because the end of virtually every Lydian module features a crescendo to the next Phrygian gate';[327] but Fyr understands Adams's comment as implying that 'performers do not need to do anything beyond what is indicated in the score to mark the gates'[328] – or, in Berry's words, it is sufficient for performers to 'yield to compositional intent'.[329]

IV. POSTMINIMALISM-SPECIFIC CHALLENGES

In addition to its 'minimalist' challenges, performers of postminimalism will often have to tackle difficulties of a more conventional kind, given the tendency of postminimalism to demand aspects of traditional virtuosity and musicianship from its players. It follows from their more traditional origins that such features are not grounded in any of the salient characteristics of minimalism previously described.

It was stated in [4.2, II] that *Phrygian Gates* evokes the toccata, a compositional form which typically involves both hands playing in close proximity on the keyboard. An attendant difficulty with this type of keyboard writing is referred to by Fyr, when he states that pianists must decide 'how to negotiate the close overlaps between right-hand and left-hand patterns'; this is especially pertinent when we consider the fact that, quite often, the same pitch is scored in both hands simultaneously, and the implied 'double execution' could result in the note being played with excessive force, breaching Adams's instruction to play the work so that 'no single note [of a repeated pattern] predominates over the others'.[330] I employed two solutions to this challenge, applied pragmatically on a case-by-case basis: for some passages, I opted to drop the note in question from one pattern, playing it with only one hand; for others, I played them in both hands but consciously applied less weight to these notes so that dynamic constancy was maintained.

Another traditional – and, to my mind, pre-interpretative – challenge presented by *Phrygian Gates* is that of memorization. The relevance of this challenge stems from the fact that *Phrygian Gates*, like many postminimalist works, has expressive content; and if we assume that often the purpose of performing from memory is to give an authentic, organic representation of the work's expressive content (which in turn requires the

[326] John Adams, 'John Adams Reflects on his Career', in *The John Adams Reader: Essential Writings on an American Composer*, ed. by Thomas May (Pompton Plains, New Jersey: Amadeus Press, 2006), 2-28 (p.26)
[327] Fyr, p.164
[328] *Ibid*.
[329] Berry, p.36
[330] John Adams, 'Performance Notes', in *Phrygian Gates* [published score] (New York: AMP, 1978), p.2

performer to transcend the written score), then it is reasonable to deduce that the memorization of any 'expressive' postminimalist work will improve its performance quality. But as we will see in the next section, memorizing *Phrygian Gates* is an extremely difficult task, as the repetition employed is often intuitive and unsystematic, and also tends not to be governed by the kind of strict macro-processes that might otherwise serve as an all-encompassing mnemonic aid.

4.4. *PHRYGIAN GATES*: THE CHALLENGE OF MEMORIZATION

I. THE PURPOSE OF MEMORIZATION

Postminimalist keyboard music regularly exhibits a juxtaposition of familiar minimalist tropes with more traditional technical or representational aspects. And it is reasonable to argue that, as a consequence, the more traditional challenge of memorization often constitutes one of postminimalist keyboard music's pre-interpretative challenges. Indeed, just as it is often seen as beneficial to performance across the wider field of standard repertoire, memorization can also improve the performance quality of postminimalist keyboard music.

Although there are numerous instances of literature that articulate *how* music is memorized, sources that offer explanations for *why* musicians choose to perform from memory prove more elusive: English pianist Caroline Palmer states that 'successful performance from memory' can be explained via appeal to 'accurate auditory and motor representation', yet nowhere in her article does she discuss the purpose of memorization.[331] However, many other practising musicians do at least allude to its benefits: indeed, it was stated earlier (see [3.2, II]) that Reich could only achieve the desired results of the gradual-phasing process 'when he literally closed his eyes to avoid distraction.'[332] The memorization of *Piano Phase* implied here is explicitly referred to elsewhere: Reich states that 'one learns the musical material and puts the score aside because it is no longer necessary, it would only be a distraction.'[333]

Reich's statement above suggests that the avoidance of notational distraction is one benefit of memorization, and Russell Hartenberger expresses a similar sentiment. He states that, when coaching Reich's *Drumming*, he often encounters the musicians at the first rehearsal performing from notation, and finds them 'totally disengaged from their playing'.[334] Hartenberger states that by teaching the parts by rote and forgoing the score, the players develop a 'much more thorough sense of the whole piece by attending to their parts without the crutch of notation.'[335] This echoes Reich's own practice in the first rehearsals for *Drumming*, during which all the parts 'were taught by rote and none of the percussion players saw any notation'.[336]

[331] Caroline Palmer, 'The Nature of Memory for Music Performance Skills', in *Music, Motor Control and the Brain*, ed. by Eckhardt Altenmüller, Mario Wiesendanger, & Jürg Kesselring (Oxford: Oxford University Press, 2006) 39-53 (p.39)
[332] Strickland, p.197
[333] Reich ed. Hiller 2002 [1967], p.24
[334] Hartenberger, 2016, p.150
[335] *Ibid*.
[336] *Ibid*., p.11

The removal by memorization of notation's negative consequences is also suggested by American classical and jazz bass professor Donovan Stokes, who describes memorization's benefits in explicitly positive terms as well. Concurring with Hartenberger's view that notation constitutes a 'crutch', Stokes states that, when no longer 'chained to reading the printed page, the performer can put their attention to aspects of tone, technique, musicality, and nuance more completely.'[337] Stokes's statement implies a certain 'binary' quality to the freedom that memorization produces: it is the freedom *from* the score which allows the performer the freedom *to* attend more fully to other musical concerns.

Like Stokes, British pianist Andrew Ball feels that memorization makes for increased attention as well as more focused listening. Ball states that memorization improves performance 'because it aids the quality and intensity of concentration and listening which one experiences in one's best playing.'[338] Sarah Cahill also speaks of the 'increased freedom' that memorization affords the performer, and suggests that an improvement in performance quality occurs by way of 'internalizing' the music and making it 'a part of you'.[339] Daniel J. Levitin expands on this by describing the 'stuck in your head' nature of internalization as furnishing the performer with 'an integrated, cognitive representation of the sound of the music as well as the emotions it conveys'.[340] He also implicitly assents to the 'binary' freedom of memorization when he states that the 'aim is to know a piece so well that you can stop thinking about the *notes*, and start thinking about the emotional expression'.[341]

So according to these sources, memorization both removes some negative aspect regarding the use of notation (variously characterized in terms of 'distraction', 'disengagement' or 'restriction'), and also possesses some directly positive qualities (variously described in terms of 'internalization' or 'freedom'). As a performer I would certainly agree with this (albeit imprecise) appraisal of memorization as far as it goes. I will now attempt to describe the specific aspects of memorization to which I believe these terms allude.

[337] Donovan Stokes, 'Why Memorize Music?', *No Treble*, 2016 (uploaded 13th June), <https://www.notreble.com/buzz/2016/06/13/why-memorize-music/>[accessed 30th December 2019]
[338] Andrew Ball, email correspondence, 22nd June 2019
[339] Sarah Cahill, phone interview, 31st May 2019
[340] Daniel J. Levitin, 'How to Memorise a Symphony', *Guardian*, 16th July 2015, <https://www.theguardian.com/music/2015/jul/16/memorise-symphony-proms-aurora-orchestra-music-neurological> [accessed 30th December 2019]
[341] *Ibid*.

II. AN ARGUMENT FOR THE BENEFITS OF MEMORIZATION

If a performer relies on the score to play the work, then the music exists in an external relationship to them. In such cases, performers function as 'translators' (or 'decoders') of the notational symbols in the written music, with the visual encounter with the score constituting the 'input' of a musico-linguistic set of ciphers. The information is then deciphered by the performer via a brief period of cognitive activity, during which the notational symbols are 'translated' into the physical actions required to produce the 'output' (the sounding music). Following this intermediary stage, the performer executes the necessary physical actions and the sounding music is produced.

The impact of this 3-stage 'input-translate-output' process can be illustrated by way of a linguistic analogy: whenever we read words aloud, our eyes and brain invariably attend to words and phrases that are ahead of those that we are presently speaking. Similarly, whenever music is performed from notation, a performer's cognitive capacity is preoccupied with musical information some bars ahead of the passage that is presently being played. This means that, at any given time, the performer's attention, at least in part, is diverted away from the present musical moment and towards information that pertains to a future musical event. Consequently, there is always an element of 'disengagement' when notation is relied upon; and in cases where the musical concerns of the work are multifarious, this disengagement and lack of presence often translates into a lower-than-optimal performance in terms of technique, musicality, tone, nuance, and other musical concerns.

So if this external relation of the music to the performer constitutes a 'distraction' from musical concerns, and consequently 'restricts' the performer's ability to attain optimal performance quality, then the 'internalization' of the music by way of its memorization removes the distraction, and lifts the consequent restriction. The performer is now 'free' to engage with the sounding music fully, and pursue optimal performance quality as a live possibility. Technique, musicality and expression can now be attended to completely, in the present moment, and to explicitly positive effect. In fact, the heightened sense of presence that memorization affords can in turn lead to the peak performance state known as 'flow', a physically and psychologically immersive mode of being in which performers are 'using [their] skills to the utmost'[342] and which can only come about if performers 'keep attention right here, right now'[343] in the way that memorization allows.

[342] Mihaly Csikszentmihalyi, 'Go with the Flow' (interview with Jonathan Geirland), *Wired*, 1st September 1996, <https://www.wired.com/1996/09/czik/>[accessed 30th December 2019]
[343] Steven Kotler, *The Rise of the Superman: Decoding the Science of Ultimate Human Performance* (London: Quercus, 2014), p.113

III. MEMORIZATION AND *PHRYGIAN GATES*

As stated in [4.3], *Phrygian Gates* is a work with multiple challenges, and so a memorized performance would permit the performer to attend to these concerns fully, without the distraction of notation, and would in turn open the door to optimal performance quality.

Having performed *Phrygian Gates* from memory numerous times, I can confirm that the freedom to engage in full with the musical aspects of the work does make for a better performance. But memorization also increases performance satisfaction because it grants performers the periodic ability to immerse themselves absolutely in the sounding music, almost in the same fashion that a listener can. In those passages that feature a kind of 'cruise-control' repetition, the performer has significantly less 'executive responsibility' and can turn their attention away from any technical or musical decision-making, and towards the aural experience itself. But this immersive experience and its attendant satisfaction are only possible if the level of awareness required is not diminished by the use of notation.

Phrygian Gates is also a work with a considerable degree of dramatic and emotional content, and its memorization would no doubt facilitate the performer's ability to constitute an integrated, authentic vehicle for the expression of such content. However, while beneficial to performance quality, memorizing *Phrygian Gates* is also incredibly difficult, and the sheer paucity of pianists who are willing or able to perform the work from memory attests to this fact. For instance, neither Rolf Hind nor Andrew Zolinsky (British pianists who have been performing *Phrygian Gates* for over a decade) have given any of their performances of the work from memory.[344, 345] British pianist Ben Smith attempted to memorize the work in preparation for his 2019 performance at Barbican Hall, London, and the considerable amount of work that he put in to this task is an indication of its difficulty. Smith's efforts included consultation of Frances A. Yates's 1966 publication *The Art of Memory*,[346] application of the method of loci,[347] and a substantial amount of desk-bound, number-crunching analysis of the work's score. At the time of writing, however, Smith's labour has yet to bear fruit in the form of a memorized performance.[348]

In fact, I am aware of only two pianists who perfom *Phrygian Gates* from memory – Dutch pianist, musicologist and contemporary music specialist Ralph van Raat,[349] and

[344] Andrew Zolinsky, conversation, 28th June 2018.
[345] Rolf Hind, email correspondence, 29th May 2019.
[346] A study of the history of mnemonic devices from Ancient Greece up to the Renaissance.
[347] A mnemonic strategy which uses visualizations, spatial memory, and familiar information about one's environment, to quickly and efficiently recall information.
[348] Ben Smith, phone interview, 1st May 2019
[349] Zolinsky

myself. Indeed, my own experience of memorizing the work is a further indication of its difficulty: this single task required approximately eight weeks of dedicated effort on my part and to the exclusion of all other musical projects (even though I already had three months of practice time and one notation-aided performance under my belt).

My first-hand experience can also provide some explanation as to *why* memorizing *Phrygian Gates* is so challenging. First, recourse to muscle memory is far less effective a strategy for memorizing this work than it is for, say, an oft-memorized piece of standard repertoire. Memorizing a musical sequence is made easier if that sequence comprises distinct items of musical 'data' (motifs, phrases, patterns etc.). Correspondingly, muscle memory is at its most reliable when each item of data in the sequence is executed by a distinct set of physical actions. But with *Phrygian Gates*, muscle memory is unreliable precisely because the items of data in any given sequence are not sufficiently distinguishable – the work progresses from one musical segment to the next often via extremely subtle changes to the musical material. Correspondingly, the sets of physical actions required to execute these barely-differentiated segments are themselves barely-differentiated. Thus it is very easy to make sequential mistakes (eg following the first item in the musical sequence with the third instead of the second), given the close physical similarity of each item's execution.

A second consideration arises from the fact that the individual sequences of near-identical musical data that make up *Phrygian Gates* do not appear to be governed by any strict or audible processes. If these sequences possessed an internal logic, then the memorization of a sequence might only require the retention of its one unifying grammar, instead of its many, closely similar words or phrases. However, it is not at all clear – aurally at least – whether such 'structural mnemonics' inhabit these sequences, or whether the sequences themselves are governed by some all-embracing macrostructure that could aid memorization via its retention.

Of course, this is exactly what we might expect from a postminimalist work like *Phrygian Gates*, given what was stated earlier about postminimalism's 'underlying' use of processes that are often applied without anything like 'complete strictness'. So whereas, in contrast, the apparent 'unmemorizability' of *Music in Contrary Motion* was overcome via analytical knowledge of the strict processes governing this work*,* it might be reasonable to speculate that memorizing *Phrygian Gates* is less achievable, given the probable absence of strictly-applied processes in this typically postminimalist work.

But despite its considerable difficulty, the fact remains that memorizing *Phrygian Gates* is a live possibility. And as one of the few people around who have achieved this feat,

this author has privileged access to numerous methods and strategies which he has applied to his performances over a nineteen-year relationship with the work.

In the following two sections I will examine various analyses of *Phrygian Gates* that are drawn from primary and secondary sources. By complementing my existing methods with these analytical considerations, I will provide an enhanced version of my overall strategy for memorization. In doing so, I will again provide evidence, as per 'analysis/performance scenario #3' (see Introduction), for the central claim of this thesis: that the structural analysis of process-based minimalist or postminimalist music can yield pre-interpretative performance benefits.

4.5. *PHRYGIAN GATES*: ANALYTICAL STRATEGIES FOR MEMORIZATION

I. LITERATURE REVIEW

Although not as well-represented analytically in the available literature as case study #2, *Phrygian Gates* does fare better in this regard than case study #1, as there are at least a handful of publications that subject Adams's work to some level of relevant structural analysis. The composer's own discussion of the work's texture yields a significant structural comment. As stated previously (see [4.2, II]), Adams says that the horizontal patterns of each hand have the character of 'waveforms',[350] but he also claims that the vertical punctuations occurring throughout *Phrygian Gates* function as structural indicators: the short **'**pings' of sound (as Adams describes them) serve as 'signposts which mark off the smaller internal units in a ratio of roughly 3-3-2-4.'[351] What this means is that, for any small system adhering to this ratio, the music proceeds for 3 instances of a given time value, (until the first structural punctuation), and then continues for 3 more instances of the same time value (until the second punctuation), and then continues for 2 instances of that time value (until the third and final punctuation), and finally continues for 4 instances of that time value, after which the start of a new system is announced via a change in the composite 'waveform' pattern.

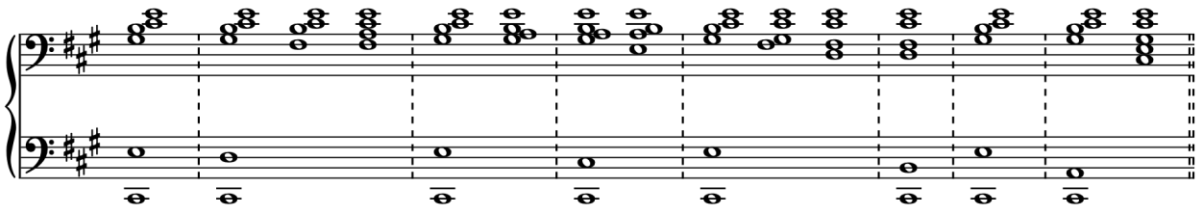
K. Robert Schwarz construes the modal progression through the circle of fifths described in [4.2, I] as occurring within a 'larger four-movement plan, the sections of which flow into one another without a break'.[352] Schwarz also comments on the expanding and contracting melodic patterns *of Phrygian Gates*, and their similarity to 'the additive and reductive processes of melodic growth found in Philip Glass's early works', with additive growth involving the 'slow process of accretion in which new notes are introduced systematically', and reductive growth involving 'a gradual systematic removal of a note or notes from the existing collection'.[353] In *Phrygian Gates*, Adams builds 'not only the shifting melodic patterns in an additive/reductive manner' but also 'the cluster-like harmonic structures', although the application of these processes does not appear to be as rigorous as in Glass's music.[354] Indeed, the less-than-systematic application of a Glassian structural trope shows how '*Phrygian Gates* asserts Adams' own, more intuitive approach to composition',[355] and would also indicate that the work's postminimalist

[350] Adams
[351] *Ibid*.
[352] Schwarz, 1990, p.257
[353] *Ibid*.
[354] *Ibid*.
[355] *Ibid*., p.258

credentials, both in its 'inheritance' of Reich/Glass processes and the lack of 'complete strictness' of their employment.

Perhaps Schwarz's most significant contribution to my analytical understanding of *Phrygian Gates* is his description of the work's 'third movement' ('A System of Weights and Measures') as constituting 'a chaconne that repeats four times during the movement'. Schwarz provides the example below (see Ex.4.4) as his representation of this chaconne 'in skeletal form':[356]

Example 4.4: *Phrygian Gates*, '3rd Movement', harmonic reduction of 'chaconne'[357]



Like Schwarz, Catherine Pellegrino understands *Phrygian Gates* to exhibit a quadripartite structure, with the work 'being divided into four movements by changes of tempo and figuration'.[358] In the part of her publication that discusses the third movement of this division (given as bb. 640 – 808 and thus corresponding to 'A System of Weights and Measures'), Pellegrino assents to Schwarz's assertion that the movement consists of four cycles of the same basic material, and elaborates on this assertion in two significant ways.

First, Pellegrino describes the progressive harmonic density that occurs across the four cycles of basic material:

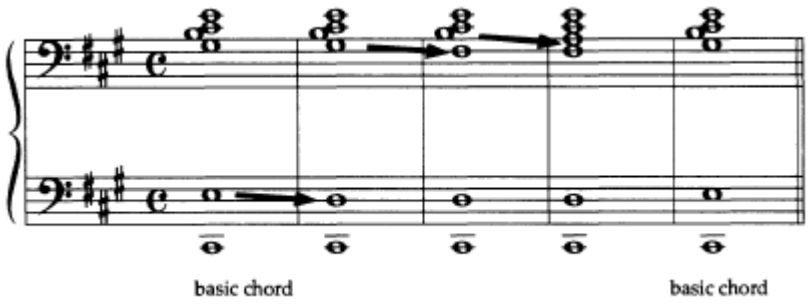
> '[Each cycle] begins with a basic chord that contains one more pitch-class than the previous basic chord. (The first basic chord is C♯, E, G♯, B; the second is C♯, E, G♯, B, D; the third is A, C♯, E, G♯, B, D; and the fourth is A, C♯, E, G♯, B, D, F♯, or the complete diatonic set.)[359]

Thus the progression terminates at the fourth cycle 'once all seven pitch classes [of the C♯ Phrygian mode in question] have been incorporated into the basic chord'.[360]

[356] Schwarz, 1990, p.257
[357] Reprinted from Schwarz 1990, p.259
[358] Pellegrino, p.150
[359] *Ibid*. p.151
[360] *Ibid*.

Second, Pellegrino analyses each cycle into four 4-chord sections, and identifies 'certain narrowly-defined voice-leading transformations' of the basic chord that begins each section. The first of these sections features three individual voices moving down by a diatonic second in the three chords that follow the basic chord, whereupon the music reverts back to the basic chord that commences the second section (see Ex.4.5). From this second basic chord, 'three individual voices move down a diatonic third', and in the third and fourth sections, three voices descend from the basic chord by a diatonic fourth and a diatonic fifth respectively.[361] Pellegrino's tabulation of the entire voice-leading process that governs each cycle is reproduced below (see Ex.4.6).

Example 4.5: *Phrygian Gates*, '3rd Movement', voice-leading in bb.640 – 644[362]



Example 4.6: *Phrygian Gates*, '3rd Movement', section-by-section voice-leading of 1st cycle[363]

basic chord	basic chord	basic chord	basic chord
one voice falls a 2nd	one voice falls a 3rd	one voice falls a 4th	one voice falls a 5th
another voice falls a 2nd	another voice falls a 3rd	another voice falls a 4th	another voice falls a 5th
another voice falls a 2nd	another voice falls a 3rd	another voice falls a 4th	another voice falls a 5th
revert to basic chord	revert to basic chord	revert to basic chord	revert to basic chord

Further interesting analytical comments are made by Pellegrino in relation to the 'fourth movement' of *Phrygian Gates* (bb. 809 – 1092). She corroborates Adams's earlier assertion that the nature of the modal alternation in the fourth movement 'breaks from the pattern' established by the previous material. Instead of featuring 'a single Lydian section […] followed by a single Phrygian section' per key signature,[364] the fourth

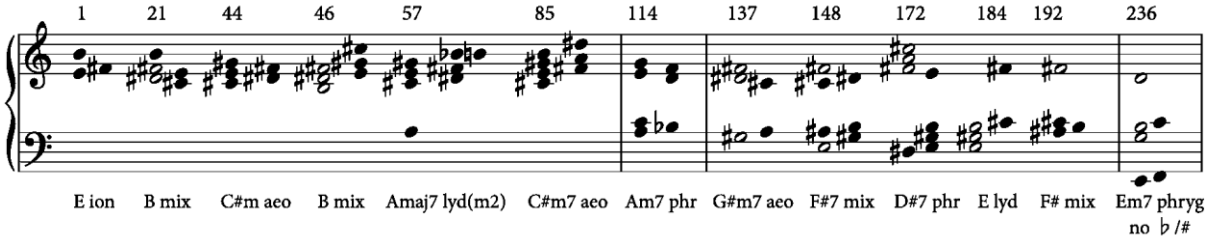
[361] Pellegrino, p.150
[362] Reprinted from Pellegrino, p. 151
[363] Reprinted from Pellegrino, p. 151 (the reproduction above preserves the typesetting of the original)**.** It should be noted that the basic chord 'reverted' to in the fifth row of each column refers to – and is the same as – the 'basic chord' that heads the subsequent column. Thus there are indeed four chords per section, not five as the table might suggest at first glance.
[364] Pellegrino, p.152

movement consists of 'the Lydian and Phrygian modes alternat[ing] frequently' and on multiple occasions per key signature.[365]

In addition, Pellegrino analyses the movement as exhibiting A ♭ Lydian/G♯ Phrygian modalities from bars 809 – 978, and E ♭ Lydian/D♯ Phrygian modalities from bar 978 until the end of the work. Furthermore, she claims that, for the A ♭ Lydian/G♯ Phrygian passages, 'the focus is not on the finals of the two modes, but rather on the fifths of the modes, E ♭ and D♯'. Pellegrino also identifies a structural palindrome that governs the entire fourth movement, and which is made manifest by 'a pattern of systematically diminishing durations in the first half of the palindrome, and systematically increasing durations in the second half'.[366]

Timothy A. Johnson has analysed certain sections of *Phrygian Gates* in terms of their purported harmonic vocabulary. By adhering to certain 'preference rules' for the harmonic interpretation of a given passage (eg 'triads are preferred',[367] 'the lowest sounding pitch […] identifies the root',[368] 'key signature indicates the diatonic field'[369] etc.), Johnson provides a harmonic sketch (see Ex.4.7) of the first three modal sections of the work (ie the A Lydian/Phrygian sections and the E Lydian section):

Example 4.7: *Phrygian Gates*, bb. 1 – 235, harmonic sketch [370]

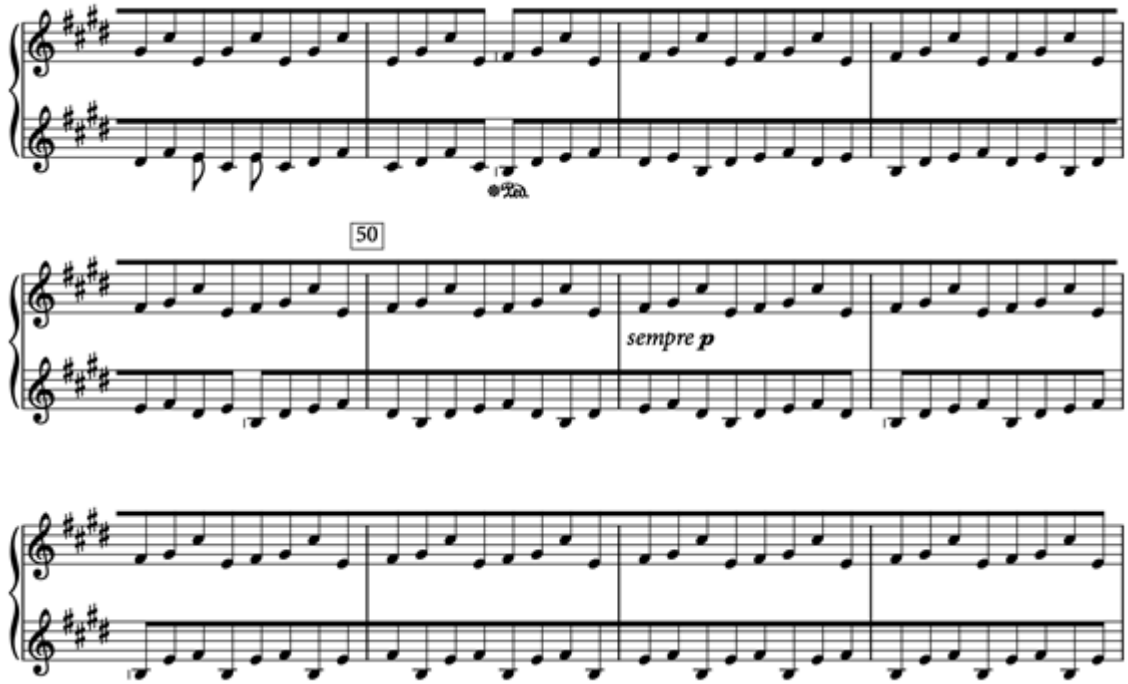


To illustrate this analysis by way of an example, the fourth chord of the sketch (bb. 46 – 56) pertains to the passage reprinted below (see Ex. 4.8). The chord is labelled 'B mix' – an abbreviation of 'B Mixolydian', the prevailing sonority of this passage as per the three preference rules cited above: according to the first rule, a triad of B can be constructed from the set of pitch classes; according to the second rule, the lowest note (B natural) indicates the root of the chord, and thus eliminates the other possible triads – E major and C♯ minor – as candidates for sonority; and according to the third rule, the key

[365] Pellegrino, p. 152
[366] *Ibid*.
[367] Timothy A. Johnson, 'Harmonic Vocabulary in the Music of John Adams: A Hierarchical Approach', *Journal of Music Theory*, 37/1 (Spring, 1993), pp. 117-156 (p.129)
[368] *Ibid*. p. 130
[369] *Ibid.*. p. 135
[370] Reprinted from Johnson 1993, p. 146

signature of four sharps postulates the A natural in the harmonic field, ruling out any implicit suggestion of B Ionian/B Major.

Example 4.8: *Phrygian Gates* bb. 45 – 56



II. LITERATURE REVIEW: APPRAISAL

As stated in [1.5, II], performers should view the sum of analytical literature on a given work not as a body of incontrovertible truths that must be translated wholesale into performance, but as a resource of intellectual 'tools' that may be used for the improvement of performance quality. As such, performers should select material from this resource according to its pragmatic value (ie its usefulness in improving the quality of performance), and they should not be afraid to reject sources which, by their assessment, contain no intellectual tools serving this purpose.

One such item that I will not utilize material from for my memorization project is Timothy A. Johnson's article mentioned above. His harmonic analysis of *Phrygian Gates* is, at the very least, unhelpful to me, as it frequently postulates harmonic conceptions which contradict and render impermissible my own 'alternative' conceptions. For instance, he describes the passage at Ex. 4.8 as 'B Mixolydian', according to his criteria identifying harmonic sonorities (ie by cross-referencing the triads available from the pitch classes employed with both the key signature and the lowest-sounding sonority).

However, when I hear or play this passage myself, I hear a chord which can be described as 'Emaj7(+6, +9)/B' (E, major 7th, with added sixth and ninth, and with a B bass). My harmonic conception of this passage stems not only from the notes used and their vertical arrangement, but also from my perception of how some notes relate to others horizontally in real time. For instance, one of the reasons that I hear the basic chord as 'E' and not 'B' is that I hear the frequent 'D♯ to E' melodic fragments as 'leading note to tonic'.

By ignoring the 'irreducible chronological factor'[371] of real-time performance, Johnson's harmonic analysis of the passage at Ex. 4.8 excludes the actual, plausible and personally compelling harmonic conception of this passage that I have upon hearing it. As such, his analysis is not helpful to my memorization project, for it does not accurately represent the music as I understand it, which means it could not help me attain an accurate cognitive representation of the music by way of memorization.

However, the three other sources thus far examined – Adams, Schwarz and Pellegrino – will all contribute in some fashion to the memorization method presented at the end of this chapter. Alongside the collective body of statements from these three individuals, there is one additional resource containing material which I can use to construct a method for memorizing *Phrygian Gates*. I am referring to my own previous memorization of the work in 2001, and the means by which I achieved this.

III.THE MEMORIZATION OF *PHRYGIAN GATES*: A FIRST-PERSON ACCOUNT

Every section of *Phrygian Gates* was to some extent memorized by rote. This 'brute-force approach' essentially consists of performers like myself doing 'everything we can to memorize the information by repeating it over and over again'.[372] Taking one small section at a time, my basic method was ostensibly to 'repeat repeatedly' the execution of the section until memorization was achieved.

However, there was more to memorizing *Phrygian Gates* than this, as the process always had an 'internal' component to complement the externally observable, physical one. Furthermore, when memorizing a section that seemed to be organized according to some sort of sonically discernible structural logic, the internal component that occurred was different in kind to that which occurred when memorizing sections that exhibited no such logic. In the case of these latter, 'illogical' sections, the apparent randomness of their assembly was accompanied by an internal memorization component similar to that

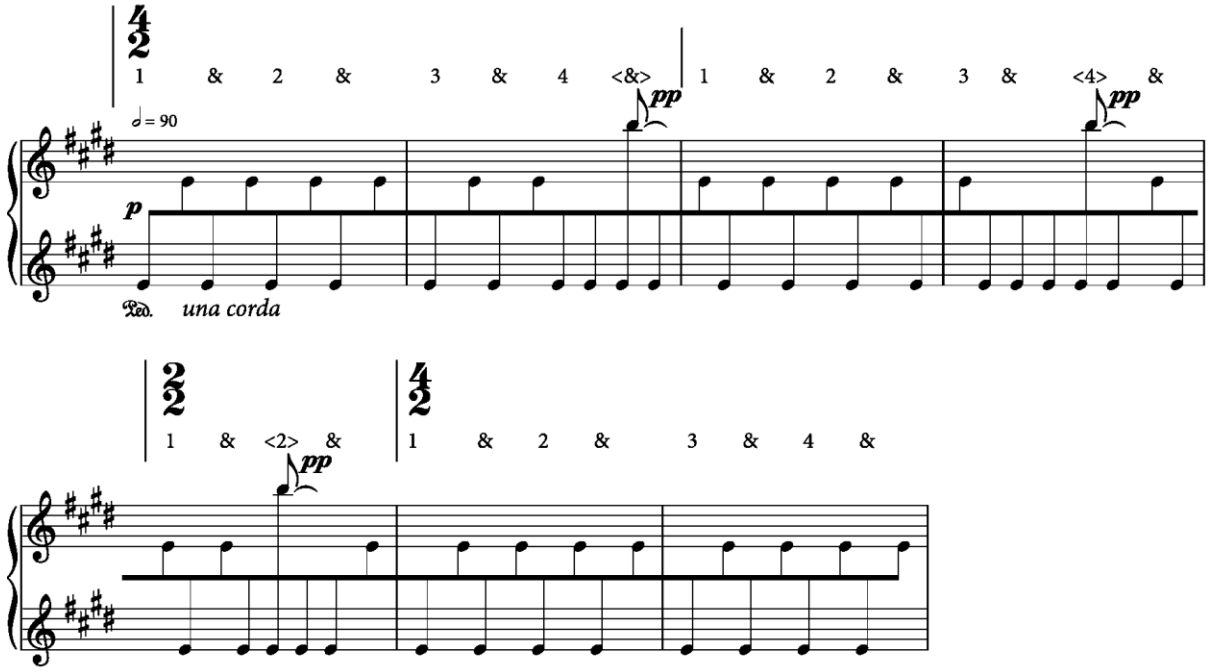
[371] Paul Ricoeur, trans. by J. B. Thompson, *Hermeneutics and the Human Sciences: Essays on Language, Action and Interpretation* (Cambridge: Cambridge University Press, 1981), p.285
[372] Daniel J. Levitin, *This Is Your Brain on Music: Understanding a Human Obsession* (London: Grove/Atlantic, 2008), p.220

which occurs whenever any random series of singular, disconnected items – such as the Arabic numerals 0 – 9, or the written letters of the Roman alphabet – is committed to memory: the musical sequence (of notes, patterns, chords etc.) just is what it is, and one just has to remember it.

In contrast, the internal memorization component that accompanied the more 'logical' sections generally consisted of the retention of the section's logic, followed by its reproduction in my mind as I played. When attempting to memorize these sections, the technique that I (unconsciously) used – which I now call 'pattern projection' – draws attention to the particular process occurring within a musical sequence in order to aid its memorization. This technique works by conceiving any points of change as accented beats, and then constructing a memorizable pattern from both the accented beats and the metric duration between them, which can then be projected onto the relevant section of the work. For instance, the opening system of *Phrygian Gates* (constituting 7 bars of 4/4) can be memorized by way of its polymetric reconfiguration into 6 bars (two bars of 4/2, one bar of 2/2, and a final bar of 4/2). The counting strategy I employ when performing the work is superimposed on the original score to emphasize the metric reconfiguration (with the vertical punctuations represented on this metric grid as angle-bracketed beats such as '<&>' – see Ex.4.9). Ultimately the metric reconfiguration of this system allows its memorization to be achieved in terms of a few *bars* rather than many *beats* – there are fewer things to memorize, so memorization is made easier. This approach to memorizing sections with a discernible internal logic exemplifies Levitin's claim that 'rote memorization is greatly facilitated by a hierarchical organization of the material', and that very often there are 'notes in a musical piece [which] are more important than others structurally, and we organize our learning around them'.[373] Roger Chaffin, Topher R. Logan, and Kristen T. Begosh concur with this sentiment when they state that musicians analyse the 'hierarchical organization of a piece into sections and subsections based on melodic, harmonic, and metrical structures' and use these analyses 'to organize both their practice and their memories'.[374]

[373] Levitin, 2008, p.220.
[374] Roger Chaffin, Topher R. Logan & Kristen T. Begosh, 'Performing from Memory', in *The Oxford Handbook of Music Psychology*, ed. by Susan Hallam, Ian Cross & Michel Thaut (Oxford: Oxford University Press, 2009) 352–363 (p.356)

Example 4.9: metric configuration of bb. 1 – 7 superimposed on score



Such were the methods of rote memorization – enhanced and codified by appeal to a given section's hierarchical organization – that were employed intuitively when I first memorized *Phrygian Gates*. For subsequent performances (which all inevitably involved some memorization 'refresher' work), these methods were re-applied with little or no change until fairly recently. Since my engagement with the primary and secondary sources examined above, my methods for memorizing *Phrygian Gates* have been consolidated further by the incorporation of certain analytical insights that I gleaned from these sources. For the rest of this section I will outline the mnemonic efficacy of these insights.

IV. *PHRYGIAN GATES*: STRUCTURAL INDICATOR ANALYSIS

My first act in the 'memory consolidation' process was to build on Adams's assertion that the vertical punctuations occurring throughout *Phrygian Gates* function as structural indicators, which delineate the smaller internal units of each individual system in a metric or rhythmic ratio of approximately 3-3-2-4. Prompted by the composer's remarks, I conducted a full analysis of the work in terms of the structural indicators described above (see Appendix I), to ascertain the extent to which the '3-3-2-4' ratio holds for the work's individual systems. Indeed, nearly all of these systems exhibit a series of three vertical punctuations that articulate the unit's 4-block microstructure (there are some passages to which the four-punctuation template does not apply: these passages either

have more than four punctuations, less than four, or none at all – see the units marked 'N/A' in the analysis).

However, of the 125 systems identified in the analysis, only 9 of these feature punctuations which adhere strictly to the ratio '3-3-2-4': one in the A Lydian section, one in the A Phrygian section, two in the E Lydian section, three in the C♯ Phrygian section, and two in the A ♭ Lydian/G♯ Phrygian section (see the ratios in Appendix I in bold). Most of the remaining 116 systems, while not demonstrating strict adherence to the '3-3-2-4' ratio, do nevertheless exhibit a 4-block microstructure that adheres to a 'medium-medium-small-large' size relationship, thus preserving a more general dimension of the ratio (sometimes the two 'medium' blocks are the same length, and other times they are different, but in each case they still fall between the lengths of the 'small' and 'large' blocks).

The '3-3-2-4' ratio – and its less precise cousin, the 'medium-medium-small-large' size relationship – are occasionally applied microscopically, in that there are some systems that feature sub-sections which are themselves governed by the ratio or size relationship.[375] For instance, the second system of the A ♭ Lydian/G♯ Phrygian section (bb. 839 – 868) adheres strictly to the ratio (four blocks of 120, 120, 80 and 160 semiquavers in length respectively); and the 160-semiquaver block here itself exhibits a four-block structure that adheres to the 'medium-medium-small-large' size relationship (of 40, 40, 26, and 54 semiquavers respectively – see Ex. 4.10):

Example 4.10: *Phrygian Gates*, structural indicator analysis, A ♭ Lydian/G♯ Phrygian section (first 2 systems)

SYSTEM (A ♭ LYDIAN/G♯ PHRYGIAN)	BAR NOS.	STRUCTURE (SEMIQUAVERS)
1	809 – 838	140,122,40,180→[52,44,16,68]
2	839 – 868	**120,120,80,160**→[40,40,26,54]

'→[*n*, *n*, *n*, *n*]' = denotes microscopic size relationship within the system's final block

Precise '3-3-2-4' ratio in bold

[375] Incidentally, the size relationship also operates macroscopically, for not only there are sets of 4 systems that exhibit the ratio or size relationship among their constituent systems, but also there are three modal sections – A Lydian, G ♭ Lydian and C♯ Phrygian – for which the whole section can be divided into 4 sets of 4 systems that exhibit the size relationship among their constituent sets. But while being of musicological interest, these macroscopic manifestations of the size relationship, 'nested at three different levels' (Fyr, p.143) will not feature in further discussion, as it is doubtful whether knowing about them would have any impact on performance.

There are myriad ways in which I can employ these analytical insights for the purposes of memorization. For one, my analysis makes explicit the metric sequence occurring at each system, and so for any system that I might be struggling to memorize intuitively, I now have the option of consciously learning the system's structure from the analysis, retaining it, and then reproducing it in my mind as I play as a guide towards accurate reproduction of that system. For another, the identification of those 9 systems that adhere strictly to the '3-3-2-4' ratio allows me to categorize these systems together in my mind, and I can work towards their memorization by straightforwardly learning, retaining and reproducing the sole 'unifying grammar' that governs all 9 systems. It is especially beneficial to the memorization of *Phrygian Gates* that 3 of these 9 systems occur in the hardest part of the work to memorize ('A System of Weight and Measures'). After all, this 'slow movement' features 16 individual systems, but if 1 ratio governs 3 of those systems, then the memorization workload is reduced, and the performer need only learn, retain and reproduce a maximum of 14 individual microstructures.

The mere identification in 'A System of Weights and Measures' of any structural patterns whatsoever – let alone one that unifies 3 systems – is certainly an improvement on the circumstances of my first attempt to memorize this passage. This first attempt, albeit successful, involved nothing but the crude rote memorization of what I considered to be randomly-assembled metric systems. The fact that I could not aurally discern any significant structural organization is further evidence that the processes of postminimalist works like *Phrygian Gates* are applied in a far more 'underlying' fashion than they are in minimalism. The same can be said for the analytical insights provided by Schwarz and Pellegrino: for despite my direct and nineteen-year-long aural engagement with *Phrygian Gates* as both a performer and listener, the 'underlying' macrostructure of this movement revealed by these authors was unknown to me until my encounter with their analyses.

Indeed, the initial obscurity of these structural facts concerning *Phrygian Gates* suggests that the claim made in [1.5, II] – that some level of overall structural analysis is both achievable for performers and beneficial to the quality of their performances – does not extend as generally to process-based postminimalism as it does to process-based minimalism. This is because the processes featured in postminimalist works tend to be more complex and convoluted than those of minimalism, and consequently the task of overall analysis is likely to fall outside the limits of the average performer's analytical capabilities. However, instances of analysis at a more local level are often both achievable for performers and beneficial to performance quality (my method for memorizing *Phrygian Gates*, described in [4.6], constitutes a series of just such instances of local-level analysis).

The processes identified by Schwarz and Pellegrino that operate within 'A System of Weights and Measures' are incredibly useful when it comes to memorizing the passage.[376] Instead of perceiving it as 160 bars of randomly-pitched sustained chords, Schwarz's analysis of the 'movement' as four consecutive occurrences of a basic chaconne[377] (with the harmony becoming denser with each occurrence) allows me to spot memorizable similarities between the four instances of this chord progression. Pellegrino's analysis of the 16-chord chaconne itself – as constituting four 4-chord progressions, each beginning with the same chord, and each governed by a successively larger intervallic voice-falling process – allows me to identify memorizable patterns within the chaconne. These include the fact that chords 1, 5, 9 and 13 are identical, and that the voice-falling process that governs the entire chaconne can be reduced to the following easily retainable sequential schema: 'By a 2^{nd} x 4, by a 3^{rd} x 4, by a 4^{th} x 4, by a 5^{th} x 4' (or even just '2-3-4-5'). Add to these insights the fact (stated above) that the microstructures governing the movement's 16 systems have been identified, and all of a sudden the task of memorizing 'A System of Weights and Measures' does not seem as burdensome and protracted as it did initially.

[376] Less useful are certain aspects of Pellegrino's analysis concerning the 4^{th} movt. of *Phrygian Gates*. She claims that the movement exhibits A ♭ Lydian/G♯ Phrygian modalities from bars 809 – 978, and E ♭ Lydian/D♯ Phrygian modalities from bar 978 until the end of the work. She also claims that, for the A ♭ Lydian/G♯ Phrygian passages, the focus is on the fifths of the modes, E ♭ and D♯. I discount both claims: first, and assenting to Fyr's statement that Pellegrino 'incorrectly asserts that the passage […] in mm. 923–977 continues the alternation between the three-flat and four-sharp collections' (Fyr, pp.148-149) I contend that the movement exhibits A ♭ Lydian/G♯ Phrygian modalities from bars 809 – 922, and E ♭ Lydian/D♯ Phrygian modalities from bar 978 until the end, with an intermediate section exhibiting all four modes at bars 923 – 977 (which is also in agreement with Fyr's claim this latter passage 'alternates among *two different pairs* of diatonic collections' – see Fyr, p.149). Second, given that Pellegrino's claim about the fifths of the modes in the A ♭ Lydian/G♯ Phrygian section is founded on her previous mistaken claim, I therefore assert that the A ♭ Lydian/G♯ Phrygian section *does* focus on the finals of these modes. My subsequent memorization method will make use of the claims I assert here.

[377] Schwarz's skeletal reduction of this 16-bar chaconne (see Ex. 4.4) is a little misleading, as he presents a reduction with only 15 chords (having collapsed the harmony of the penultimate chord into that of the final chord).

4.6 *PHRYGIAN GATES*: A METHOD FOR MEMORIZATION

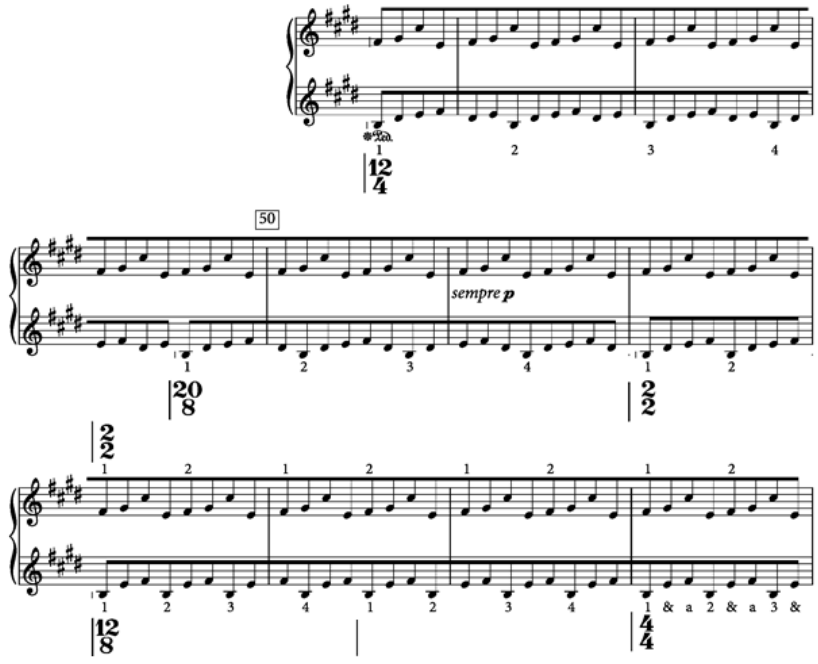
I. PREAMBLE

In what follows I will consolidate all of the mnemonic devices and analytical insights previously discussed into a method for the memorization of *Phrygian Gates*, which I will present via a section-by-section illustration of the different memorization strategies employed. The work has been analysed into thirteen sections according to their modes, and at least one distinct strategy will feature in the discussion of each section.

II. A LYDIAN SECTION (BB. 1 – 113)

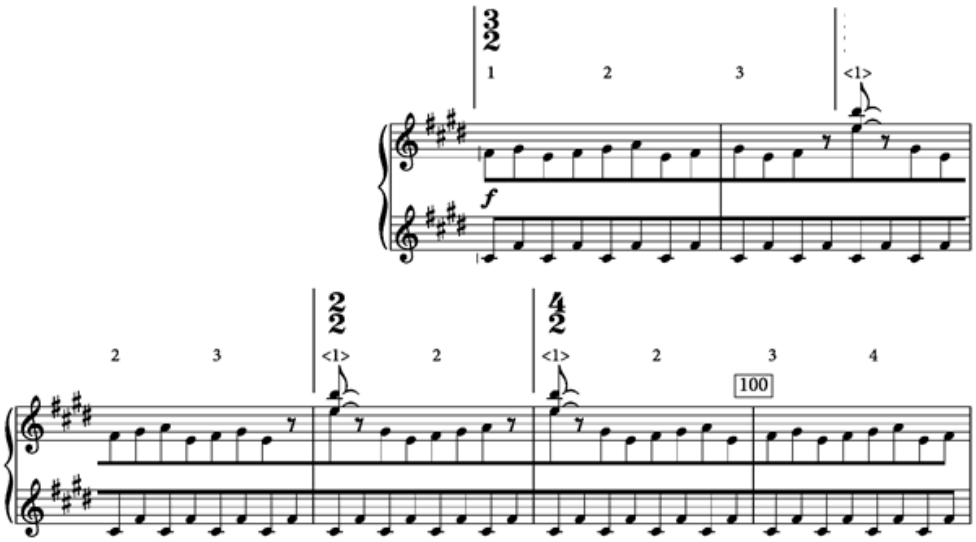
There are many opportunities to use mnemonically-motivated metric reconfigurations in the A Lydian section of *Phrygian Gates*. Most (like the one previously described in [4.5, III] – see Ex. 4.9) are oriented around the vertical, structural signposts that occur throughout the work. Some, however, invoke the logic governing the horizontal waveform patterns. At bb. 46 – 56 the ten and a half bars of 4/4 are reconfigured into a bar of 12/4 (governed by the left-hand pattern), a bar of 20/8 (also governed by the left-hand pattern), a bar of 'unsyncopated' 2/2 (with both hand patterns aligned), and then four bars of 'syncopated' 2/2 (the syncopation resulting from the combination of different metric reconfigurations or subdivisions per hand – see Ex.4.11):

Example 4.11: metric configuration of bb. 46 – 56 superimposed on score



The A Lydian section also features the first system with an internal logic adhering precisely to the '3-3-2-4' ratio described by Adams above. In this system (bb. 95 – 100), the original 6 bars of 4/4 can be reconfigured metrically as two bars of 3/2, one bar of 2/2, and a final bar of 4/2 (see Ex. 4.12). The logic of this system is in harmony with this reconfiguration in significant respects: note how the numerators of the four bars' time signatures, taken sequentially, form the series '3-3-2-4', and also how the start of each successive 'reconfigured' bar is announced by a vertical, structural signpost.

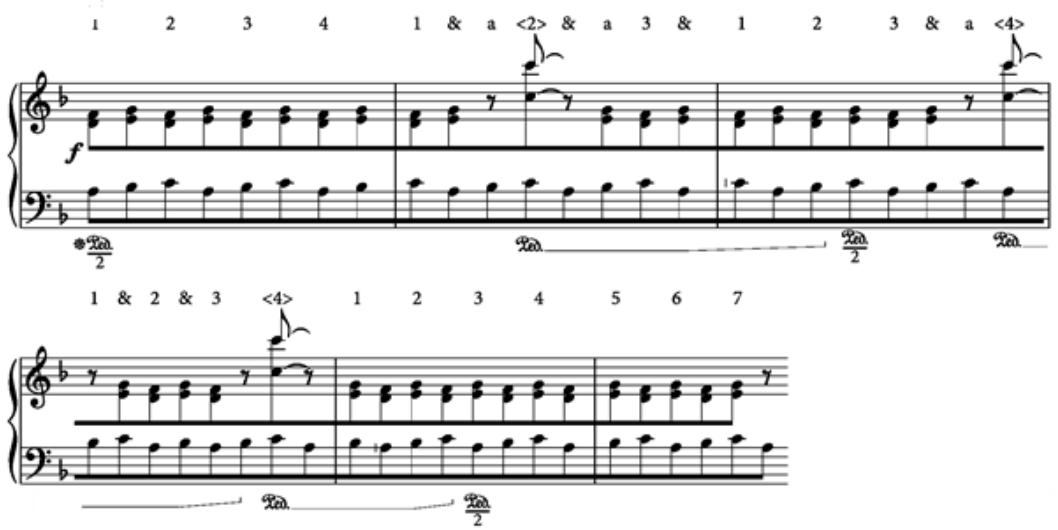
Example 4.12: metric configuration of bb. 95 – 100 superimposed on score



III. A PHRYGIAN SECTION (BB.114 – 136)

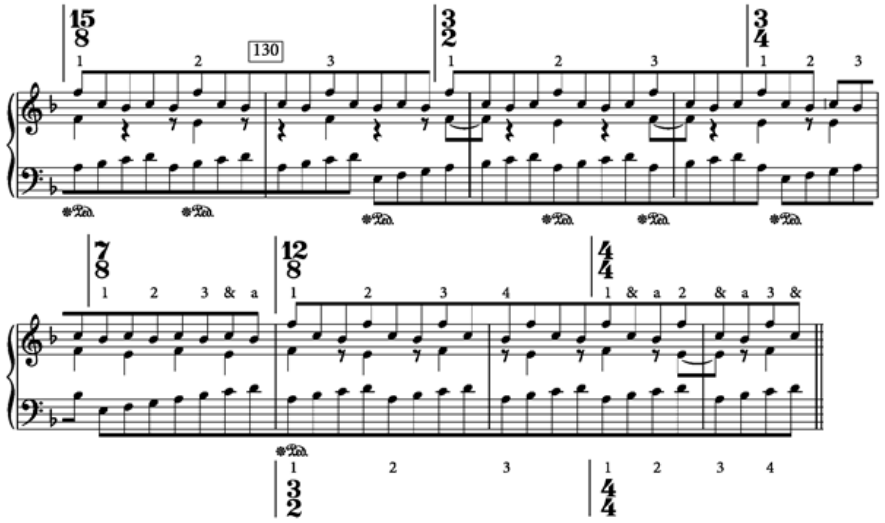
The opening system of this section (bb. 114 – 119) allows for an instance of pattern projection that preserves the original metre of the score. Here, this type of projection uses a mixture of regular and irregular subdivisions and counting strategies, and appeals to the rhythms produced by the combination of vertical and horizontal material in the right hand. The first bar proceeds according to a regular 4/4, whereas the second bar invokes an irregular tripartite division of the bar into respective groupings of 3, 3, and 2 quavers. The third bar is irregularly subdivided into four quaver groupings (of 2, 2, 3, and 1 this time), and the remainder of the system reverts back to the regular 4/4 (see Ex. 4.13):

Example 4.13: metric configuration of bb. 114 – 119 superimposed on score



The A Phrygian section also features a system (at bb. 129 – 136) with an internal logic adhering precisely to the '3-3-2-4' ratio (changes in the right-hand pattern divide the passage into four blocks – 15, 15, 10, and 20 quavers long respectively). On this occasion, however, this ratio is not embodied by the sounding music as I experience it, and so the metric reconfiguration I employ does not invoke this ratio. The original seven and a half bars of 4/4 (bb.129 – 136) are reconfigured as a bar of 15/8, a bar of 3/2, a bar of 3/4, a bar of 7/8, a bar of syncopated 3/2, and a bar of syncopated 4/4 (with the syncopation of these last two bars resulting from the combination of different metric reconfigurations or subdivisions per hand – see Ex. 4.14):

Example 4.14: metric configuration of bb. 129 – 136 superimposed on score

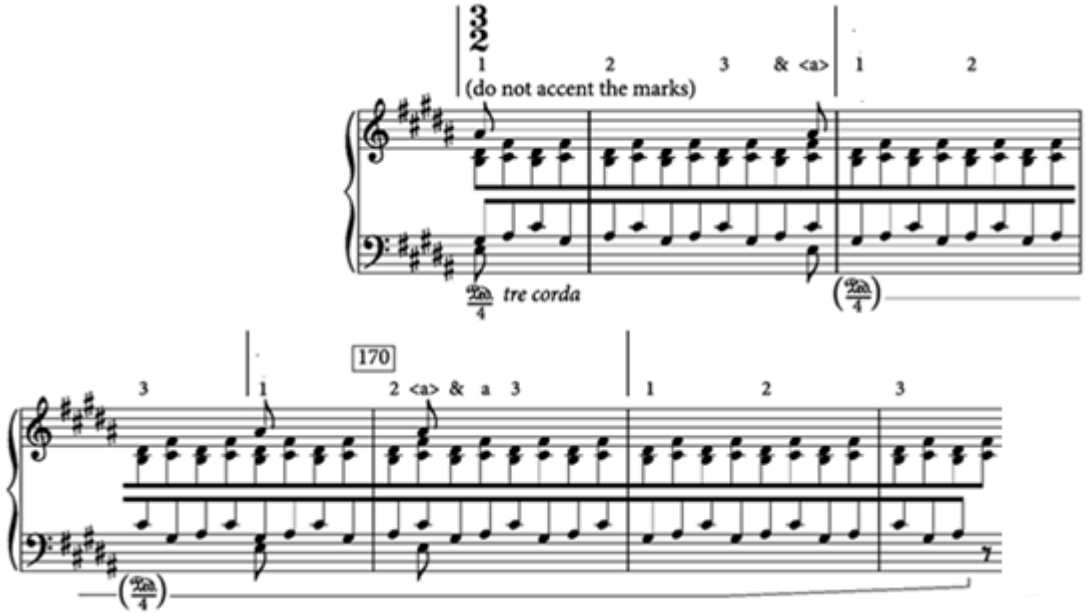


What this most recent example demonstrates is that the implicit logic of a system is not necessarily presented aurally by the sounding music (the two '3-3-2-4' examples presented so far differ greatly in the extent to which they exhibit this ratio sonically). So in the same way that performers of Reich's music should enjoy the metrical ambiguities 'while avoiding metrical accents that detract from a listener's options',[378] neither the system's structure nor the projection employed should be emphasized in performances of *Phrygian Gates*. In this respect, the way in which the performer conceives the system should not impinge on how the listener perceives it.

IV. E LYDIAN SECTION (BB. 137 – 235)

Like its A Lydian counterpart, the E Lydian section provides many opportunities for mnemonically-motivated metric reconfiguration. For instance, the six 4/4 bars of the system at bb.159 – 166 can be reconfigured into four bars of 3/2 (see Exs 4.15). This vertical-signpost-oriented, 'medium-medium-small-large' pattern projection differs from its predecessors (see Exs. 4.9 and 4.13), as the configuration at bb. 159 – 166 features neither polymetre nor irregular subdivisions.

Example 4.15: metric configuration of bb. 159 – 166 superimposed on score

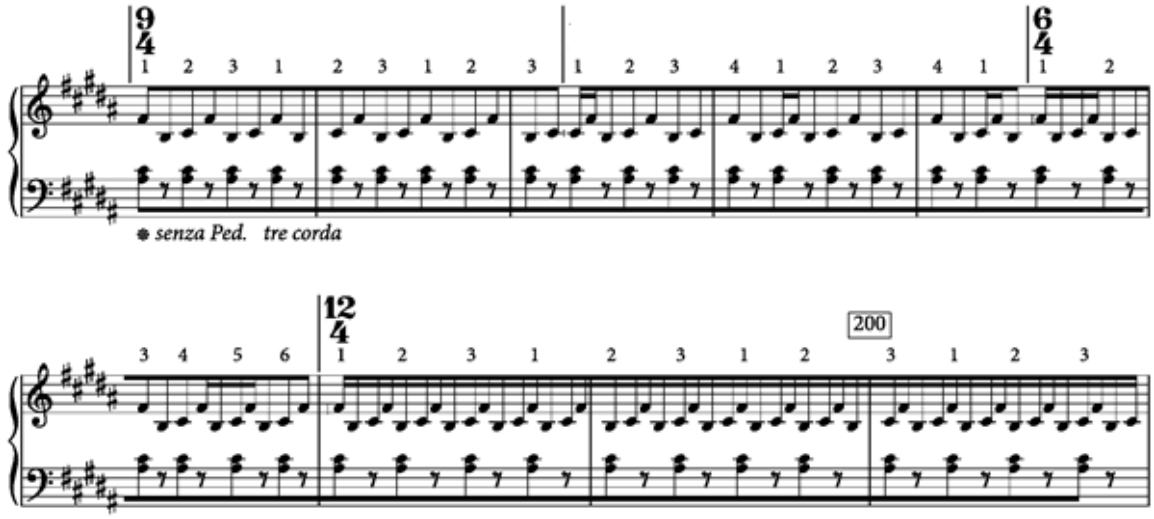


Like the previous two modal sections, The E Lydian section features a system with an internal logic adhering precisely to the '3-3-2-4' ratio. In this system (bb. 192 – 200),

[378] Hartenberger, 2013, p.379

the original 9 bars of 4/4 can be reconfigured metrically as two bars of 9/4,[379] one bar of 6/4, and a final bar of 12/4 (see Ex. 4.16). The system embodies the '3-3-2-4' ratio sonically in the sense that the metre changes coincide with the start of a new right-hand pattern, and embodies it conceptually in the sense that the numerators of these new time signatures, taken sequentially, form a multiple of the series '3-3-2-4' (ie '9-9-6-12'). So this '3-3-2-4' system is distinct from the previous two examples (see Exs. 4.12 and 4.14) in that the ratio is indicated both by changes in the horizontal waveform patterns and by the metric reconfiguration employed.

Example 4.16: metric configuration of bb. 192 – 200 superimposed on score



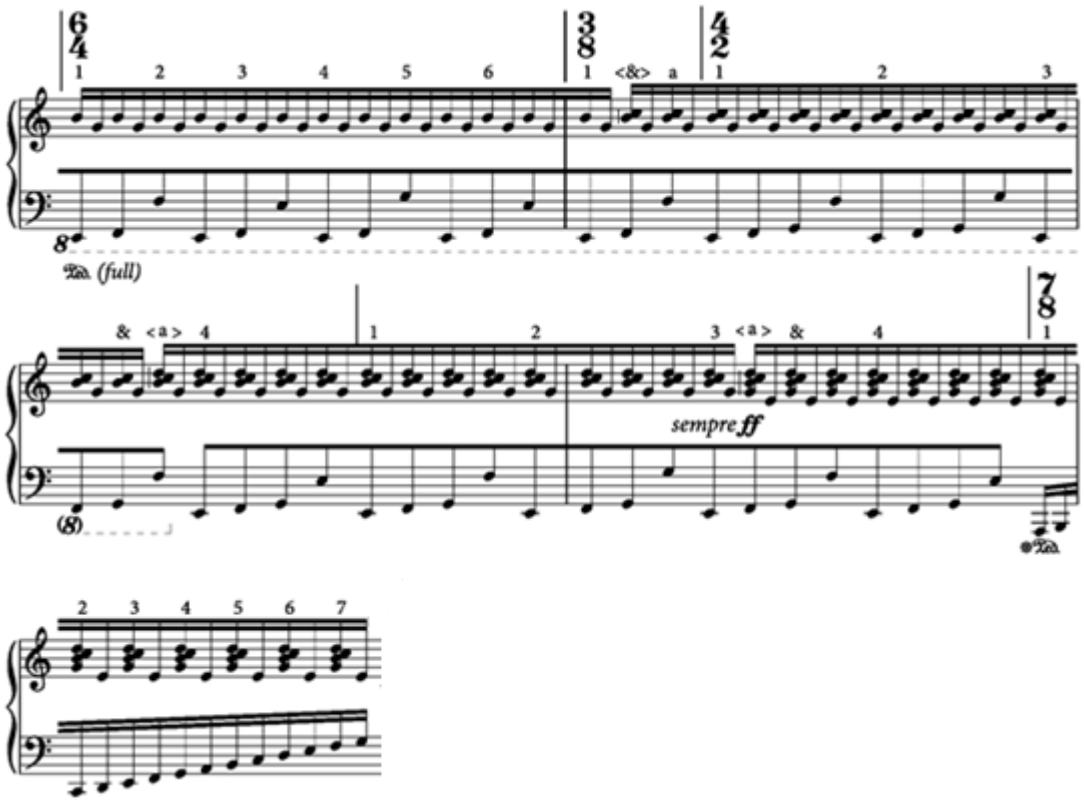
V. E PHRYGIAN SECTION (BB. 236 – 265)

All opportunities for pattern projection in this section are determined by the horizontal waveform patterns, but the systems' microstructures are not always particularly reflected by the reconfigurations I employ. The system at bb. 251 – 255 constitutes a 4-block microstructure of '13-13-14-14' (see Appendix I), and so it is the first system under discussion not to exhibit either the '3-3-2-4' ratio or the 'medium-medium-small-large' size relationship. Furthermore, this microstructure does not coincide with the metric reconfiguration that is based on the sounding music as I experience it. I reconfigure the original four and a half bars of 12/8 as one bar of 6/4, one bar of 3/8, two bars of 4/2, and a final bar of 7/8 (see Ex. 4.17). I base this reconfiguration on certain changes in the sounding waveforms, not on the system's microstructure. Like Ex. 4.14 above, the reconfiguration of bb. 251 – 255 demonstrates that when the system's

[379] The first of these 9/4 bars is regularly subdivided into three 3-beat groups. The second is irregularly subdivided into two 4-beat groups plus one single beat.

microstructure is inconsistent with the way in which the system is unavoidably experienced aurally, then the pattern projected should be oriented around the sounding music and not the microstructure. This approach amounts to the demand that an understanding of a work by way of analysis should be compatible with how that work actually sounds to the performer.

Example 4.17: metric configuration of bb. 251 – 258 superimposed on score

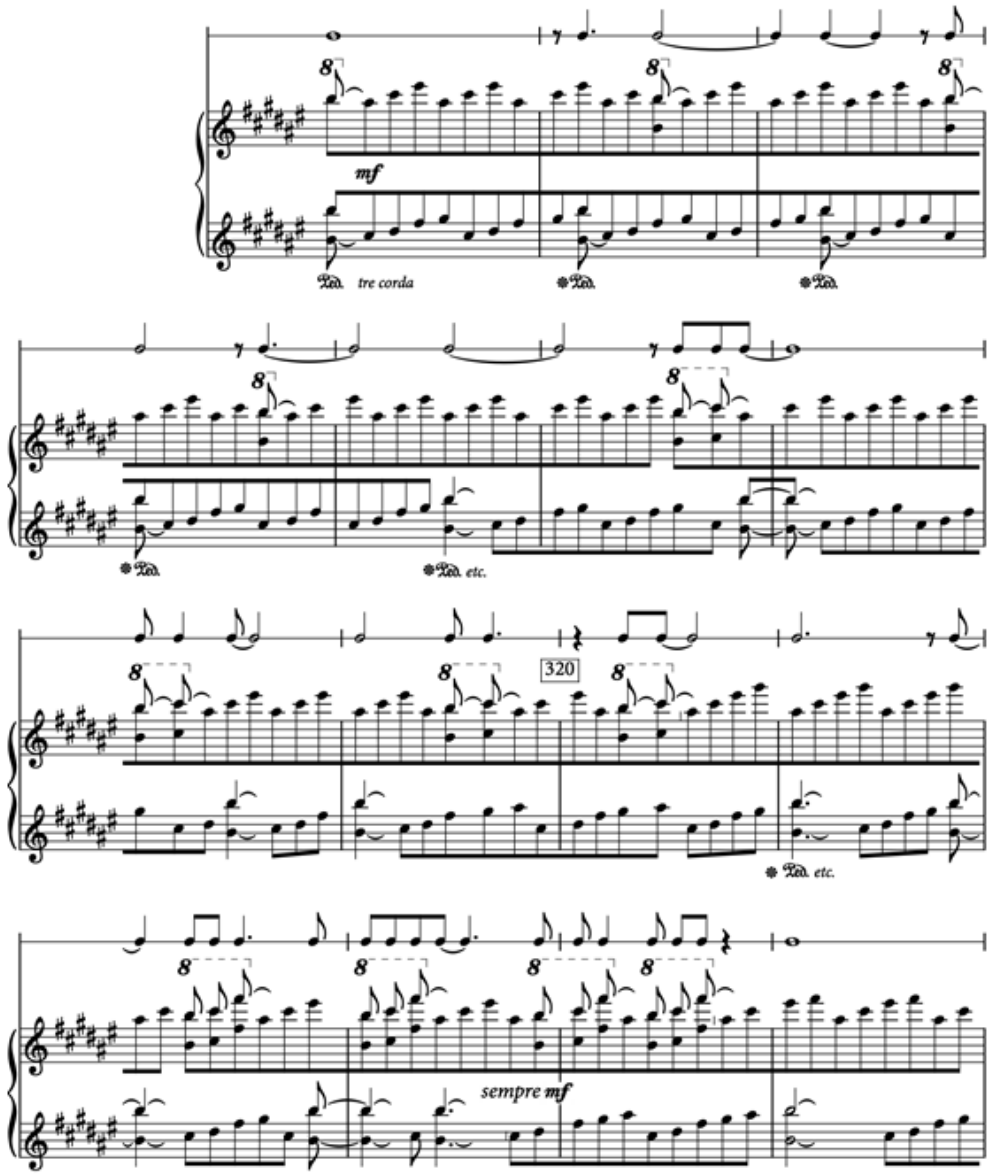


VI. B LYDIAN SECTION (BB. 266 – 333)

The pattern projection I employ in this section occasionally admits of either the 'vertical' variety (ie metric reconfiguration coinciding with the structural signposts) or the 'horizontal' variety (ie reconfiguration coinciding with changes in the waveform patterns). But the chief form of pattern projection used in the B Lydian section involves reducing a given system to a skeletal rhythm, constructed from that system's vertical signposts, and intended for retention as a mnemonic device. This method works particularly well in this section because the vertical 'pings' occur closer together than in previous sections, and so the composite rhythm they create is more easily perceivable. For instance, the vertical material of the three consecutive systems at bb. 311 – 325 can be reduced to a single, continuous and irregular composite rhythm which, when

juxtaposed with the original 4/4 metre, exhibits a strong and memorable syncopation (see Ex.4.18):

Example 4.18: bb. 311 – 325, composite rhythm superimposed on score



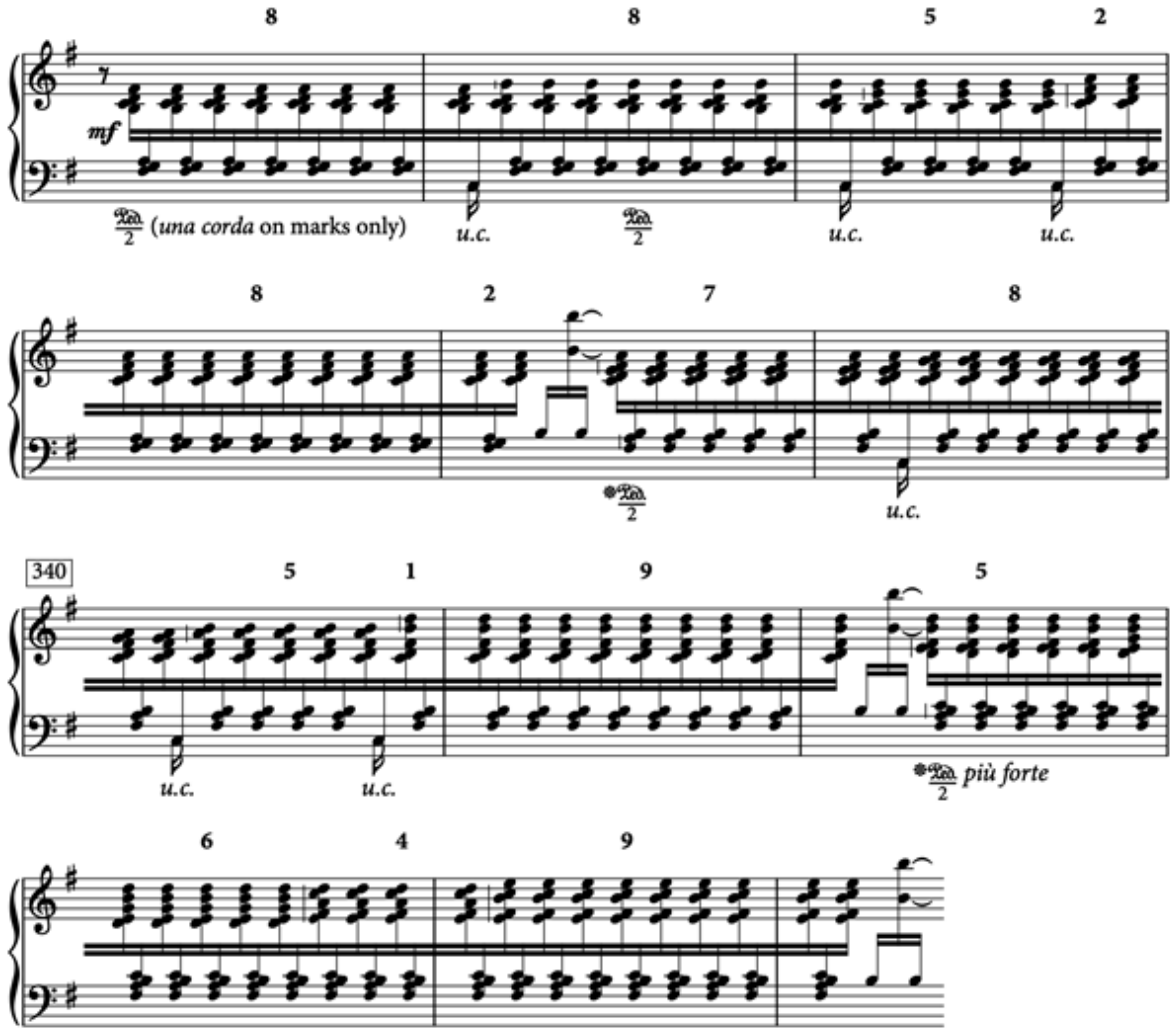
VII. B PHRYGIAN SECTION (BB. 334 – 401)

It was stated earlier that some systems in *Phrygian Gates* possess microstructures that do not appear to have any inherent mnemonic value, and that such systems require the kind of 'brute force' memorization strategy that might apply whenever one attempts to memorize a random series of singular, disconnected items. Many examples of these

'random' systems can be found in the B Phrygian section (although the section does also feature systems similar to those already discussed). In the first three systems of the section (bb. 334 – 345) I identify the number of quavers in each left-hand/right-hand tremolando semiquaver passage, and use this string of numbers as the basis of my memorization aid. I do away with bar lines or metre in my conception of the passage, and instead I appeal to the quadripartite structure exhibited by each of these systems. I know that the 4 units of each system are separated from each other by a low C, and that the last passage of each system is followed by three high B semiquavers before the next system starts. This framework – in the absence of any explicit metre – gives an overall structure to my number-series conception of the passage (see Ex. 4.19). I take further steps to ameliorate the apparent randomness of this passage's assembly by identifying four 8-quaver passages which occur across the first two systems,[380] and two 9-quaver passages which occur across the second and third systems.[381] So having identified six passages that collectively exhibit only two categories of quaver length, there is less data to memorize than one might think at first glance; and with fewer things to memorize, memorization is made easier. I can also appeal to the 'medium-medium-small-large' size relationship – common to most systems as previously discussed – in order to aid memorization of the third system (which has passages of 5 quavers, 6 quavers, 4 quavers, and 9 quavers). All this serves to demonstrate Levitin's earlier claim that even the rote memorization of an apparently random series 'is greatly facilitated by a hierarchical organization of the material'.[382]

[380] The 8-quaver passage in b.337 is in fact part of a 12-quaver passage, but the first two quavers are conceived as a 'pickup' to b.337, and the last two quavers are conceived as the 'downbeat' to b.337 (both of which imply that there is still some residual metric aspect to how I perceive the section).
[381] The 9-quaver passage at b.341 is in fact a 10-quaver passage that begins in the previous bar, although I view the first quaver of this passage as a pickup to b.341 (which again implies residual metric perception).
[382] Levitin, 2008, p.220.

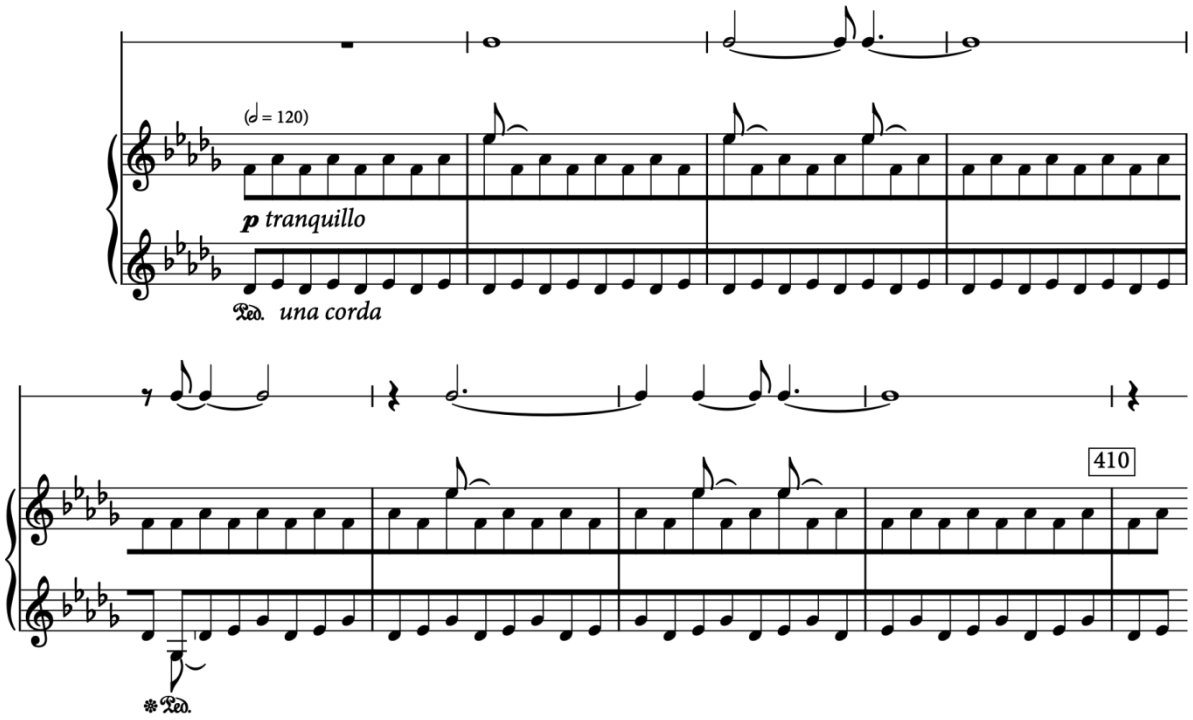
Example 4.19: bb.334 – 401, number series superimposed on score



VIII. G♭ LYDIAN SECTION (BB. 402 – 469)

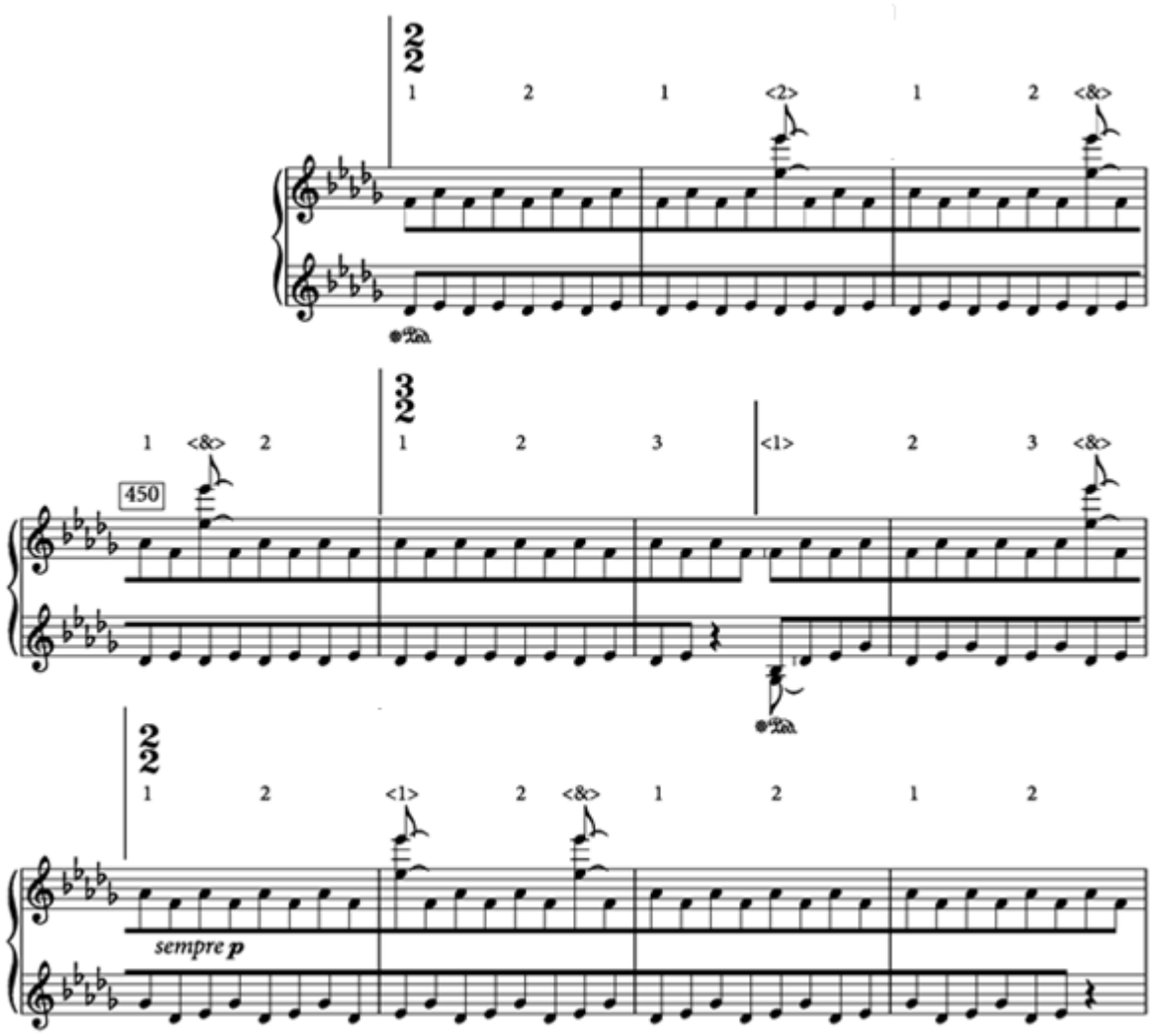
In this section the pattern projection I employ is either the reduction of a system to a composite rhythm that is constructed from its vertical structural signposts, or a metric reconfiguration which coincides with the signposts. The former method is applicable in this section – as it is in the B Lydian section – because many systems feature vertical 'pings' in close metric proximity which thus produce clearly perceptible rhythms. For instance, the two consecutive systems at bb. 402 – 410 can be reduced to an irregular composite rhythm which, like the previous example at Ex. 4.18, is juxtaposed with the original 4/4 metre and thus exhibits a strong and memorable syncopation (see Ex.4.20):

Example 4.20: *Phrygian Gates* bb. 402 – 410, composite rhythm superimposed on score



An example of metric reconfiguration employed in this section can be found at bb. 447 – 457. The original 11 bars of 4/4 are reconfigured as four bars of 2/2, two bars of 3/2, and four more bars of 2/2 (see Ex. 4.21). A curious thing here is that the reconfiguration revolves around only a select few 'pings' being conceived as on-beats; the majority of these 'potential metric determinants' feature, rather paradoxically, as offbeats. Nevertheless, it is still the reconfiguration that best represents how I hear this system metrically.

Example 4.21: metric configuration of bb. 447 – 457 superimposed on score



IX. F♯ PHRYGIAN SECTION (BB. 470 – 605)

In this section I employ each of the three main forms of pattern projection so far described (namely, the reduction of a system to a skeletal rhythm that is based around its structural signposts; 'vertical' metric reconfiguration which coincides with the signposts; and 'horizontal' metric reconfiguration which coincides with changes in the waveform patterns). All three forms have received sufficient explanation not to warrant any further examples. However, the following metric reconfiguration of two consecutive systems from the F♯ Phrygian section is presented in order to highlight something new.

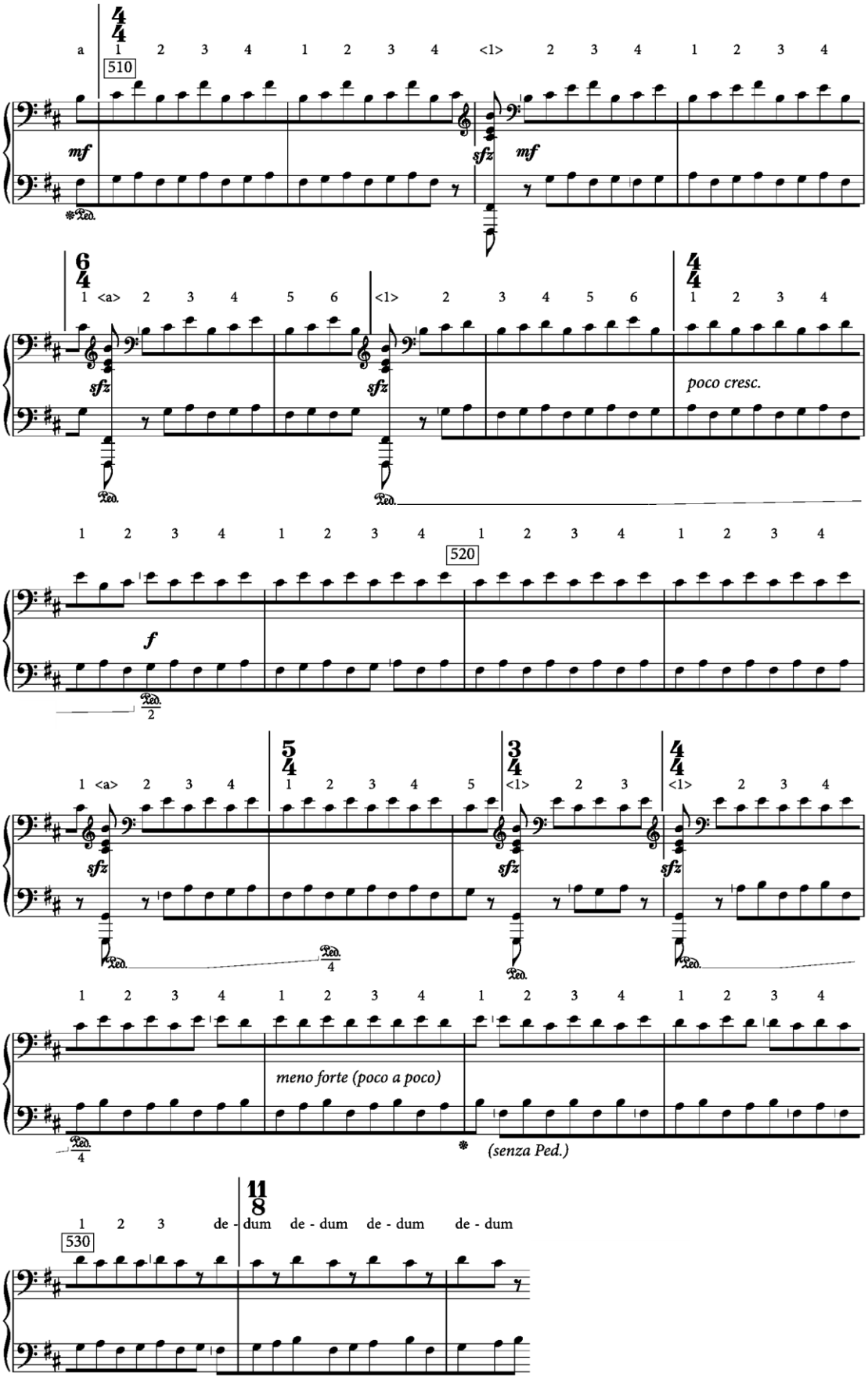
The systems' twenty-two and a half bars of 4/4 (bb.509 – 532) are metrically reconfigured as four bars of 4/4 (preceded by a quaver pickup), two bars of 6/4, six bars of 4/4, one bar of 5/4, one bar of 3/4, six bars of 4/4, and a final bar of 11/8 (see Ex.

4.22). The first thing that is striking about this configuration is that it reflects both horizontal *and* vertical structural points of interest. For instance, the second system (bb.522 – 532) begins with vertical signposts and ends with multiple waveform changes, and the corresponding metric reconfiguration reflects this plurality of structural event-types.

The second point of note is that these two systems feature incredibly strong structural signposts (and for which the label of 'ping' doesn't feel all that appropriate). However, despite their *sforzandi*, I still aurally perceive as offbeats those signposts scored as such, and the metric reconfiguration harmonizes its conception of these offbeats with my perception of them.

Thirdly, for the very last phrase of the right hand (occurring at the quaver pickup to the last bar, and the last bar itself), I abandon counting and revert to the scat syllables 'de-dum' - with the 'de' representing a quaver and the 'dum' representing a crotchet – which I have been inadvertently using internally while playing this passage. The reason for preserving the scat syllables in the schema is that no numerical substitute for these syllables preserves the rhythmic feel that they lend the phrase, and so I have opted to keep them in my analysis in virtue of their pragmatic value, despite their 'conceptual messiness'.

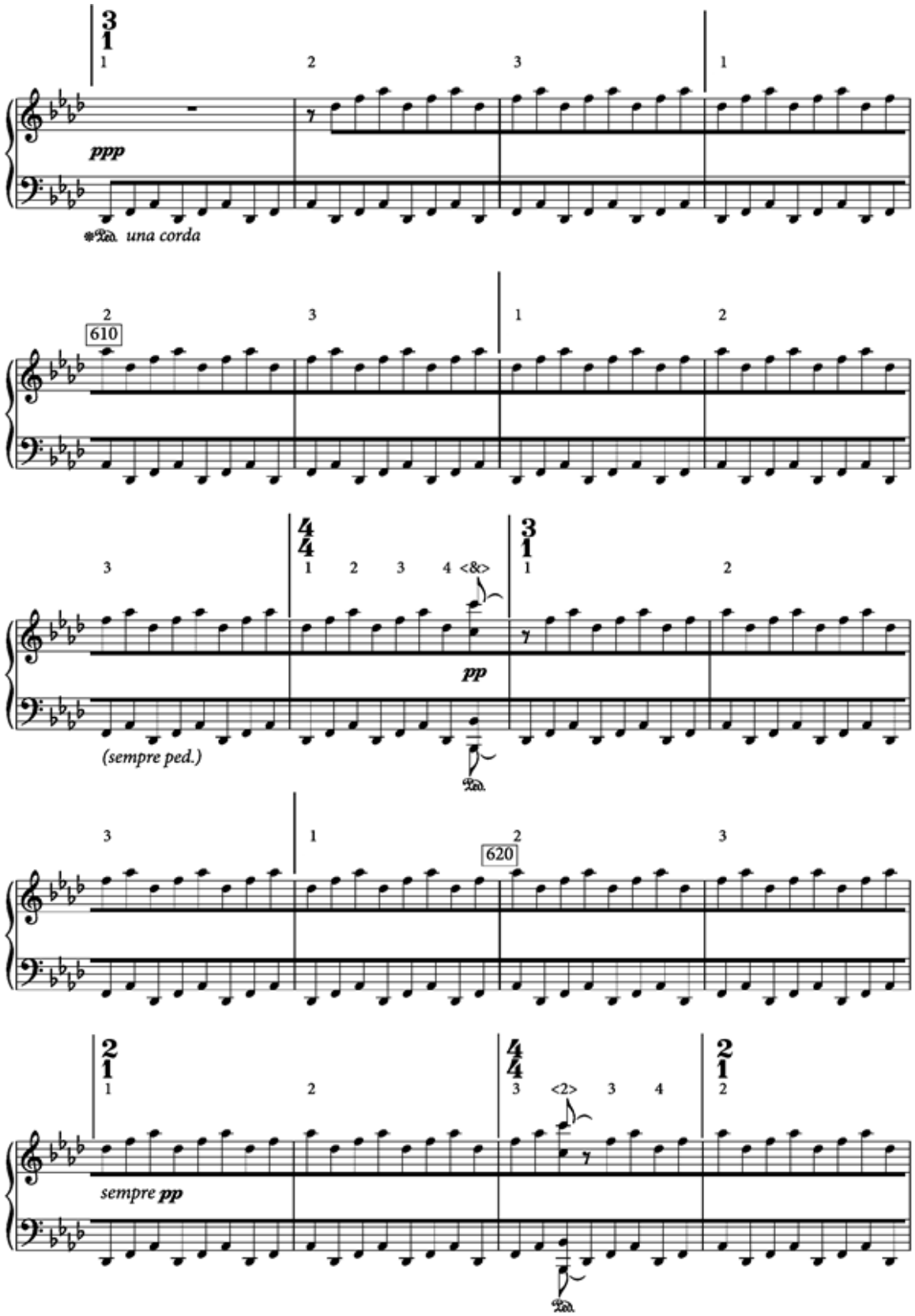
Example 4.22: metric configuration of bb. 509 – 532 superimposed on score



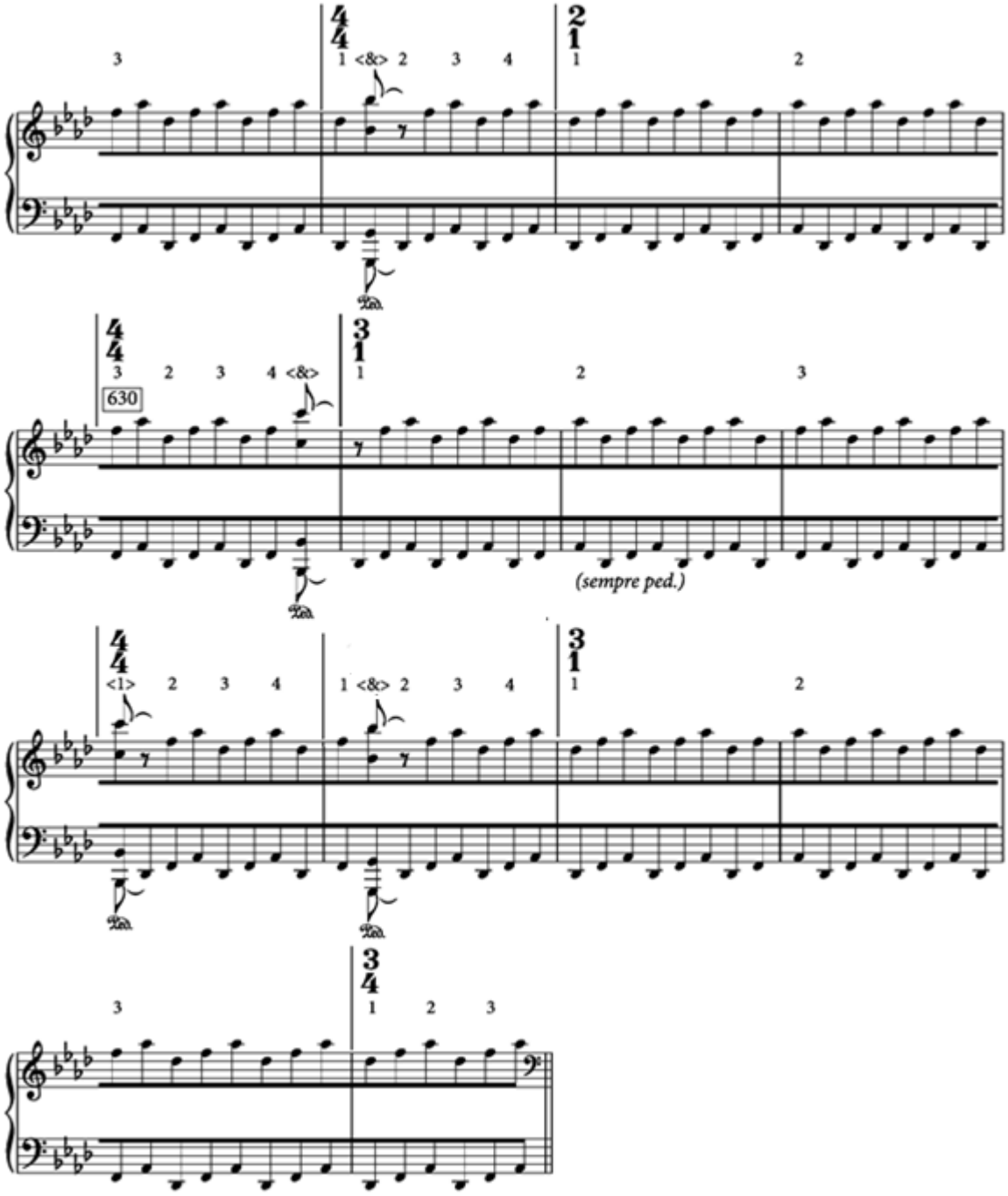
X. D♭ LYDIAN SECTION (BB. 606 – 639)

This section is notable not only because it is short enough for me to present in its entirety, but also because the metric reconfiguration presented below applies to a system which doesn't exhibit a quadripartite structural division (see the 'N/A' for this section's single system in the table at Appendix I). The pattern projection employed is oriented around the passage's vertical signposts: the original 34 bars (33 of 4/4 and a single bar of3/4) are reconfigured as three bars of 3/1, one bar of 4/4, two bars of 3/1, a bar of 2/1, a bar of 4/4, a bar of 2/1, a bar of 4/4, a bar of 2/1, a bar of 4/4, a bar of 3/1, two bars of 4/4, one bar of 3/1, and a final bar of 3/4 (see Ex. 4.23). However, the counting system I have employed is a little more complex, and *prima facie* it doesn't reflect the downbeats of the reconfigured metres. The reason for this is that, when uninterrupted, the D♭ arpeggio waveform creates a 3-bar pattern (see the opening 3 bars of the section at bb. 606 – 608), with D♭s falling on the 1st bar's downbeat, A♭s falling on the 2nd bar's downbeat, and Fs falling on the 3rd bar's downbeat. This hierarchical organization of the triadic pitches is an effective mnemonic device, and consequently the numbers I use to count downbeats correspond to this hierarchy (ie if D♭ is the downbeat I count '1', for A♭ I count '2', and for F I count '3'). This explains why not every downbeat is counted with a '1' as might be expected.

Example 4.23: metric configuration of bb. 606 – 639 superimposed on score



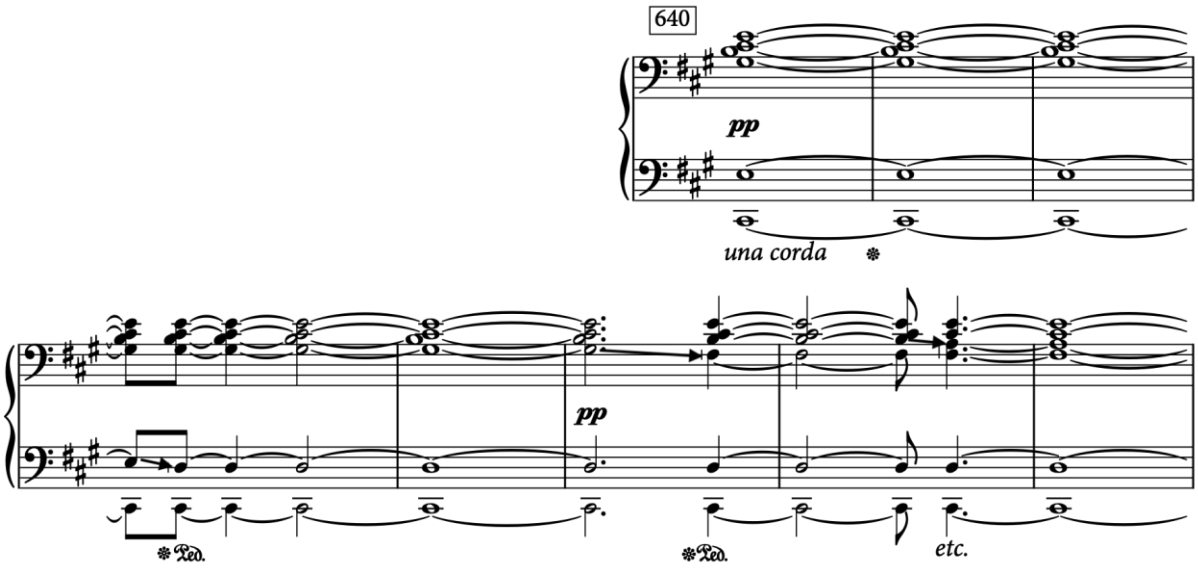
Example 4.23 (cont.)



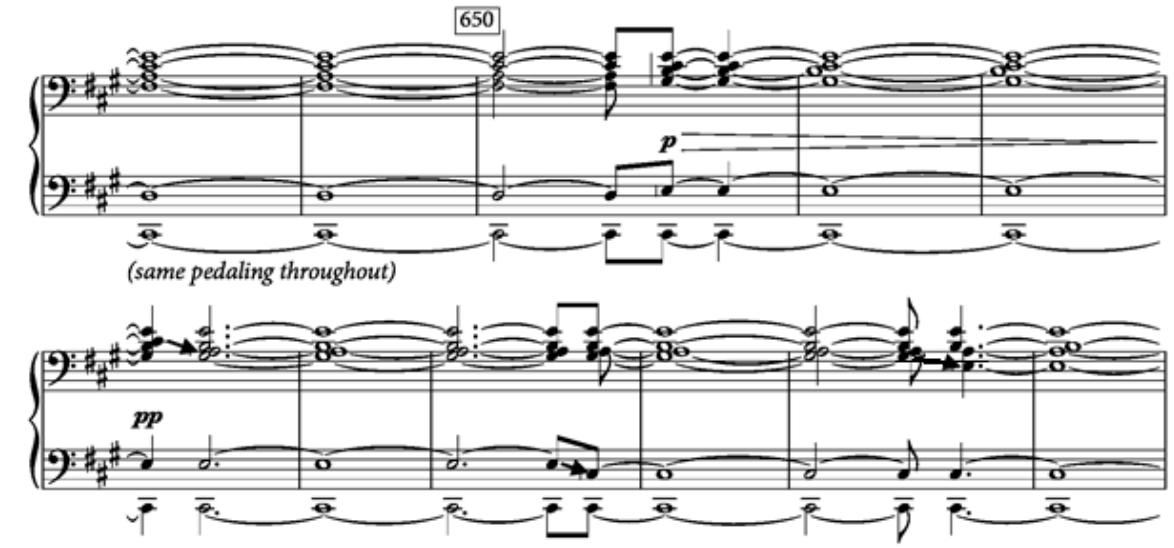
XI. C♯ PHRYGIAN SECTION (BB. 640 – 808)

It was stated in [4.5, IV] that the C♯ Phrygian section – 'A System of Weights and Measures' – is the hardest part of *Phrygian Gates* to memorize, although many of the mnemonic devices I employ here (eg skeletal rhythm reduction, 'vertical' and 'horizontal' metric reconfiguration) have received sufficient explanation not to warrant further examples. However, one strategy that is unique to the C♯ Phrygian section utilizes information from Pellegrino's analysis of the chaconne's voice-leading characteristics (see [4.5, I]). I conceive bb. 640 – 647 as three voices moving down a diatonic 2nd in the three chords that follow the basic chord (see Ex.4.24). At bb. 648 – 658 I conceive three voices moving down a diatonic 3rd across three chords (see Ex.4.25). And at bb. 659 – 668 and bb. 669 – 681 (see Exs. 4.26 and 4.27) I conceive three voices descending from the basic chord by a diatonic 4th and a diatonic 5th respectively. These conceptions of the first chaconne's component parts are advantageous for two reasons. First, my initial perception of this chaconne as a series of randomly-assembled chords is replaced with a sense of the process that governs the progression from one chord to the next, something which in turn lends security to my memorized execution. Second, to understand bb. 640 – 681 as four consecutive voice-leading processes instead of sixteen individual sustained chords is to conceive the same sounding music using fewer items of data to memorize – and with fewer things to memorize, memorization is made easier.

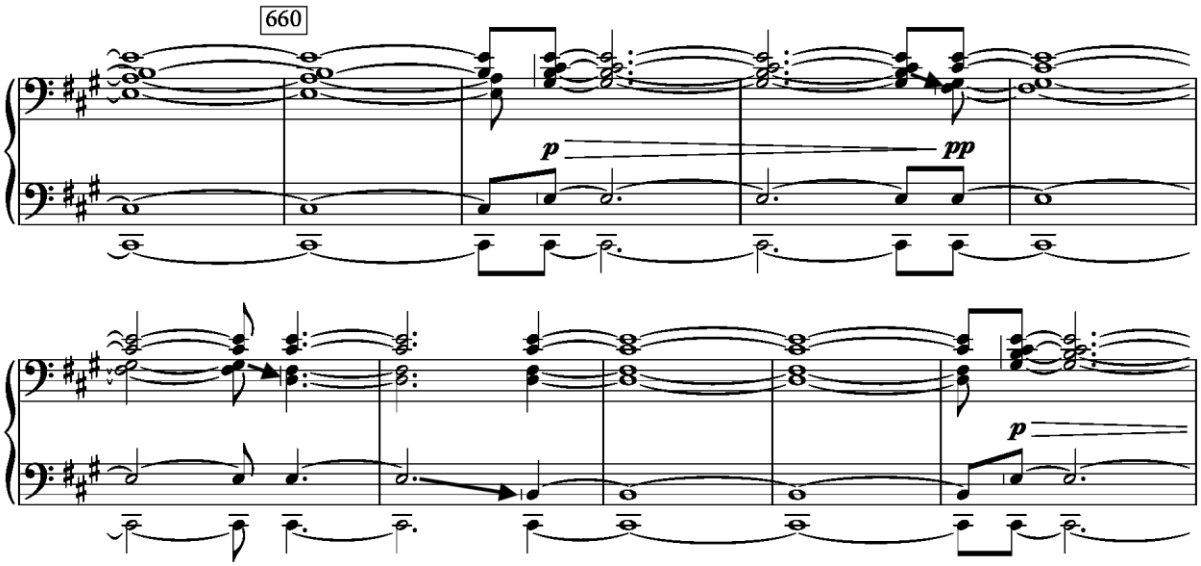
Example 4.24: *Phrygian Gates* bb. 640 – 647, descents by a diatonic 2nd indicated by arrows (bb. 643, 645 and 646)



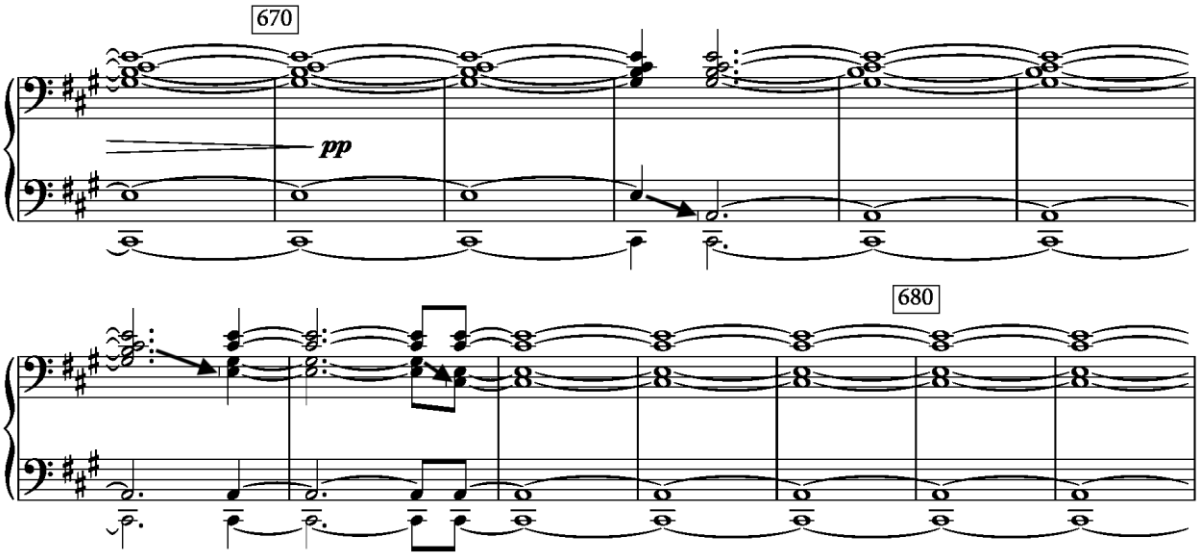
Example 4.25: *Phrygian Gates* bb. 648 – 658, descents by a diatonic 3rd indicated by arrows (bb. 653, 655 and 657)



Example 4.26: *Phrygian Gates* bb. 659 – 668, descents by a diatonic 4th indicated by arrows (bb. 662, 664 and 665)

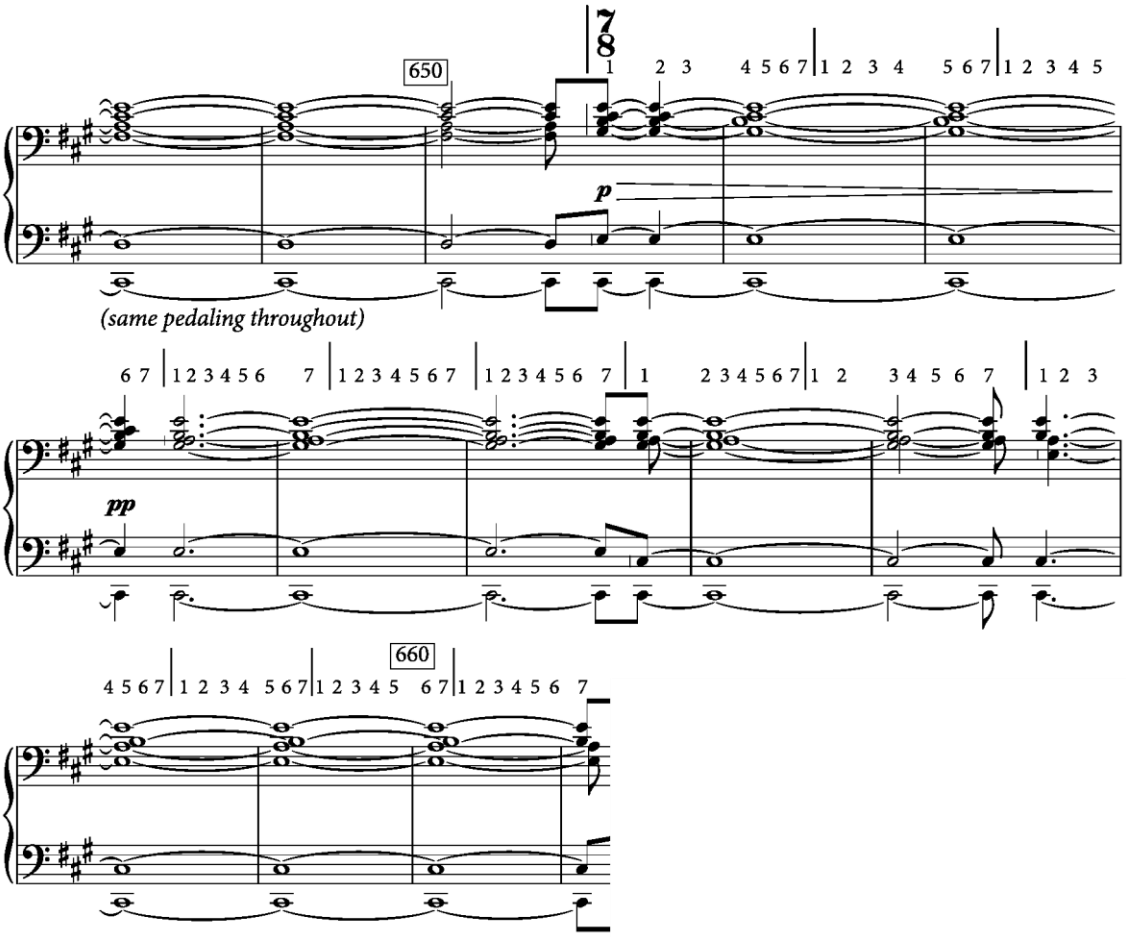


Example 4.27: *Phrygian Gates* bb. 669 – 681, descents by a diatonic 5th indicated by arrows (bb. 672, 675 and 676)



Of the nine passages in *Phrygian Gates* that adhere precisely to the '3-3-2-4' ratio, three occur in 'A System of Weights and Measures'. And although metric configuration according to this ratio is something which has been already discussed at length, it is worth mentioning it again, given the considerable positive impact this memorization strategy can have here. It is particularly helpful to conceive the first of these three systems (bb. 650 – 661) in terms of this ratio, and to reconfigure the metre accordingly. In this system, the original ten and a half bars of 4/4 can be reconfigured as twelve bars of 7/8, which themselves can be divided into a group of 3 bars, a second group of 3 bars, a group of 2 bars, and a group of 4 bars (see Ex. 4.28). The logic of this system is in harmony with the reconfiguration in two significant respects: note how the 'number-of-bars-per-group' sequence is identical to the series '3-3-2-4', and also how each sustained chord of the system falls on the downbeat of each group's first bar. Thus the straightforward regularity of this metric reconfiguration makes it an extremely effective mnemonic device. In addition, the technical execution of the passage has also been made easier, now that the original, awkward offbeat chord placements have been replaced by downbeat attacks in a monometric 7/8 reconfiguration.

Example 4.28: metric configuration of bb. 650 – 661 superimposed on score



XII. A ♭ LYDIAN/G♯ PHRYGIAN SECTION (BB. 809 – 922)

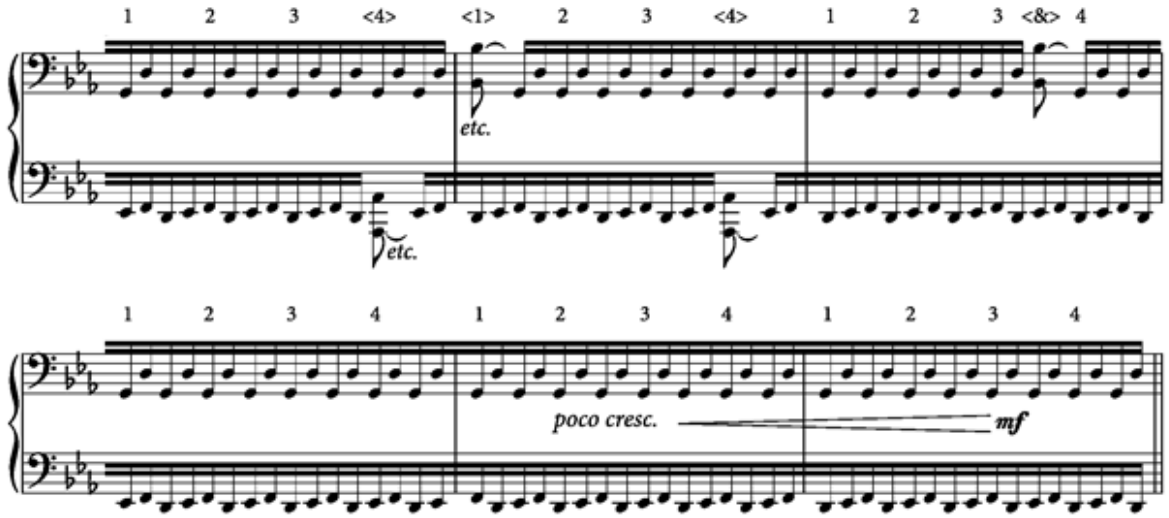
This section is the first in the 'structural palindrome' – as identified by Pellegrino at [4.5, I] – that governs the 'coda' (Adams' description) or 'fourth movement' (Schwarz and Pellegrino's description) of *Phrygian Gates*. In the palindrome, Lydian passages are paired with Phrygian passages of equal lengths, but the total length of each evenly-matched pair gradually diminishes until the midway point, whereupon the pair-lengths increase until the close of the work.

The A ♭ Lydian/G♯ Phrygian section consists of four Lydian/Phrygian pairs of ever-decreasing length, as the entire section is situated in the first – diminishing – half of the palindrome. There is ample opportunity to subject the systems of this section to any or all of the mnemonic devices thus far discussed. However, given that the passages paired together often exhibit similarities with each other, the conscious identification and codification of such similarities is a further applicable strategy that has mnemonic value;

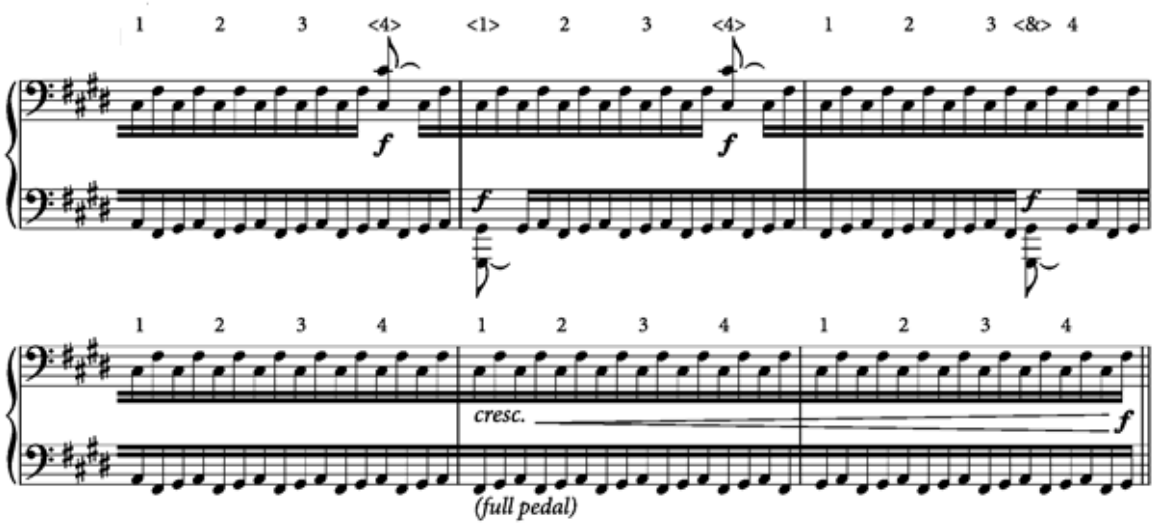
for if these similarities result in fewer items of data to memorize, then it follows that memorization is made easier.

An example of this can be found by way of a comparison of the material at bb. 833 – 838, and the material at 863 – 868. Both passages can be subject to the exact same pattern projection (one which revolves around vertical structural signposts and which preserves the 4/4 of the original notation). The vertical 'pings' of each passage align with the pattern projection in identical fashion, the only difference being that the left-hand 'pings' of the first passage take the place of the right-hand 'pings' of the second passage, and vice versa (see Exs. 4.29 and 4.30):

Example 4.29: metric configuration of bb. 833 – 838 superimposed on score



Example 4.30: identical metric configuration of bb. 863 – 868 superimposed on score

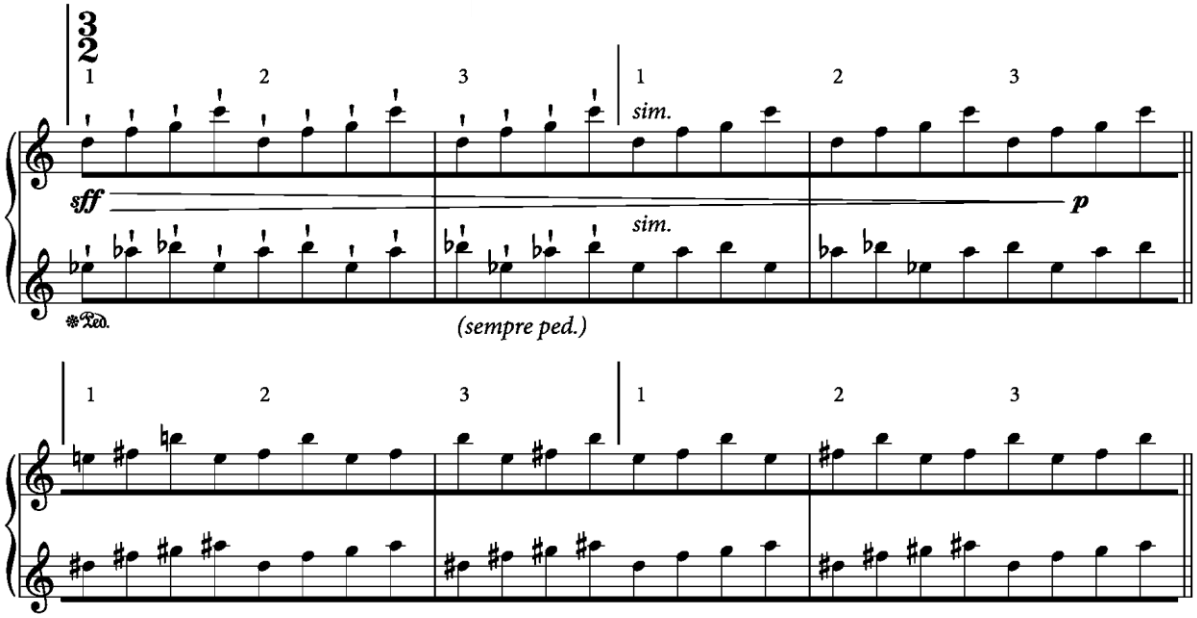


XIII. A♭/E♭ LYDIAN, G♯/D♯ PHRYGIAN SECTION (BB. 923 – 977)

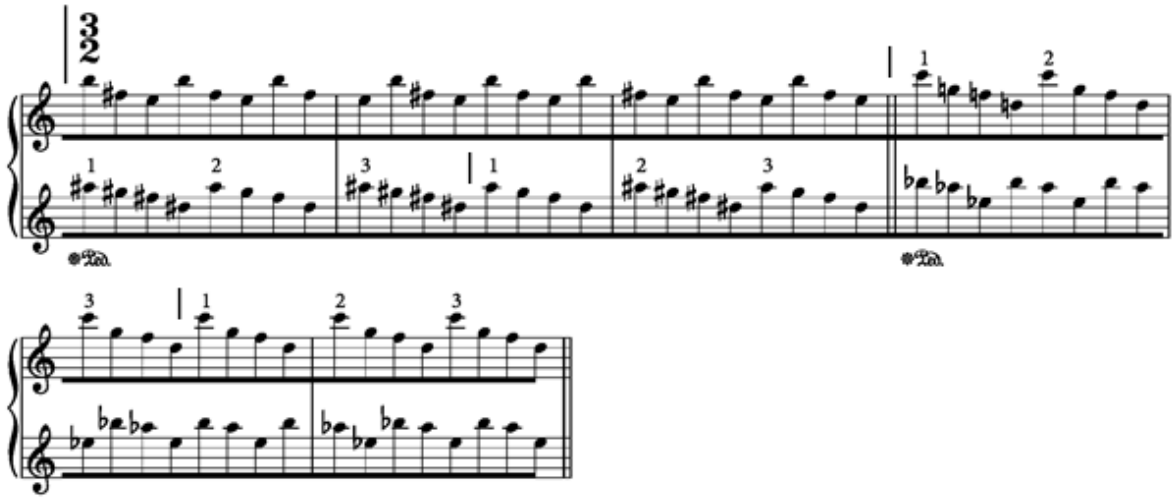
This short section consists of brief passages of material in four alternating modes (A♭ Lydian, E♭ Lydian, G♯ Phrygian and D♯ Phrygian). The section also constitutes the nexus of the structural palindrome, with a 'line of symmetry' cleaving the section in two at the midway point of bar 950. Furthermore, both the metre and the pitched material of the section itself are also palindromic: the second half of the section is an exact rhythmic, harmonic and melodic retrograde of the first. What this means is that the similarities between any given bar in the first half, and its retrograde counterpart in the second half, can be exploited for the purposes of memorization; for if these similarities result in fewer items of data to memorize (as was the case in the previous section), then it follows that memorization is made easier.

An example of this can be found by way of a comparison of the material at bb. 923 – 928, and the material at 972 – 977. Both passages can be subjected to the exact same basic pattern projection (a metric reconfiguration of the original six bars of 4/4 into four bars of 3/2). More significantly, the pitched material at bb. 972 – 977 (24 quavers of D♯ Phrygian material followed by 24 quavers of A♭ Lydian material) is the exact retrograde of the pitched material at bb. 923 – 928 (see Exs. 4.31 and 4.32):

Example 4.31: metric configuration of bb. 923 – 928 superimposed on score



Example 4.32: metric configuration of bb. 972 – 977 superimposed on score

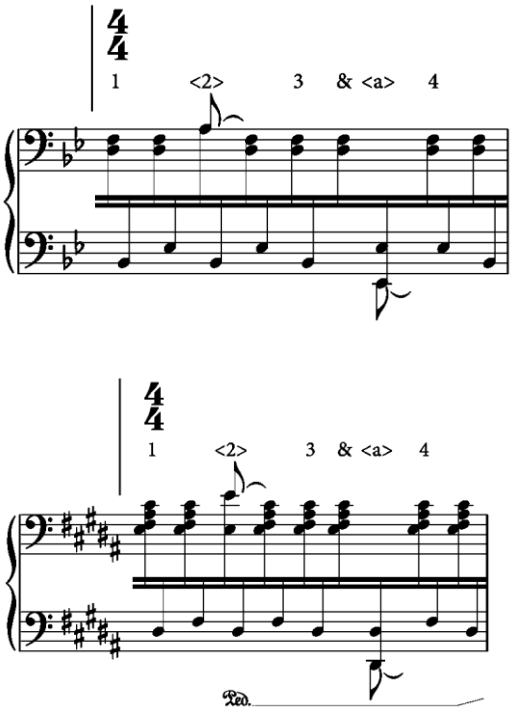


XIV. E ♭ LYDIAN/D♯ PHRYGIAN SECTION (BB. 978 – 1092)

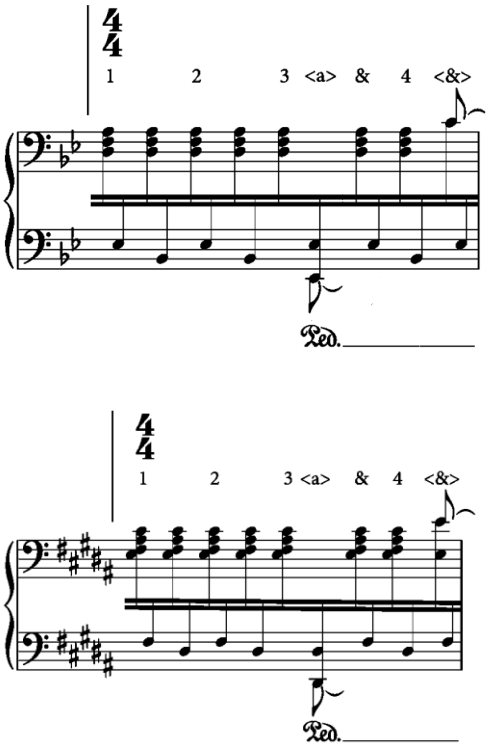
In the final section of *Phrygian Gates*, four Lydian passages are paired with four Phrygian passages of equal lengths, and the total length of each evenly-matched pair gradually increases until the structural palindrome runs its course at the work's end. As with the A ♭ Lydian/G♯ Phrygian section, the sections that are paired together often exhibit similarities with each other, and the exploitation of these similarities has the mnemonic value of reducing the number of items that need memorizing, thus making the job easier.

An example of this can be found by way of a comparison of the material in the final Lydian section bb. 1033 – 1062, and the material in the final Phrygian section at 1063 – 1092. I have identified two fragments from each section that form Lydian/Phrygian pairs in terms of their similarities (the first pair is b.1037 and b.1089, and the second is b.1045 and b.1085). Each Lydian fragment is identical (in terms of both the vertical signposts and their hand distribution) to the Phrygian fragment with which it is paired. Thus the two items per pair can be subject to a single pattern projection (see Exs. 4.33 and 4.34) which reduces the amount of data to be memorized:

Example 4.33: pattern projection of b.1037 and b.1089 superimposed on score



Example 4.34: pattern projection of b.1045 and b.1085 superimposed on score



4.7. RESULTS, IMPLICATIONS & CONCLUSIONS

I. *PHRYGIAN GATES*: THE MEMORIZATION METHOD AND ITS EFFICACY

Whereas case studies #1 and #2 featured analyses that subsequently enabled me to achieve certain ends (respectively, discovering the open form of *Music in Contrary Motion*, and constructing a method for systematic gradual phasing in *Piano Phase*), the analytical content of case study #3 has a certain 'retrospective' quality, in that it is primarily geared towards an end that I had already achieved prior to these analytical discoveries (that end being, of course, the memorization of *Phrygian Gates*). Indeed, my first memorized performance of the work occurred in 2001,[383] and this past achievement did admittedly furnish my present research with invaluable empirical data. However, it was often hard to gauge how effective my subsequent, analysis-based strategies for memorization actually were, as in my case much of the work was already so securely memorized that there was nothing left for these strategies to improve.[384]

But is worth noting that my 2001 performance, from a memorization point of view at least, was near-perfect, with the only discernible lapses consisting of occasional over-repetition of material (eg the first two crotchets of b.551 are repeated when no instruction to do so is given).[385] From this it is reasonable to conclude that the mnemonic devices presented in this chapter that were implicitly utilize in my early memorized performances are indeed effective strategies for the memorization of *Phrygian Gates*.

Musically, I regard my rendition to be effective and accomplished, with my memorization of *Phrygian Gates* contributing in no small part to the high quality of its performance. For instance, my freedom from the score meant that I was no longer put off by the frequent discrepancy between the work's *notated* metre and its *sounding* metre: the score is, for the most part, notated in 4/4 (in keeping with Adams's pragmatic practice of 'the route of least resistance in terms of notation'),[386] yet as Fyr points out, 'the pulse streams created by repeating pitch patterns [do] not often fit into such a framework'.[387] This discrepancy is ultimately the reason why the metrically reconfigured pattern projections (see [4.5] and [4.6]) are appropriate and effective; yet for a pianist performing from notation, there is the risk that unconscious 'metrical accents' prompted by the score will

[383] Paul David Kean, 'John Adams | Phrygian Gates (1977 – 78) | Live Performance | Paul David Kean (Piano)' [recorded 1st April 2001], YouTube, 2019 (uploaded 27th December) <https://www.youtube.com/watch?v=-FNW72EzHIw&t=18s> [accessed 30th December 2020]
[384] The obvious exception to this was 'A System of Weights and Measures', the memorization of which was greatly improved by the relevant analytical insights contained in this chapter.
[385] While these errors might leave me open to the same criticisms I directed at recorded performances of *Phrygian Gates* (see [4.3, I]), I would like to stress that my mistakes were made within a live performance setting, and consequently I did not have multiple opportunities to get the material right.
[386] Rebecca Jemian & Anne Marie de Zeeuw, 'An Interview With John Adams', *Perspectives of New Music* 34/2 (Summer, 1996), 88-104 (p.94)
[387] Fyr, p.173

detract from the intended aural asymmetry of the pulse streams. However, my memorization of *Phrygian Gates* entailed that I ran no such risk in my performance.

Having said all this, my performance did exhibit flaws, with one example being the occasional (and inadvertent) employment of *rubato* which, to my mind, detracted from the performance quality. Indeed, the presence of this 'stylistic tic' demonstrates how hard it is to banish any unwanted performance habits of standard repertoire from renditions of minimalist music, especially if the performer regularly performs minimalism alongside traditional classical works. Piano Circus member Nathan Williamson corroborates this when he states that minimalism 'requires such a different mindset' from one required from 'more 'romantic'/conventional repertoire', and that 'it's very difficult to switch that [mindset] on and off in the middle of a programme'.[388]

II. CASE STUDY #3: IMPLICATIONS FOR PERFORMANCE

The results of this chapter are potentially wide-ranging: not only could other performers employ the methods herein to give their own improved, memorized renditions of *Phrygian Gates*, but also, the various strategies for memorization could be used to memorize any sufficiently similar postminimalist work. My PhD Final Recital is a case in point: before *Phrygian Gates*, I performed Graham Fitkin's solo piano piece *The Cone Gatherers* (1987). In Part 2 of the work, bb.2 – 24 comprise six systems of uniform duration (13 crotchets), although this uniformity is not obvious from the score, as the different systems have different metric configurations (eg the second system – 4 bars long – consists of one bar of 2/4, one bar of 3/4, and two bars of 4/4, while the third system – 3 bars long – consists of two bars of 4/4 and one bar of 5/4). This plurality of metric configurations amounted to a plurality of things to memorize, and so memorization of this passage (at least as it is notated) was proving difficult. My solution was to standardize the metric configurations of these systems as far as was possible. Each system was reconfigured into a 3-bar passage, and the six systems were grouped into three pairs, with the items in each pair exhibiting some kind of metric similarity (eg the first two systems now consisted of one bar of 5/4 and two bars of 4/4). So with the number of bars per system now uniform and with only three categories of metric configuration across the six systems, there were fewer things to memorize. Thus memorization was made easier and was ultimately successful in performance.[389]

[388] Nathan Williamson, email correspondence, 29th December 2019
[389] Paul David Kean, 'Graham Fitkin | The Cone Gatherers (1987) | Live Performance | Paul David Kean (Piano)' [recorded 28th June 2018], YouTube, 2020 (uploaded 9th January) <https://www.youtube.com/watch?v=-FNW72EzHIw&t=18s> [accessed 30th December 2020]

III. CHAPTER CONCLUSION

It is my hope that the dissemination of this chapter's findings will have three positive outcomes. First, performers of *Phrygian Gates* will successfully attempt to memorize the work, and performance quality will increase. Second, the memorization methods presented in this chapter will be applied, with beneficial results, to the wider postminimalist repertoire (much like I did myself with Fitkin's *The Cone Gatherers*). Third, performers will break free from the customary reliance on notation that is prevalent in contemporary classical concerts, and seek to improve performance quality via memorization if and when appropriate.

CONCLUSION

Throughout this study there have been many examples of inversely proportional relationships. Our first encounter occurred in the Introduction, where it was stated that the interpretation of minimalism often requires fewer decisions to be made, but that the individual decision themselves arguably assume a greater importance, given that they each make up a significant proportion of the work's overall interpretative dimension.

This statement was followed by an elucidation of the four possible scenarios that can occur when considering the general relationship between analysis and performance. But the Introduction also contained a second instance of inverse proportionality; for it was speculated that if the analysis of a work improves its performance, then perhaps the greatest such improvement yielded by analysis would obtain for those works which consisted of nothing more than musical processes.

Prompted by this speculation, Chapter 1 contained a discussion of recent scholarship that cites the positive impact of musical analysis on performance, which was followed by a demonstration of this scholarship's uncertain applicability to minimalism. This uncertainty can be expressed via inverse proportionality; for the more a work adheres to the paradigm of minimalism, the less relevant the claims of these scholars seem to be, as their claims are supported with reference to music that is conceptually antithetical to this paradigm.

Further instances of inverse proportionality were demonstrated when a number of minimalism's paradigmatic features were described. For instance, it was stated that minimalism's characteristic minimization of change, in the form of stasis or graduality, is invariably accompanied by maximal duration. This proportionality holds because the various purposes of this lack of change (ie 'static ends', perception of gradual processes, and psychoacoustic effects) can only be fulfilled within the context of a lengthy timeframe. It was also stated that the reduction of motivic material to its bare minimum corresponds to the extreme repetition of that material. This relationship exists because a work with such a pared-down set of ingredients would be rather inconsequential without considerable iteration of those ingredients.

Evocations of inverse proportionality continued to feature when the performative challenges of process-based minimalism were discussed in Chapter 1. It was stated that the fewer instances of change exhibited by this music lead to a) greater physical challenges (eg the frequent demand to play repeated passages of unchanging steady rhythm and constantly loud dynamic), b) greater mental challenges (ie the need to maintain alertness in the face of static musical material and the attendant absence of new aural stimuli), and c) greater challenges of note accuracy (as the infrequent change in pitched material magnifies the negative impact of mistakes). It was also stated that

process-based minimalism's conceptual reduction of music to a process corresponds to a greater need for performers to attain awareness of these processes, if they are to avoid the negative pre-interpretative consequences that follow from a lack of such structural awareness. This latter recommendation is essentially a prescriptive expression of my central claim: that the analysis of process-based minimalism more often informs its performance at the rudimentary, 'pre-interpretative' level of execution.

Inverse proportionality could be unpacked from other general recommendations. For instance, it was stated that comparative lack of time it takes to learn the notes of a process-based minimalist work often corresponds to a need for a lot more rehearsing or 'practice performances' than usual. Indeed, it was recommended in [1.3, III] that in order to overcome the physical challenge, process-based minimalist works should frequently be practised according to their expected performance duration, even if those works are nothing but multiple repetitions of a small musical figuration that can be easily executed in isolation.

Indeed, an inversely proportional consideration provided the foundation for the primary recommendation of this thesis: that given the comparative lack of depth to the 'surface' structure of many process-based minimalist works, it follows that some level of performance-oriented structural analysis is more achievable. Performers should therefore consider analysis to be as much a necessary part of performance preparation as note-learning, rehearsal, practice performances, and other such aspects of preparation for the concert stage, given the benefits that such analysis affords. These benefits were demonstrated by the three case studies: in Chapter 2, the analysis of Glass's *Music in Contrary Motion* yielded solutions to the work's ontological indeterminacy and note accuracy issues; in Chapter 3, analysis of *Piano Phase* led to the construction of a method for systematic execution of Reich's gradual-phasing technique; in Chapter 4, analysis of *Phrygian Gates* underpinned each of the various strategies employed for memorizing Adams's work. Furthermore, the applicability of the performance practice solutions offered in each chapter extended beyond the three respective works of the case studies, and were shown to be transferable to sufficiently similar minimalist or postminimalist compositions.

So we can see that the inversely propotional features exhibited by process-based minimalism are pervasive at the levels of both theory and practice. Theoretically speaking, it is reasonable to assume that whenever there is a reduction along one particular 'musical axis', there will most likely feature an equal and opposite increase along another. From a practical standpoint, performers must recognize that whenever less time or effort is required to fulfil one practical aspect (eg note-learning), it is likely

that an equal and opposite increase in time or effort is required elsewhere (eg amount of rehearsals, number of practice performances), or that entirely new practices (eg analysis) should be added to one's performance preparation. 'Equilibrium' is the watchword, and perhaps it is fair to say that, in essence, performers of minimalism should aspire to balance the perceived extremes of the aesthetic with their actions and attitudes, especially when it comes to cultivating an ability to meet the maximal repetition of minimal musical ingredients with an inexhaustible enthusiasm for 'so much of so little'. To conclude, perhaps a necessary condition of the ideal performer of minimalism is a joyous inability to be bored with 'more of the more of the same'.

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APPENDIX I

JOHN ADAMS, *PHRYGIAN GATES*: STRUCTURAL INDICATOR ANALYSIS

SYSTEM (A LYDIAN)	BAR NOS.	STRUCTURE (QUAVERS)
1	1 – 7	14, 14, 8, 20
2	8 – 14	16, 14, 5, 21
3	15 – 19*	9, 7, 5, 13
4	19* – 28	19, 19, 13, 27
5	29 – 37*	19, 17, 5, 24
6	37* – 44*	14, 14, 9, 19
7	44* – 46*	5, 4, 2, 8
8	46* – 56	24, 20, 8, 32
9	57 – 61*	N/A (38 quavers)
10	61* – 66*	11, 9, 3, 15
11	66* – 69*	N/A (26 quavers)
12	69* – 75	(R.H.) 15, 12, 4, 19
13	76 – 85*	19, 19, 13, 25
14	85* – 94	22, 19, 6, 29
15	95 – 100	**12, 12, 8, 16**
16	101 – 113Δ	29, 26, 8, 37

SYSTEM (A PHRYGIAN)	BAR NOS.	STRUCTURE (QUAVERS)
1	114 – 119*	11, 12, 7, 16
2	119* – 125*	12, 11, 4, 17
3	125* – 128	8, 7, 5, 10
4	129 – 136Δ	**15, 15, 10, 20**

SYSTEM (E LYDIAN)	BAR NOS.	STRUCTURE (QUAVERS)
1	137 – 142*	(R.H.) 11, 11, 5, 18
2	142* – 148*	(L.H.) 12, 10, 4, 19
3	148* – 156*	N/A (64 quavers)
4	156* – 159*	6, 6, 4, 10
5	159* – 166*	12, 13, 5, 26
6	166* – 172*	11, 13, 5, 19
7	172* – 184*	8, 10, 10, 3, 17
8	184 – 191Δ	16, 16, 4, 28
9	192 – 200Δ	**18, 18, 12, 24**
10	201 – 210	**18, 18, 12, 24**
11	211 – 218*	20, 18, 6, 26
12	218* – 224*	(L.H.) 11, 11, 8, 16
13	224* – 235	26, 22, 8, 36

SYSTEM (E PHRYGIAN)	BAR NOS.	STRUCTURE (QUAVERS)
1	236 – 243*	23, 23, 15, 30
2	243* – 250	26, 22, 8, 33
3	251 – 255*	13, 13, 14, 14
4	255* – 265	31, 33, 23, 39

SYSTEM (B LYDIAN)	BAR NOS.	STRUCTURE (QUAVERS)
1	266 – 282*	34,32,24,45 →[10,12,6,17]
2	282* – 286*	9, 9, 3, 11
3	286* – 291*	9, 8, 5, 12
4	291* – 293*	N/A (20 quavers)
5	293* – 299*	10, 11, 8, 20
6	299* – 302*	5, 6, 3, 8
7	302* – 305*	(R.H.) 5, 5, 3, 8
8	305* – 306*	3, 3, 2, 5
9	306* – 310	8, 9, 4, 13
10	311 – 316*	12, 11, 6, 16
11	316* – 322*	11, 12, 6, 16
12	322* – 325	6, 7, 4, 13
13	326 – 333Δ	15, 15, 8, 22

SYSTEM (B PHRYGIAN)	BAR NOS.	STRUCTURE (SEMIQUAVERS)
1	334 – 338*	17, 16, 10, 27
2	338* – 342*	13, 16, 10, 23
3	342* – 345*	10, 12, 8, 20
4	345* – 350*	17, 23, 12, 37
5	350* – 362*	63, 47, 32, 46
6	362* – 367*	20, 22, 12, 34
7	367* – 378*	44, 42, 28, 66
8	378* – 401Δ	(R.H.) 90, 90, 60, 122

SYSTEM (G♭ LYDIAN)	BAR NOS.	STRUCTURE (QUAVERS)
1	402 – 406*	8, 8, 5, 12
2	406* – 410*	9, 8, 3, 13
3	410* – 413*	6, 5, 3, 9
4	413* – 418*	11, 11, 7, 17
5	418* – 422	8, 8, 5, 12
6	423 – 427*	9, 8, 3, 13
7	427* – 429	6, 5, 3, 9
8	430 – 435*	11, 11, 7, 17
9	435* – 438*	6, 5, 2, 9
10	438* – 441*	5, 5, 3, 9
11	441* – 443*	N/A (15 quavers)
12	443* – 446	7, 7, 5, 12
13	447 – 452*	12, 10, 4, 18
14	452* – 457	10, 10, 6, 18
15	458 – 461*	9, 6, 3, 12
16	461* – 469Δ	18, 16, 4, 24

SYSTEM (F♯ PHRYGIAN)	BAR NOS.	STRUCTURE (QUAVERS)
1	470 – 480*	19, 19, 14, 26
2	480* – 489	23, 19, 7, 29
3	490 – 496*	(R.H.) 13, 13, 5, 22
4	496* – 509*	22, 29, 10, 45
5	509* – 519*	(L.H.) 17, 17, 11, 33
6	519* – 532*	20, 17, 6, 59
7	532* – 543*	(R.H.) 23, 23, 15, 30
8	543* – 554*	24, 22, 16, 26
9	554* – 567*	(R.H.) 12, 13, 8, 17
10	567* – 579	(R.H.) 15, 13, 4, 19
11	580 – 588*	(R.H.) 18, 18, 10, 22
12	588 – 605Δ	(R.H.) 40, 34, 10, 50

SYSTEM (D♭ LYDIAN)	BAR NOS.	STRUCTURE (QUAVERS)
1	606 – 639Δ	N/A (270 quavers)

SYSTEM (C♯ PHRYGIAN)	BAR NOS.	STRUCTURE (QUAVERS)
1	640 – 650*	25, 21, 7, 32
2	650 – 661*	**21, 21, 14, 28**
3	661* – 668*	14, 14, 9, 19
4	668* – 682*	33, 28, 9, 43
5	682* – 694*	29, 25, 8, 37
6	694* – 705*	**21, 21, 14, 28**
7	705* – 708*	8, 7, 3, 10
8	708* – 724*	37, 32, 10, 48
9	724* – 732*	16, 16, 11, 22
10	732* – 739*	16, 14, 5, 21
11	739* – 741*	5, 4, 2, 7
12	741* – 752*	**22, 21, 14, 28**
13	752* – 768*	33, 33, 22, 43
14	768* – 782	33, 28, 9, 43,
15	783 – 787*	9, 9, 6, 13
16	787* – 808Δ	42, 42, 28, 57

SYSTEM (A♭ LYDIAN/G♯ PHRYGIAN)	BAR NOS.	STRUCTURE (SEMIQUAVERS)
1	809 – 838	140,122,40,180→[52,44,16,68]
2	839 – 868	**120,120,80,160**→[40,40,26,54]
3	869 – 883	60,58,39,83→[23,20,12,28]
4	884 – 898	70,60,18,92→[28,22,8,39]
5	899 – 906Δ	36,30,10,44→[12,10,6,16]
6	907 – 914Δ	**30,30,20,40**→[12,10,4,14]
7	915 – 919Δ	18, 16, 4, 22
8	920 – 922Δ	16, 14, 10, 20

SYSTEM (A♭ /E♭ LYDIAN G♯/D♯ PHRYGIAN)	BAR NOS.	STRUCTURE (QUAVERS)
1	923 – 977	N/A (360 quavers)

SYSTEM (E♭ LYDIAN/D♯ PHRYGIAN)	BAR NOS.	STRUCTURE (SEMIQUAVERS)
1	978 – 981Δ	17, 14, 8, 21
2	982 – 985Δ	18, 14, 6, 22
3	986 – 993Δ	(R.H.) 36, 30, 10, 44
4	994 – 1001Δ	(R.H.) 30, 30, 20, 40
5	1002 – 1017	60,60,42,79→[20,20,12,27]
6	1018 – 1032	71,58,16,95→[26,24,14,31]
7	1033 – 1041*	34, 34, 24, 48
8	1041*–1051*	36, 30, 10, 84
9	1051* – 1062	(R.H.) 45, 44, 30, 61
10	1063 – 1070*	(R.H.) 30, 30, 20, 60
11	1070* – 1077	(R.H.) 30, 30, 10, 46
12	1078 – 1082	21, 18, 8, 33
13	1083 – 1092	(L.H.) 41, 40, 26, 53

* = system starts/finishes midway through the bar

Δ = denotes a system that finishes with an irregular bar-length

(R.H./L.H.) = denotes the hand that plays the punctuations that serve as structural indicators (in systems that feature punctuations played by both hands)

'→[*n*, *n*, *n*, *n*]' = denotes microscopic size relationship within the system's final block

Precise '3-3-2-4' ratios in bold

APPENDIX II: RECITAL COMPONENT

DATE AND TIME

7:00pm – 8:30pm, Thursday 28th June 2018

LOCATION

Great Hall, Goldsmiths, University of London

PROGRAMME

Philip Glass (1937 –) *Music in Contrary Motion* (1969)
Paul David Kean (organ)

Terry Riley (1935 –) *Keyboard Study #1* (1964)
Paul David Kean (pianos)

Steve Reich (1936 –) *Piano Phase* (1967)
Paul David Kean (pianos)

– INTERVAL –

Philip Glass (1937 –) *Music in Fifths* (1969)
Paul David Kean (piano)

Graham Fitkin (1963 –) *The Cone Gatherers* (1987)
Paul David Kean (piano)

John Adams (1947 –) *Phrygian Gates* (1977 – 78)
Paul David Kean (piano)

In order to present a written component and a performance component that constituted two equal aspects of an integrated 'thesis', it was necessary for me to perform all three case study works in my recital. However, to perform *Music in Contrary Motion, Piano Phase* and *Phrygian Gates* in a single concert was, admittedly, a daunting prospect, given that each work alone requires considerable skill, preparation and nerve.

Two measures were taken to address this. First, I made the advance decision to give a shorter rendition of *Piano Phase* in the interests of energy conservation. My previous solo performances of this work did not require this kind of caution, as they all featured as finales to their respective programmes. My recital performance of *Piano Phase*, on the other hand, was merely the last item in the first half, and so it was important that I save some strength for what lay ahead (particularly *Phrygian Gates*).

The second measure was to insert a comparatively straightforward work in between *Music in Contrary Motion* and *Piano Phase* (ie Terry Riley *Keyboard Study #1*) and to precede *Phrygian Gates* with two works (Philip Glass *Music in Fifths* and Graham Fitkin *The Cone Gatherers*) that were at least less formidable than the Adams.

This judicious programming granted me the physical and mental reprieve ahead of the recital's most challenging works. But they also added aesthetic benefits to the proceedings alongside these pragmatic ones. For instance, the inclusion of *Keyboard Study #1* gave me a second opportunity to exploit the sonic possibilities of the 2-pianos 2-hands instrumentation, and the inclusion of *The Cone Gatherers* added variety by giving the audience their first moments of calm and pianistic nuance.