Chapter Four

Learning Strategies and Performance Practice for the New Complexity Repertoire

4.1 Introduction

The performer faced with a new complexity score is in a quandary. The initial impression that it is unplayable is common. Further, once the superficial aspects of the score are penetrated, it is often the case that whilst the notes are theoretically playable, conveying the density of information with any accuracy appears impossible. The temptation to simplify, even ignore some of the instructions might be strong. It can, however, be a reasonable starting point to get to know the music. Looking to the composer for guidance ought to be helpful but, as some of the examples in the previous chapter show, making pragmatic performance decisions from very diverse views on the aesthetics of the genre can be difficult. The composer may be on hand to offer advice, accept compromises and generally encourage the performer. As this cannot be guaranteed, the score should stand as a sufficient signifier of its realisation. According to Ferneyhough:

notation is always relative to intention, whereby it is up to the composer to adequately suggest appropriate forms of response. It is clear that no conceivable notation would ever be equal to the task of rendering every aspect of a work’s physiognomy in a manner capable of performer reproduction; nor am I suggesting that this would even be desirable. (Ferneyhough 1990, 19)

This chapter will be concerned with the methods performers have described for solving the rhythmic problems that arise in the new complexity repertoire.
Although some performers have written about the ways they learn the pieces, regrettably few go into any great detail about their methods or the criteria by which they judge the adequacy of their learning processes. Similarly, there is as yet little or no tradition for performance of new complexity compositions. This is not surprising given that the pieces are still relatively new and a performance practice would necessarily develop over a period of time. There are relatively few performances and seldom more than one or two recordings of many of the works. Many guitar pieces have not had any commercial recording, there being perhaps only a handful of private recordings.

It is therefore necessary to survey some of their techniques and practices of those performers who have been forthcoming. These might be generally useful or instrumentally specific. A précis of these approaches is given, followed – where appropriate – with some instances of how their methods could be applied to compositions for the guitar.

A critical analysis of the results obtained by the use of these methods follows in the next chapter. Whilst rhythmic accuracy is not the sole criterion by which performances can be evaluated, it is one element in trying to assess where the aesthetic of new complexity lies. There is, however, the danger of offending, belittling and insulting performers by making superficial judgements of their work, picking out elements for criticism and ignoring the overall artistic effect of their performances. This is not the intention and every effort will be made to avoid the possibility of such inferences being made.

In reality, the (often) extreme complexity of the writing forces the performer to make decisions as to what determines a credible performance so it is not surprising that there is a range of approaches to learning and preparing the works for performance. Some take what Frank Cox calls the ‘high modernist’ position (Cox 2002, 71) where accuracy is primary, an aesthetic appreciation only valid once this is achieved. Others, including Ferneyhough, see accuracy as less
important than fidelity. Whilst this approach is more practicable, there is the view that this might encourage a more cavalier attitude to preparation that misses the wealth of subtle detail that can colour a performance; simplistic approximations can result in bland, undifferentiated musical material.

Since the early days of new complexity the technological advances, from programmable metronomes to computer simulation, have changed the relationship of the performer to the score. Hours spent with a calculator and graph paper can be replaced immediately by some simulacrum of the score played by a computer. On the other hand, the use of a simple metronome does not necessarily ensure the performance of the standard repertoire will be of satisfactory quality. They are tools but not fundamental to the essence of the interpretative work.

Broadly, the areas that need to be addressed by a performer are those of rhythm, dynamics, articulation, timbre, microtones, extended techniques, instrumentally specific gestural movements and general playability. This chapter will focus on the methods performers use to analyse rhythmic problems. The effect of other parameters on the performance of rhythm will be discussed in the next chapter.

There is one other issue to raise: computer software for notation of music on personal computers was not widely available in the 1980s and many scores are handwritten (or self-generated by some means) and published in facsimile editions of the composer’s manuscript. In some respects this is a virtue (recall Dillon’s comment about writing by hand forcing a slower pace and a more intimate relationship with the music (Toop 1988, 40)) but there can be problems¹. The following will serve as an example.

In bar 14 of Kurze Schatten II (Example 4.1), the placing of the last harmonic in the first voice seems (visually) to be somewhere near to the last note in the third part, but the complexity of the notation is so perverse as to make the exact order of the sequence of sonic events quite unclear. (The microtonal scordatura for this piece
given in Chapter Two (page 22) must be born in mind for this and all subsequent examples from this piece.)

**Example 4.1** Ferneyhough, *Kurze Schatten II*, 1st movement, bars 13-14

Exactly where that note should be placed is the problem. The issue is further complicated by an apparent error: the 31:24 should be 27:24 if the given note values are correct. A possible explanation might be the absence of an 8th note rest somewhere in the bar².

The notation is misleading if the upper part should be 27:24 for then the last note should be played 17/27ths of the way through the bar. That is just before the 2/3rds point or the fifth quaver³. So whilst the B harmonic looks as though it should come at about the same time as the last note in the lower part, it should really come about an 8th note later. It is also interesting to speculate on why Ferneyhough beamed the second part as if it were in triple time, and if this was important for representation of the metrical underpinning of this bar⁴.

Similar errors will be discussed as they become pertinent.
4.2 Brian Ferneyhough

Ferneyhough is the composer most fundamentally associated with new complexity and generally accepted as having written some of the most notationally challenging scores. His views on how the performer should learn the pieces and prepare for performance are therefore of great importance.

The performer with conventional conservatoire training is likely to be ill equipped to deal with the difficulties that much of this repertoire presents. On the other hand, the performers who are most likely to tackle these works will have been so trained. Composers are aware of this. Ferneyhough has written extensively, and been interviewed many times, about his music and the problems faced by performers in realising his scores. In a conversation with Molly Sheridan he says:

> it seemed to me important to try and create a musical notation which provided a lot of specific detail but at the same time allowed the performer to make connections towards different sorts of traditions that are part of their professional background (Sheridan 2005).

This is immediately apparent in Kurze Schatten II where it is quite clear that he has an intimate knowledge of the guitar fingerboard, the possible fingerings, the idiomatic potentials and highly specific techniques probably known to few professionals let alone students. For example, he requires the use of *pizzicato alla lagoya*, a reference to a technique developed by (or associated with) the guitarists Alexandre Lagoya and Ida Presti, requiring the use of the little finger of the right hand to partially damp the strings by the bridge of the guitar whilst the other right hand fingers play normally. There is a reference to this technique in Jean-Luc Mas’s *Sonorités Nouvelles Pour Guitares* (Mas 1986, 23) but it is hardly a well-known technique\(^5\)\(^6\). Later, in the same interview, Ferneyhough says:
when you write for any given instrument you have to know that
instrument ... I will frequently dream about an instrument that I can't
play personally ... I know so much about it that I can dream of putting
my hands in the right place on that instrument to play these strange
sounds. (Sheridan 2005)

He is scathing about student composers who make demands on the performer
without understanding the difficulties inherent in the instrument, declaring that
such issues should be left to the performer. His view is that the composer should
seek out instrumentalists, do the research, and find out what can be done
(Sheridan 2005).

When it comes to what he does expect or hopes to hear in a performance of his
music he says:

I'm interested much more in what you might call sublime impossibility,
which points out to the performer that no interpretation of a given
piece is an exact reflection of what is on the paper, nor should it be.
(Sheridan 2005)

This is much the same as his advice quoted earlier, so he has been consistent over
this period. Also, as previously stated, he is not so much looking for accuracy as for
'fidelity' to the score.

Briefly, he suggests the performer prioritise and deal with what is to them the
most meaningful parameter at first, be it pitch, gesture or, presumably, rhythm
(though he doesn't state that here). He goes on to say that at some point in this
process one might have 'a pretty good sort of fake version of the piece' and that
'this is the time for recalibration and synthesis of the several layers of expression'
(Sheridan 2005). This of course is where the main difficulties begin. It might also
be pointed out that this advice is neither original nor specific to his music though
performers are more likely to have the resources with which to approach other forms of music.

It is of interest to compare these later thoughts with those he expressed in his remarks at the beginning of Cassandra’s Dream Song for solo flute. Although it was published in 1975, it was written in 1970 so it seems probable that the remarks were written at the same time. He writes:

a valid realisation will only result from a rigorous attempt to reproduce as many of the textural details as possible: such divergencies and “impurities” as then follow from the natural limitations of the instrument itself may be taken to be the intentions of the composer. No attempt should be made to conceal the difficulty of the music by resorting to compromises and inexactitudes (i.e. of rhythm) designed to achieve a superficially more “polished” result. On the contrary, the audible (and visual) degree of difficulty is to be drawn as an integral structural element into the fabric of the composition itself. (Ferneyhough 1975)

We must infer that he expected (at that time) a degree of rigour and exactitude, and that the sensation of difficulty of performance is part of its aesthetic. The passage can also be construed as being ambiguous. It could be interpreted that he is implying that, whilst a performer might be able to realise the rhythms exactly, they should not ‘smooth’ the rough edges to produce a more ‘polished result’. It is more probable that any rhythmic inaccuracy will be due more to the almost impossible task of doing otherwise and the alternative reading is that he is warning against such a compromised reading.
4.3 Magnus Andersson

It is unfortunate that the guitarist Magnus Andersson has not written more extensively about his work on new complexity as he has given numerous premières of the repertoire, including Ferneyhough’s *Kurze Schatten II* and Dillon’s *Shrouded Mirrors*. His essay on *Kurze Schatten II* (Andersson 1988) starts with his dismay at the quality of repertoire for the guitar, including much by contemporary composers. His request to Ferneyhough to write a piece for the guitar in 1979 resulted in a meeting in 1980 where he demonstrated the possibilities of the guitar, including the clichés that can result in idiomatic but dull, formulaic composition. This seems to have prompted Ferneyhough to suggest the use of an unusual scordatura and the gradual return to near normal tuning (the second string remains at B flat) over the course of the seven movements. It is interesting to speculate on the extent of their interaction as Ferneyhough has stated that he never collaborates with performers:

I never *collaborate* (writer's italics) with a given performer in the sense of having him give me his particular ‘box of tricks’. I believe that one should never start from the global effect, but rather allow it to emerge synthetically as a result of the confluence of other compositional considerations. This seems to me the sole way to legitimize, to ground sonoric innovation. [Ferneyhough 1995 370]

Andersson discusses the form and some of the technical challenges of the first three movements but does not give much of an indication as to how he solved the problems. He stresses his uncompromising approach to the second movement:

J’ai choisi là de ne faire aucun compromis en fait de technique et de tempi (malgré des difficultés considérables) afin de réaliser dans l’exécution un déroulement conforme, à mon sens, à l’idée de cette
musique, en un fragile équilibre au bord de la catastrophe. (Andersson 1988, 130)

(I decided not to compromise here in technique or tempi (despite considerable difficulties) in order to achieve performance of the musical line. In my opinion, this conformed to the concept of this music, a delicate balance on the edge of disaster.)

Later he explains how he began the learning process by getting a general idea of the gestures and their relative textures without worrying about their internal organization. He states that the subsequent synthesis required high precision but gives few details of his processes or methods:

Ma première démarche a été de me faire une idée du processus gestique et de la texture qualitative des différents gestes, sans me préoccuper de leur organisation interne. (Andersson 1988, 131)

(My first step was to get a sense of the gestural process and the qualitative texture of the different gestures, without worrying about their internal organisation.)

And:

Ensuite, il s’agissait de dégager l’enchaînement des gestes en phrases, et d’assembler celles-ci en paragraphes porteurs de sens. Cela demandait une évaluation et une maîtrise précises de la synchronisation interne et globale de chacun des éléments. Je commençai donc tout simplement par réunir les indications métriques en un tout définissant l’espace temporal dans lequel devaient prendre place l’expansion et la concentration de chacun des éléments des paragraphes. La division des différentes strates temporelles se poursuivait ensuite jusqu’à
l’obtention d’un plus petit dénominateur commun, réalisable avec une grande précision. (Andersson 1988, 131)

(It was then a matter of disconnecting the sequence of gestures and phrases and re-assembling them into meaningful paragraphs. This required precise assessment and mastery of the comprehensive internal synchronisation of each of the elements. So I began by simply reuniting the information in a metrical space defining the time which should take up the expansion and contractions of each of these elements. The division of the strata continued until the lowest common denominator was obtained. This could be done with high precision.)

Andersson finds resonances in Dowland, Monteverdi, Charpentier, Garcia Lorca and takes inspiration from the recordings of Arthur Schnabel, and in particular his agogic accentuation. (Andersson 1988, 132). These references might, or might not, be useful for other performers.

In focusing on the form of the first three movements, Andersson covers much the same ground as Ferneyhough in his own essay on Kurze Schatten II (Ferneyhough 1995). Ferneyhough analyses all seven movements and his is a more detailed exegesis of the piece7.

4.4 Performers’ responses in complexity?

The essays by the performers in the Complexity? booklet (Bons 1990) are for the most part quite short. The questionnaire (Bons 1990, 7) did not include any questions that would elicit specific details of their individual, practical, approaches to learning the works. Some of the respondents completely ignored the questions and just wrote on what concerned them about complexity in music. Irvine Arditti stated:
With Ferneyhough, many works often require mathematical pre-calculations in order to solve rhythmic problems. Each problem has to be resolved in spite of (or in addition to) the constantly changing metres. These metres are often further complicated by several layers of irrational rhythms on top of each other, starting and ending at different points. This achieves a constantly changing pulse, often even between metrical beats. These are the complications that place Ferneyhough's music in the category of the most extreme difficulty and render his scores only accurately playable by experts or extreme devotees. (Arditti 1990, 9)

The cellist Taco Kooistra, in answer to the question “Did you use a calculator?” replied:

Sometimes. The pitches you have to work out on the cello, but the rhythms have to be done mentally. I don’t agree with Pierre Boulez who says that, because of the way these kinds of rhythms are notated, the musicians will simply play slightly before or after the beat. Of course there is a grain of truth in what he says, but if you actually work out the rhythmic sub-divisions as Ferneyhough wrote them, and try to execute them, the effort you make will be audible and in the end it will sound much more intense. I’m not suggesting we are playing all the rhythms exactly as they are notated since it’s almost impossible to feel 13:9 for instance. (Kooistra 1990, 27)

The clarinetist Roger Heaton, whilst allowing that the various extended techniques ubiquitous in this music might be possible, saw excessive rhythmic complexity as the main problem. As the rhythms were impossible to play accurately:
we are thrown into an area of approximation and even improvisation on a text whose very nature is to notate in detail and control every aspect of performance. (Heaton 1990, 26)

The singer Brenda Mitchell expressed objections to almost all the characteristics of complex writing for the voice. In particular vibrato could not be used when note durations were often so short. She agreed with researchers in psychomusicology that ‘over stimulation of perceptual apparatus and the semblance of a-rhythm causes reactions of stress and aggression.’(Mitchell 1990, 31). Her conclusion is that:

It is not the musical difficulty per se from which many respectable musicians shy away, but the lack of opportunity to employ the vocal sound in the technical and aesthetic way acquired during years of study. (Mitchell 1990, 31)

A commentary on all the above responses will be given later in section 4.18 Discussions and conclusions, so that connections can be made with subsequent writers.

4.5 Rhythm – introduction to the problems

This is probably the area of most concern to the musician who first encounters scores of this nature. The twentieth century saw an increasing preoccupation of composers with the possibilities inherent in conventional rhythmic notation; the use of irregular meters, polymeters, fractional subdivisions of beats etc. became commonplace. Gardner Read’s Modern Rhythmic Notation (Read 1980) published in 1980 gives many examples. Here the use of fractional beats and time signatures such as 1/3, 4/5 and 4/7 is mentioned, but not particularly investigated despite the citation of examples from works by Henry Cowell, John Cage, Christian Wolff,
Conlon Nancarrow and others. It is clear therefore, that composers were aware of such compositional possibilities for a substantial part of the twentieth century.

One method of analysing and solving the rhythmic problems in a piece such as *Paths of Resistance* for guitar, by Jason Eckardt⁸ might be simply to calculate where the beats are in any one bar and make estimations of where the notes lie in relation to them. In bar 14 of this work (Example 4.2), the first two beats can be estimated with the second beat lying somewhere between the tied A harmonic and the D harmonic.

**Example 4.2** Eckhardt, *Paths of Resistance*, bar 14

\[ 8^{th} = 60 \]

A competent musician can then estimate the subdivisions of these beats. This approach might be useful for an initial sight-reading or preliminary study of the piece but is likely to be inaccurate and miss the finer points of the composer’s intentions. It does however prioritise the importance of meter.

4.6 *Steve Schick – an introduction*

Steve Schick’s contribution to the 1994 *PNM* Complexity volume was a paper detailing the processes and techniques he used for learning Ferneyhough’s *Bone Alphabet*⁹ written between 1991 and 1992 (Schick 1994). This is a piece almost exclusively concerned with rhythm as the actual choice of percussion instrument is

63
largely the performer’s, making issues of timbre secondary in compositional terms. This is not to diminish the other aspects of the work such as texture, dynamic, shape and form. There is also a host of issues specifically of importance to the percussionist such as use of mallets, sticks and layout. Similarly, the issues of register and delay would be matters for the percussionist to determine before all else. One assumes that once these are decided, the overwhelming considerations for learning this piece are rhythm and gesture.

Schick was assiduous in his preparation for performing this work and in this paper he gives probably the most comprehensive account of the possible techniques, short of technological methods, that can be used to facilitate the learning of such rhythms. Any instrumentalist, not just percussionists, can use these procedures. He gives the following three methods for calculating rhythms. These are presented with some examples of how they can be applied to guitar pieces together with some critical comments.

4.7 Schick’s Method 1

Schick’s first method of dealing with polyrhythm is to calculate ‘the least common multiple of their constituent components’ (Schick 1994, 137). His example is bar 1 (Example 4.3). Page 1 of the score is included as a supplementary data file.

Example 4.3 Ferneyhough, Bone Alphabet, bars 1-3

[Image of Bone Alphabet score]
Here the dotted 8\textsuperscript{th} note grouping of the lower part for the first two beats is divided into ten units. The same period in the upper part is, of course, twelve 64\textsuperscript{th} notes. The least common multiple is 60 so a grid with 60 divisions will account for every note of this rhythm. Each 64\textsuperscript{th} note of the upper part will take five units on this grid and each of the smallest note values in the lower part will take 6 units. Example 4.4 shows how this works. The counting of course must start from zero\textsuperscript{10}.

**Example 4.4** Ferneyhough, *Bone Alphabet*, bar 1 (Schick’s schematic representation (Schick 1994, 139))

Schick describes this method as:

working very well (for) polyrhythms that begin and end together, and where the least common multiple is not so large as to render subdivision by a performer impractical. (Schick 1994, 138)

One might question its usefulness however, as simple arithmetic and further analysis of the above example reveals that at the given metronome marking 8\textsuperscript{th} = 54, each unit of the grid lasts approximately 0.0278 seconds indicating a counting speed, or metronome mark of about 2,158 - which is clearly not practicable\textsuperscript{11}.

Admittedly one can start slowly and build up but one can’t help but speculate that a fair amount of approximation comes into this method. However, it does give a graphic description of the musical events and is therefore a method to be considered.
4.8 Schick’s Method 2

Schick describes his second method as ‘translating the rhythmic notations into indications of tempo’ (Schick 1994, 137). Rather than use Schick’s example of bar 2 of Bone Alphabet, bar 1 of the second movement of Kurze Schatten II will suffice (Example 4.5).

Example 4.5 Ferneyhough, Kurze Schatten II, 2nd movement, bars 1-4

The 6:5 above the whole bar means that the equivalent of six 16th notes are to be played in the time of five at a tempo of 16th = 180. This can be translated to a new tempo of 6/5 times 180 – i.e. 216, or 8th = 108. This method works for bar 1 only and the performer is obliged to return to the original tempo for bar 2. Bars 10, 15 (lower part) and 16 (Examples 4.6 and 4.7) of the first movement are amenable to this method despite the further subdivisions (and the modifier esitando in bar 16).
Example 4.6 Ferneyhough, *Kurze Schatten II*, 1st movement, bars 9-10

Example 4.7 Ferneyhough, *Kurze Schatten II*, 1st movement, bars 15-16

8th = 44 ca

Bars 3 and 5 (first movement) could be usefully analysed in this way with the other voices approximated once the lower voice is more accurately understood. Another example is bar 24 (Example 4.8) from *Paths of Resistance* by Jason Eckardt.
Example 4.8 Eckhardt, *Paths of Resistance*, bar 24
8th – 60

It is possible that recalculating the tempo for a part of a bar might help to establish the sense of a rhythmic subdivision while the original tempo is retained. This works reasonably well for bar 1 of *Kurze Schatten II* (Example 4.9). The first two and a half 8th notes are to be divided into eleven in the lower part resulting in tempo of mm 16th note = 1941/2.

Example 4.9 Ferneyhough, *Kurze Schatten II*, 1st movement, bars 1-2

According to Schick, Ferneyhough expressed his desire that the performer should not use this method of shifting tempi as he thinks it ‘implies a reorientation of the overall metrical point of view’ (Schick 1994, 138). It is possible that Ferneyhough is unable to distance himself from his work to recognise that performers need strategies to prepare the score for performance. One might assume that a
percussionist would be more likely than other performers to have the wherewithal to solve complex rhythmic problems, and that if they find the method useful, other instrumentalists should feel free to use it.

4.9 Schick's Method 3

Schick's third method is to cast 'one line of a polyrhythm as strongly foreground in nature against which other rhythmic lines act ornamentally in varying degrees of rhythmic dissonance to the original' (Schick 1994, 137). The primary subdivision is the most common subdivision in a bar and other voices are mapped onto the line essentially as grace notes of different degrees of separation from these primary notes. An arithmetically accurate representation of the relationship between the notes in the several voices can involve subdivisions into thousandths of a 128th note. This might be arithmetically precise but is impracticable and in all probability, audibly incoherent. Schick takes bar 9 of Bone Alphabet (Example 4.10) with the schematic breakdown given as Example 4.11. (Included with the supplementary data files.)

Example 4.10 Ferneyhough, Bone Alphabet, bars 9-10

8\textsuperscript{th} = 46
Schick used the 128th note as a basic unit to construct a grid on which to calculate the exact placing of all the notes. As this resulted in essentially meaningless subdivisions of the 128th note into thousandths, Schick came to the conclusion that the best solution would be to make various estimations to what he saw fundamentally as grace notes activity. One might suspect that this is what many performers do in most of these situations.

The guitar repertoire is comparatively less dense in contrapuntal and polymetric complexity. Whilst the realisation of three or four part polyrhythms is possible, informational density in more than one part at one time is technically unfeasible. The first movement of Kurze Schatten II is written on three staves to clarify the voices, the upper two being purely harmonics of comparatively long duration. The solution of the polyrhythms is therefore only a matter of accurately placing single notes. The third movement is necessarily written on two staves as the upper part is percussive. The fourth uses two staves for clarity for most of its duration. The other movements are all written on one stave as the subdivisions are rarely in more than one part at a time.

Schick admits that there is a danger in approximating and that the results can become too uniform, missing the variety inherent and implicit in the notation. As
pointed out earlier though, Ferneyhough is not necessarily looking for absolute
rhythmic accuracy and is more concerned with the attempt of the performer to
realise the polyphony, texture and form: the essence of the music, however
indefinable that may be. Returning to Example 4.10, it is difficult to know whether
or not Schick’s realisation in performance of the polyrhythms is accurate to any
great extent. The degree of complexity is so great as to be impossible to
appreciate.

Schick is aware of the possibility of using computer modelling as an aid, but states
that this was something he didn’t want to use – although he doesn’t give his
reasons, apart from his conviction that in the end the ear should be the judge
(Schick 1994, 141).

4.10 Schick’s later thoughts

Schick’s book *The Percussionist’s Art* was published in 2006 (Schick 2006). In the
chapter *Learning Bone Alphabet* he gives another account of the way he worked on
the piece. Coming over a decade from his first writing about it, it represents his
more nuanced views on the piece, undoubtedly reflecting the many performances
he had given of it. Whilst the tenor of the first paper was a high modernist view of
the primacy of accuracy, Schick later allows a degree of mutability or plasticity, the
‘music warps itself in our image’ (Schick 2000, 97). However, he can sound
contradictory. Reflecting on his original approach he writes:

Learning therefore was defined in the broadest terms as both perfecting
the capacity to execute the score accurately and as curating an
evolutionary imperative that would allow the piece and my relationship
with it to develop slowly over the years. I do not relinquish my goal of
an accurate performance, but I do resist developing a fixed
interpretation of a work. Multiple performances from memory tend to
cement musical information into rigid physical reflex – the more you play a piece in a certain way, the greater the likelihood that you will continue to play it that way. On the contrary, long-term evolution of interpretation requires plasticity of materials. One must be able to change tempi, foreground/background relationships, and even instrumentation as the occasion requires. (Schick 2000, 95)

But later he writes:

Embracing plasticity does not mean celebrating inaccuracy. It simply acknowledges the inherent mutability of the bodily memory. Human performers are notoriously unreliable and unstable as computers. We can store a great deal of musical information, but over time it is sifted through a warren of physical habituation and the vagaries of memory. (Schick 2000, 96)

And more specifically:

A rhythm of 7:5 played by a body with the proportions 3:2, will, over time, likely lean towards 8:6. (Schick 2000, 97)

Later however, referring to the particular techniques he developed to learn the rhythms he asserts:

spending a lot of time on the bedrock of rhythm meant that the structures most central to the composition were the least mutable in performance. (Schick 2000, 100)

And:

At first it might seem overly optimistic to be able to remember and reproduce tempi like 46.3 or 52.5. In personal experience though, I have
found that it is not difficult to train even a very finely calibrated tempo sense. (Schick 2000, 109)

From much of what he says it is not clear if he is referring to general perceptions with which he concurs or general perceptions with which he disagrees. For example, his comment on the 7:5 rhythm tending to 8:6 is ambiguous. It could mean that whilst that happens to others he made strenuous efforts to avoid it, or that he noticed and was unable to avoid this tendency in his own playing.

4.11 Irvine Arditti

Arditti’s contribution to the Complexity? booklet has already been discussed. Since then he has spoken about the repertoire and how he prepares for performance. The first point to mention is that he is not interested in the notion of complexity or new complexity as a genre. He finds the notion of complexity ‘takes away from the listening – one presupposes something which is perhaps not necessary’ (Hear and Now 2010 – see the data file). Having said that, he refers time and again to complex music, seemingly unable to avoid using the term. He has a refreshingly honest approach to the music: on receiving the score for the piano quintet soadie waste from Dillon, he assumed the title (and possibly the music itself) referred to some environmental disaster – possibly nuclear fallout. Dillon explained that it was a reference to a dance hall in Glasgow (Hear and Now 2010 – see the data file). This example shows that Arditti, and probably most performers, find imagery a necessary, unavoidable concomitance even for the most abstruse, abstract music.

In a recent interview with Paul Archbold at the School of Advanced Study, University of London (Arditti 2012), Arditti goes into much more detail about his approach to complexity. He begins by explaining that it was his involvement as a performer in Ferneyhough’s La Terre est un Homme where he noticed that other players were nowhere near accurate. He determined to play the music ‘the way
they (the composers) would like to hear it’. Working with composers is vital to ‘define the style of interpretation’. He elaborates on his preparation explaining that he makes changes to the tempi, bar lengths, and ‘rewrites tempi to remove irrationals’ (Arditti 2012). He admits that Ferneyhough disapproves of such methods but the performer has to make the score practicable. He does not use graph paper to calculate complex rhythms but draws lines to indicate the beats and also, where indications of simultaneous events are helpful, in ensemble music. He stresses the importance of clarity of writing, with regard to proportional spacing, to give a visual indication of the placing and relative duration of notes. He finds phrasing can be unclear and not easy to understand. These are issues that can be clarified with the composer. Finally, he admits to not reading analyses and doesn’t listen to other performers (Arditti 2012).

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In 2007 the Contemporary Music Review devoted a volume to the performance practice of contemporary music. The ideas in the following sections are taken from the papers in that volume, supplemented by other sources.

4.12 Christopher Redgate

Roger Redgate wrote Ausgangspunkte14 for solo oboe between 1981-2. It is dedicated to Christopher Redgate who gave the first performance in April 1982 – very shortly after its completion. He discusses the methods he used to learn this piece and his general approach to learning complex music in A Discussion of Practices Used in Learning Complex Music with Specific Reference to Roger Redgate’s Ausgangspunkte (Redgate 2007). This paper is thus a distillation of his views over about twenty-five years. One obvious advantage of this is that the relationship with the piece develops and deepens over a long period. Re-learning a work several
times, rethinking and finding better fingerings and solutions to other technical problems can be rewarding in itself.

Many of the problems facing the oboist are not shared with the guitarist. Fingerings for multiphonics, breathing strategies etc. are instrumentally specific. For Redgate ‘the complexity of this music is not gratuitous but is a central part of the composer’s aesthetic’ (Redgate 2007, 142) and later ‘the technical challenges in a sense become part of the complexity and part of the aesthetic of the music’ (Redgate 2007, 143). He gives some general, quite uncontroversial advice about analysing the problems, practising away from the instrument (mental preparation) and breaking down into components so that problems can be solved and then reintegrated back into the musical structure. He sees the music in several layers that can be worked on separately. Compromises may be necessary, if possible with the approval of the composer. He quotes Roger Redgate’s equating such compromises with Ferneyhough’s ‘meaningful inexactude’ (Redgate 2007, 145).

The rhythmic complexity of Ausgangspunkte is of course essentially linear. Whilst there are many nested irrational and unusual time signatures there is not the polyphonic complexity of Bone Alphabet or Kurze Schatten II. Example 4.12 shows the opening 6 bars of Ausgangspunkte

Example 4.12 Redgate, Ausgangspunkte, bars 1-6
It is easy to see how he came to the conclusion that ignoring the irregular rhythmic subdivisions of the beat whilst learning the fingerling and generally negotiating the notes was the best way to approach the first stage of preparation. He works on the nested ‘irrationals’ starting from the largest. He is supported in this by Roger Redgate who finds other approaches can ‘side step the notation’ (Redgate 2007, 146) – which is similar to Ferneyhough’s disparagement of Schick’s idea of recalibrating the metric. Once each group was clear then squeezing them in to the correct metronomic subdivision of the pulse could be facilitated by means of a programmable metronome. He uses software\textsuperscript{15} to ‘get the rhythms into the ear’ (Redgate 2007, 146) and then works them in to the context of the piece. He then allows that ‘even with all this effort I find there is still a margin of error’ (Redgate 2007, 146). It is as if the aesthetic of the music resides in this margin of error.

4.13 Barrie Webb

Barrie Webb has given a detailed account in Richard Barrett’s ‘Imaginary Trombone’ (Webb 2007) of how he prepared Barrett’s pieces \textit{EARTH} (1987-8) for trombone and percussion\textsuperscript{16} and \textit{basalt} (1990-1) for solo trombone\textsuperscript{17}. He also stresses the importance of studying away from the instrument (especially in the early stages) so that the form of the work – and hence the context into which subsequent, more detailed, work is done – is well understood (Webb 2007, 151-2). At this stage much of the rhythmic analysis can be done and much of the paper is concerned with the techniques he used for solving rhythmic problems. One obvious point (often ignored) is the recognition of where a tight rhythmic result is essential, as opposed to more free sections where a flexible performance (perhaps indicated graphically) is required (Webb 2007, 153). He also advises on other problems, for example the need to negotiate changing mutes, the use of lipping to produce the microtones (Webb 2007, 160) and even gives advice as to the layout of the pages of the score for performance (Webb 2007, 162).
As *EARTH* is for two instruments, the rhythmic problems are not simply restricted to a single part but of coordination with another. This is often made easier if one part has a more transparent rhythm to which the other part can be fitted in ‘proportionally’ – a term Webb uses many times throughout his paper without explanation. It is not clear if he means an estimation based on the look of the score or a more arithmetical analysis. The first seems more probable. He comments of the clarity of Barrett’s scores:

> in which duration is notated proportionally within any one section, so that when the performer needs this approach it is readily available! Such care and attention by the composer is always welcomed by performers and may well have a direct bearing upon whether a work of this difficulty is playable at all! (Webb 2007, 158)

Should this not be the case then it may be that he is referring to something on the lines of Schick’s third method.

Webb admits to marking the beats with a thin red pen (Webb 2007, 165) – a useful starting point, as mentioned earlier. Sometimes his explanations of his methods have the same problems as Schick’s (discussed earlier); for example he says (of *basalt*) ‘In bar 2, subdivision into 64th notes fixes the rhythm’ (Webb 2007, 165) (Example 4.13 – see the data file for page 1 of the score. For reasons of page size this cannot be reproduced with any degree of legibility here).

**Example 4.13** Barrett, *basalt*, bars 1-19

(See supplementary data file)

The first group in this bar is a triplet in 16th notes and cannot be simply construed this way. The second group is four in the time of five 16ths so can be thus subdivided. The last 8th is not problematic. So the question is how can this second
group be integrated to the context in any reasonably accurate way? At the given
mm of $8^{th} = 52$ the second group should last 2.88 seconds and subdividing this into
20 (the least common multiple for a 4:5 subdivision) gives a unit of 0.144
seconds\textsuperscript{18}. This corresponds to a mm of about 416, which is clearly impracticable.
But even at half the speed where each of the 20 subdivisions corresponds to a mm
of 208 it is not easy to see how the second group can be ‘felt’ and then reintegrated
to its context.

It might be simpler to use a digital metronome with programmable beats to
indicate a five beat pulse at 104 and simply learn to subdivide the total duration
into fours.

There is a further problem with bar 11 (see Example 4.13) where Webb points out
an error: ‘Actually the bracket over the top should read 7:6 and not 8:7’ (Webb
2007, 165).

This might be the correct solution but the score is ambiguous here as there is an $8^{th}$
rest preceding the 8:7 group on the top stave but a 16$^{th}$ rest in the lower. Clearly
both rests should be the same. If they are both to be $8^{th}$ rests then the grouping
should be 7:5. If the rests should be 16$^{ths}$ then the grouping should be 7:6. There is
also the possibility that the 8:7 is correct but the bracket should cover a 16$^{th}$ rest.
This example shows that whilst a manuscript can be aesthetically pleasing, any
errors can cause the performer time consuming work trying to construe the
composer’s intentions\textsuperscript{19}. It could be countered that any difference between any of
the solutions given above are inaudible, especially in a live performance. For
instances such as these, the composer should be consulted if at all possible.

The ensemble version, \textit{basalt – E\textsuperscript{20}}, has note-grouping guidance for the conductor.
This can be useful for the performer of the solo version and the solution to the
above problem does seem to be as Webb suggests (despite the same error in the
score). On the other hand this does not help the soloist who is possibly unaware of
the ensemble version. It is also tempting to speculate that Barrett simply added these marks at a later date without necessarily scrutinising the score for such mistakes.

The contrary position is exemplified in bar 14 (see Example 4.13) where the solo version is most easily construed grouped as \((2 + 6 + 3)\) 16ths whereas the ensemble is to be conducted as \((3 + 2 + 2 + 2 + 2)\), which is indeed how the viola part is grouped (Example 4.14 included as a data file).


(See supplementary data file)

The ensemble work *basalt – E* is part of a larger cycle of pieces, *Negatives*, another part of which is *colloid – E* for 10-string guitar and ensemble\(^{21}\). This also exists in a solo form – *colloid\(^{22}\). This has rhythmic similarities to basalt and the methods Webb proposed can be applied to the guitar piece despite the preponderance of time signatures such as \(52/8\), \(58/8\), \(55/16\), \(125/8\) etc. The grouping throughout is clear and the main perceptual (as opposed to technical) difficulties would appear to be keeping track of the special notation and extended techniques he requires. The strictness of the rhythmic requirements does seem to be qualified by Barrett's introductory note which states that 'Variations of actual speed owing to differences in ease of execution are intentional'\(^{23}\)

This is a little ambiguous as it is placed just after his note about trills, gracenotes and tremoli and could therefore be taken as referring solely to the speed of execution of those ornamental effects.
4.14 Mieko Kanno

Mieko Kanno focused on rhythm and meter in contemporary performance practice in her lecture given at the Second Bienniel International Conference on Twentieth Century Music at Goldsmiths’ College in June 2001 – later made available on line (Kanno 2001). Her conclusion was:

> accuracy (in performance) lies within the interaction between the outlined scheme in composition and the actual circumstances of its articulation in performance. These seldom overlap. But this isn’t in any sense a disadvantage, because the friction between the two constitutes what music is.” (Kanno 2001)

This chimes with Ferneyhough’s thoughts mentioned earlier. Whilst all this is rather helpful to the performer who is trying to penetrate the rhythmic difficulties in such scores there is still the question as to what constitutes a credible performance within the parameters set up by the composer in the notation. If a composer has written 17:24 is any linearly correct jumble of 17 notes and rests fitted in to a metric of 3/8 acceptable? The ideas in the score may be performed in an expressive way with attention to all the expression marks but the composer wrote with a precision which seems to call for something more. Kanno makes the uncontroversial point that (what she calls) a ‘mobile phone’ performance is certainly going to be unsatisfactory for anything other than, for example, dance music (techno or some other similar form of popular music). She goes further:

> despite the merit of universal correctness in the result, this approach is often ever so close to trivialising the multidimensional nature of the expressive power of rhythm in music (Kanno 2001).

There is again, therefore, the question of the extent to which this applies to the new complexity repertoire where the interplay of the rhythmic and metrical
schemata (particularly in Ferneyhough’s scores) seems fundamental to the expressive purpose. Kanno’s analysis of an excerpt from Coelocanth by Giacinto Scelsi for solo viola leads her to two other possible modes of interpretation. The first is to avoid directionlessness by emphasis and development of gestural patterns and phrases. Her idea seems to be to create a sense of continuity, or momentum, from one phrase or note group to the next. Her second approach is almost the opposite. To avoid continuity, by seeing the ‘gestural materials’ as non-developmental, existing in some way frozen in some temporal space. Coelocanth is not particularly complex rhythmically but Kanno’s view – that a straight ‘mobile phone’ performance will not do justice to the implicit expressive needs of the music – seems to be directly applicable to the new complexity repertoire.

Of relevance to the study of new complexity, and in particular its importance for string players, is her paper Prescriptive Notation: Limits and Challenges (Kanno 2007). There is a myth that new complexity composers write with such an extraordinary degree of precision that the performer is left with nowhere to leave their own imprint on the work. This is clearly not the case where the composer (consciously or otherwise) is using prescriptive notation; for example a glissando indicates a method of connecting two notes. Notating it accurately by descriptive means would clearly be impossible and the glissando indicates to both the performer and the non-performing score reader the intended effect. Percussive sounds, ornaments, harmonics and string indications are examples of prescriptive indications that are well understood by performers and enable faithful communication of the composer’s intentions. The interpretation of such notation is largely under the performer’s control and, as Kanno points out, the only danger is of excessive mannerism and clichéd gestures (Kanno 2007, 234).

Tablature is probably one of the first examples of prescriptive notation and there is a myriad of non-descriptive terms and signs in use that could be considered both descriptive and prescriptive. The terms are not mutually exclusive. Kanno does not mention other functions of notation and surprisingly she does not include
idiomatic notation in her discussion. This is particularly relevant for the guitarist, as ostensibly descriptive staff notation is not always realised as such on an instrument with idiosyncratic sustaining properties. For example, the following (Example 4.15) is more likely to be heard as three-part writing with each note connecting to its successor in each part.

Example 4.15 Carcassi, *Andantino in C*, bars 1-4

In the following example (Example 4.16) the effect will be of all the notes ringing together in a harp-like fashion.

Example 4.16 Carulli, *Waltz in G*, bars 1-4

The fact of the implicit octave transposition (guitar music is written one octave higher than it sounds) is also idiomatic.

Kanno talks about the intrinsic gestural aspects of Barrett’s *air* for solo violin but, rather frustratingly, doesn’t give any indication of how she would approach negotiating the rhythmic problems in the example she quotes. Her focus is on the higher levels of the interpreter’s art; for example she says (of Matthias Spahlinger’s *adieu m’amour*):
It follows that the identity of the music lies not in its metaphysical form but in the figurative/allegorical power within each performance, the power the composer encoded in the score. (Kanno 2007, 248)

4.15 Philip Thomas

Philip Thomas is a pianist who specialises in both experimental and modernist repertoire. It is probable that his work in the experimental tradition has informed his views on complexity, which he has given in *A Prescription for Action* (Thomas 2009). Starting with Cardew’s dictum that the purpose of the score is ‘to make people move’ (Thomas 2009, 78), he recognises that ‘what the performer actually does, rather than what she is required to do, is a theme that needs investigating’ (Thomas 2009, 78). His approach to the nested rhythms of Stockhausen’s *Klavierstücke 1* (Example 4.17) follows Schick’s method 2, recalibrating tempos to prompt the performer to ‘(shift) the pulse to a new gear’ (Thomas 2009, 84). Taking bar 6 as an example he assumes an initial tempo of mm $8^{th} = 90$ (Stockhausen simply states the tempo should be as fast as possible) and calculates the first group to be performed at mm $8^{th} = 98.4$ and the second at mm $8^{th} = 103.1$\(^{24}\)

**Example 4.17** Stockhausen, *Klavierstücke 1*, bars 4-6
For Thomas these tempo shifts ensure the performer is ‘kept sufficiently alert’ (Thomas 2009, 84) and he sees this as supporting his argument that the performer must ‘adopt an approach which focuses on ‘action’ rather than ‘interpretation’ ’ (Thomas 2009, 85).

This example will be analysed in more detail in the next chapter.

Thomas continues:

If, as Cardew stated, the function of notation is to make the performer move, then notation which is multi-layered and complex can create a situation in which the performer is reacting to a number of elements resulting in a sonic event which is the sum of but also other than the notation’s appearance. Such notation, rather than binding the performer can act as a stimulus for the performer and push her beyond herself. Composers who work with complex notation in this way do so understanding that notation can never be a description of sound but instead, a prescription for action. I would suggest that the intention is often to create a lively and unpredictable situation and is often as experimental in intent as many indeterminate scores. (Thomas 2009, 86)

Such notation therefore, has the potential to transcend traditional instrumental, technical and experiential boundaries (Thomas 2009, 86).

Kanno and Thomas appear to have the same views on the function of notation, though each places a different emphasis on the prescriptive/descriptive aspects. For both, an appreciation of the prescriptive side is fundamental to the realisation of the essence of the work.
4.16 Geoffrey Morris

The Australian guitarist Geoffrey Morris has given some indications of how he approaches learning contemporary music and in particular new complexity works in *The Modern Guitar in Australia* (Morris 2002). He uses a pre-programmable metronome controlled by a footswitch, to establish and internalise multiple tempo changes but gives no other indication of how he calculates the precise rhythmic relationships within the bar. This may be the Tama Rhythm Watch he mentions in *The Guitar Works of Aldo Clementi* (Morris 2009, 573). He also mentions other issues such as the difficulty in producing the necessary clarity to bring out the contrapuntal lines in Dillon’s *Shrouded Mirrors*, balancing voices (especially in ensemble music) and the practical difficulties when a work arrives with too little rehearsal time and unplayable passages.

4.17 Mats Scheidegger

Mats Scheidegger has written (Scheidegger 2008) to the effect that complex rhythm is relative to tempo. At a slow tempo rhythms can be played precisely but the faster they are played the more the smallest differences will disappear – each performer needing to find their own way\(^{25}\).

4.18 Discussion and conclusions

By quoting and critically evaluating the writings of the performers there is the risk of a perception of *ad hominem* criticism. Nothing could be further from the truth. The composers have produced work of exceptional richness, originality and musical depth. The performers without exception have been sedulous in promoting this work, investing a huge amount of their time in learning and studying the pieces in order to communicate them effectively to audiences.
The performers naturally have different attitudes to complex scores. They are often in conflict. Heaton is frustrated by the impossible rhythmic demands and asserts that the implication of such detail in the score is an attempt to micromanage the interpretive work of the performer. Ferneyhough has denied that this is his intention but admits the score as a dynamic factor – the performer forced to negotiate a path through its complexities. Kanno and Thomas see the performer’s work as being to transcend the limitations of the score. Mitchell, seems to resent being involved in music that she sees as contradicting the skills she has developed over her career. Kooistra starts by stating that he disagrees with Boulez that performers will approximate very complex rhythms asserting the perceptible rewards of calculating them as accurately as possible – but finishes by saying that no one can play 13:9

The difficulty is in trying to establish and be objective about the aesthetic domain of the score. Schick writes:

> During a rehearsal of Bone Alphabet, Ferneyhough once defined interpretation as “meaningful deviation” from the score. In fact deviation sometimes looks like imperfection. (Schick 2006, 96)

And, after quoting some examples:

> These deviations are products of a musical sensibility that has been filtered over the course of decades through the minds and bodies of performers. Their interpretations may be superficially inaccurate, but in my opinion they are marked by a “rightness” that transcends correctness. (Schick 2006, 97)

This is similar to Roger Redgate’s reference to Ferneyhough’s ‘meaningful inexactitude’ and Ferneyhough’s own ‘sublime impossibility’. ‘Meaningful inexactitude’ is not really helpful without knowing the answer to the question
“meaningful to whom?” Possible answers are i) the performer, ii) the composer and iii) the audience – or all three, preferably simultaneously. And what can “meaningful” mean? Complete accuracy in any repertoire is impossible (and unwelcome) in the first place; deviation from the score is the performer's way of realising the music, interpreting the score through their own sensibility. Ferneyhough answers the question of how to prepare one of his pieces by saying that at some point in this process one might have ‘a pretty good sort of fake version of the piece’ and that ‘this is the time for recalibration and synthesis of the several layers of expression’. The pejorative word ‘fake’ ensures that the performer might always suspect their work is inadequate.

On the other hand one could argue that, while the rhythms might be perceptible in isolation, almost all but woeful inaccuracies in performance are undetectable (especially so in any live performance). It follows that a principled position would be to not go to any great effort to calculate the rhythms at all, the estimation of the rough positions of the notes relative to a metric being deemed sufficient. 'Principled' as the performer could argue that the meaning of the music does not reside in absolute adherence to the rhythmic notation, but in the totality of the sonic experience conjured up in performance.

The issue of prescriptive versus descriptive notation is important but intrinsic to the notation of any music – certainly not just for modernist or new complexity works. The power of prescriptive notation to inspire (or at least prompt) the performer to go beyond the perfunctory interpretation must be recognised as well as the possibility of its having the opposite effect through standardised responses and clichéd gestures. It should always be borne in mind that there are often many passages where rhythmic flexibility is expected.

Thomas's idea that notation is a ‘prescription for action’ looks promising until the question ‘what action?’ is asked. The idea of, for example, a 9:8, rhythm ‘nudging’ the music along is helpful and is possibly the way many performers see it. Thomas
is on firm ground when he is considering music by Wolff, Cage and others and the application to new complexity is pragmatic.

Few performers seem to want to use technological tools, and in particular computer simulation, in order to hear, and hence learn, the rhythms. Given the Herculean difficulties in penetrating the complexities of (in particular) Ferneyhough’s scores, one might think that any help would be appreciated, if only to avoid the arithmetical mistakes that would most likely plague someone using only a calculator. Redgate is the only performer who admits to using such methods. Morris’s programmable metronome is only useful for establishing multiple tempo changes. Webb’s estimation of rhythms ‘proportionally’ is ambiguous. Schick repeats his view that he did not wish to use computer methods (Schick 2006, 105). He does, however, value the learning process and rails against the need of performers to learn so much new music so quickly. He seems to believe that the mental calculation of such rhythms forces the performer to learn the music extremely slowly, the intimacy of the interaction with the score having a palpable influence on the depth of interpretation. This is highly subjective and impossible to verify.

4.19 The guitar

The repertoire so far discussed has not been taken up to any significant extent by guitarists. Guitarists are on the whole well aware of the lack of substantial repertoire from the previous centuries and the necessity to encourage the most respected composers to write for the instrument. On the other hand, guitarists are perhaps more likely than other instrumentalists to programme contemporary works in their recitals26. If any of the works mentioned were to be programmed, and recorded, by a performer with a high profile then it would surely become part of the repertoire. Unfortunately, with one possible exception27, this isn't the case and the reputation of the guitar, and guitarists, remains compromised.
The difficulties involved in performing these works however, may not be as great as would appear at first glance. The technical accomplishment to play them may not be any more than that needed for the more conventional repertoire. The main stumbling block for most will be rhythm. This could be more a matter of not being intimidated by the apparent demands of the composer. Even if all the methods of calculating the relationships and polyrhythms described earlier are followed it is highly unlikely that a performer will remember the exact, and frankly imperceptible, details of every bar (of sometimes fairly long pieces) even if they are playing from the score. It is probable, and desirable, that the performer will mould the piece to produce an aesthetically satisfactory result that will involve deviation (meaningful or otherwise) from the score to possibly quite a high degree. This is true for the conventional repertoire where the differences between different performers playing the same piece is a matter for appreciation of the depth of musical content of the piece and the demonstration of artistic imagination and communication by the performer. This is not to imply that the rhythms should not be analysed to the greatest degree possible; it is probable that the music could not be notated in any simpler way without a loss of grittiness – to quote Hayden\textsuperscript{28}. The issues of playability can be resolved; most composers seem to be happy to adapt their scores for the suitably qualified performer. Accuracy should not be a fetish but an objective investigation of several performances will give some idea of what has been achieved by performers so far. This can at the very least serve as a guide to performers new to the repertoire and act as a modifier to the claims of those who profess to aspire to such accuracy. The next chapter will examine the nature of objectivity in assessing recorded performances.
Notes

1. There can also be problems with computer software, for example Roger Redgate used Sibelius to write *Disjecta* for 10-string guitar where the programme misconstrued the nested subdivisions. (Redgate 2010),

2. There are many other errors in this score the published version of which has remained unchanged since the first 1990 edition. Other errors uncorrected in the current edition include the missing metronome marking at the beginning of the sixth movement and the absence of an instruction to retune the first string to E at the beginning of the seventh movement.

3. For, as a simple estimation, the last note of the lower part is played just before the half way point of the bar and $1/2 < 5/9 = 15/27 < 17/27 < 18/27 = 2/3$.

4. Using the waveform editor Audacity 1.3 (available from audacity.sourceforge.net) an analysis of Morris’s performance (Morris 2000) reveals that he plays this note about 0.25 of a second after the final note in the lower part. Andersson on his recording (Andersson 1996) plays the harmonic much closer to the final note in the lower part.

5. Parts 1-3 of *Kurze Schatten II* were written in 1983-4. Sketches for the other four parts were written at that time but only finished towards the end of 1988 (Ferneyhough 1995, 144). The *pizzicato alla lagoya* is employed in the 5th and 7th movements so Mas’s book could have been the source of his knowledge of the technique. It is also possible that Andersson simply told him of the technique.

6. There is a reference to the same technique but without the same name in *The Contemporary Guitar* by John Schneider (Schneider 1985, 122). Schneider
does mention that Lagoya likened the effect to the lute stop on a harpsichord (Schneider 1985, 122).

7. Written two years after Andersson's paper.

8. Eckardt: *Paths of Resistance* (1997). The score is available from the composer. There is now a recording by Jordan Dodson, which can be found on his website: www.jordandodson.net.


10. Schick actually says "A very simple grid can be constructed for each group of one and a half beats by multiplying the denominators of the two components together" (Schick 1994, 138). He does, of course, mean multiplying the numerators

11. For 8th note = 54 implies 8th note = 60/54 seconds = 1.1111 seconds.
    So a dotted 8th note = \( \frac{3}{2} \) * 1.1111 = 1.667 seconds.
    1.667 divided into 60 units implies each unit = 0.0278 seconds
    A metronome marking is how many beats per minute so if each beat is 0.0278 the metronome marking is 60/0.0278 = 2158.27.

12. For 8th note = 44 means 8th note = 1.364 seconds.
    2.5 8th notes therefore last 3.409 seconds.
    Divide 3.409 seconds into 11 units of 0.310 seconds each.
    60/0.31 = 193.55 units per minute or mm = 194.

13. Schick performs *Bone Alphabet* on the CD, drumming in the dark (Schick 2000).

15. http://www.redgatesoftware.co.uk/Metronome/Metronome.aspx


18. $8^{th} = 52$ means $5 16^{th}$s will take $5 \times 60 \div 104 = 2.88$ seconds. $2.88 \div 20 = 0.1442$.

19. This error still appears in my copy of the score purchased in 2010 – there is no errata sheet. The same error appears in *basalt – E*.


23. This appears in the introductions to both *colloid* and *colloid – E*.

24. The use of a calculator requires some approximation to some number of decimal places. Approximating to three places the following calculations do not quite agree with Thomas's. They are however sufficiently close. At $8^{th} = 90$ the division in to 5 corresponds to a new $8^{th}$ note speed of $mm = 112.78$ - or each $8^{th}$ at this new tempo = 0.532 seconds. So the first group should last 1.064 seconds. Divided in to 7 parts gives a $32^{nd}$ note $= 0.152$ seconds so four of these would take 0.608 seconds. That is $mm 8^{th} = 98.68$. Similarly, for the second group three $8^{ths}$ at 0.532 seconds = 1.596 seconds. Divided into 11
gives each new 32\textsuperscript{nd} note = 0.145 seconds. An 8\textsuperscript{th} note at this speed would be 0.58 seconds implying a mm 8\textsuperscript{th} = 103.45.

25. (Scheidegger 2008). Mats’ actual words are:

that has something, that complex rhythm can turnout to action.

hmm, complex rhythms are for the performes always in competition to the speed. if you play it totally slowly, you can play all rhythms precise. but the faster you play, the more the smallest rhythmical differencies will disappear, you start to adjust the length of the notes - so there in this gray zone, each performer has to find its own way, this is a very mucial and artistical aspect of performing.

26. See (Cooper 2008, 16)

27. Craig Ogden performed Kurze Schatten II at the Spitalfields Winter Festival on 18\textsuperscript{th} December 2008. The writer can attest to witnessing a superb performance. There is anecdotal evidence is that Ogden was asked to perform this piece at short notice and didn’t have the time to do more than approximate the rhythms.

28. Personal communication at a meeting (November 2008).