RHYTHM IN THE MUSIC OF BRIAN FERNEYHOUGH, MICHAEL FINNISSY, AND ARTHUR KAMPELA: A GUIDE FOR PERFORMERS

by

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Abstract

RHYTHM IN THE MUSIC OF BRIAN FERNEYHOUGH, MICHAEL FINNISSY, AND ARTHUR KAMPELA: A GUIDE FOR PERFOMERS

by

Graziela Bortz

Adviser: Professor Joseph N. Straus

Discusses rhythmic problems encountered in pieces of The New Complexity School of composition under the perspective of the performer. Analyses pieces by Brian Ferneyhough, Michael Finnissy, and Arthur Kampela. The repertoire illustrates four strategies proposed to help reading and practicing the changes of speed as they occur in polyrhythms using single tuplets or nested rhythms, and irrational meters.

Acknowledgements

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Thanks to Erica Casanova for language revisions and friendship, to Marta Heilborn and José Moura for being always 'there,' and special acknowledgements to Arthur Kampela, whose overwhelming creativity cannot 'fit' in a single chapter.

I would like to thank my husband, Darcio Gianelli, for his patience, love, determination, and talent. Finally, I want to thank my family in Brazil: my parents Beatriz and Enéas, my siblings Helô and Marco, for their love and confidence.

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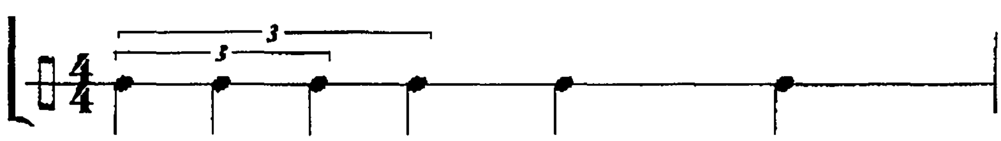
Chapter 1: Introduction

Rhythmic Challenges

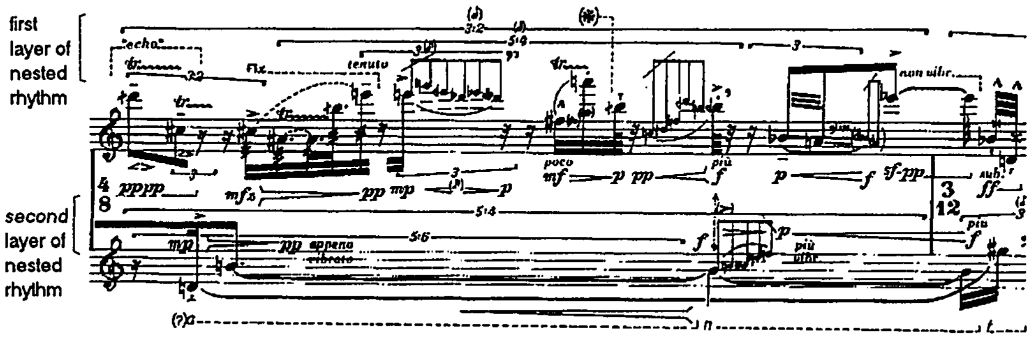
This work focuses on techniques for realizing rhythmic notation in the music of Brian Ferneyhough, Michael Finnissy, and Arthur Kampela. Musicians interested in performing music in the style of the so-called New Complexity are often confronted with severe rhythmic challenges. One of the rhythmic characteristics that we will examine in this work is the frequent use of a variety of tuplets, and nested rhythms, or chains of tuplets, as seen in Example 1-1:

Example 1-1: Nested quarter notes.



Nested rhythms are even more challenging when superimposed in different layers, as in Example 1-2 from a piece by Ferneyhough for flute, oboe, soprano, harpsichord, and violoncello. The excerpt here shows the oboe and soprano parts. Each part has its own series of nested ratios, and, since both parts have different speeds, combining them makes the ensemble realization challenging.

Example 1-2: Brian Ferneyhough's *Etudes Transcendantales* 1,[1] m. 5–nested rhythms in different rhythmic layers.



In some of his pieces, Ferneyhough employs time signatures he calls irrational meters, such as 7/20 (seven quintuplet sixteenth notes), 1/10 (one quintuplet eighth note) etc., derived from Cowell's idea of dividing the whole note into different subdivisions.[2] Reading these rhythms poses obvious problems to the performer not familiar with this kind of notation, and performers often object to what they perceive as the excessive difficulties of the scores (see Example 1-3).

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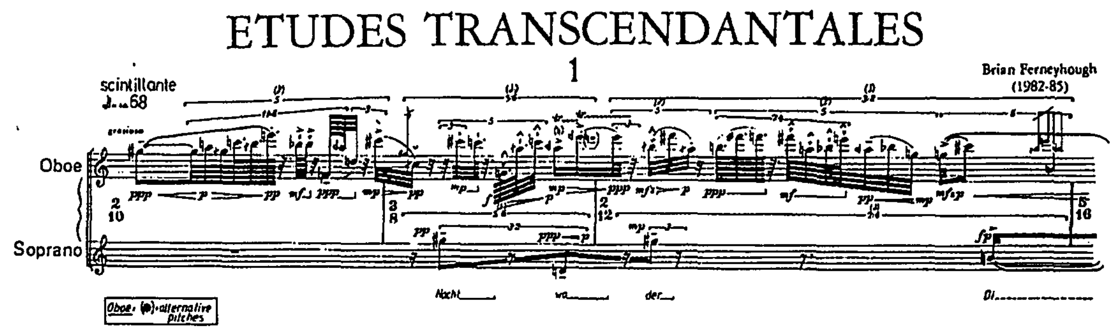
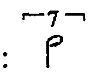
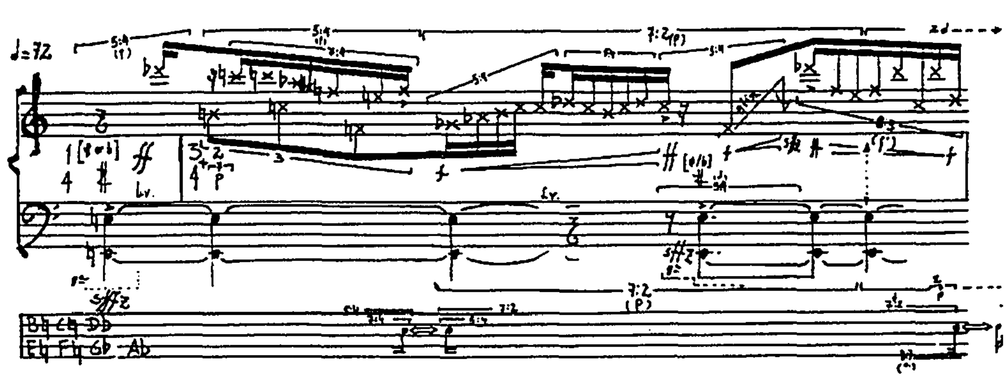
[1] Brian Ferneyhough, *Etudes Transcendentales* 1 from *Carceri d'Invenzione* (London: Peters, 1987): 9.
[2] Henry Cowell, *New Musical Resources,* ed. David Nicholls (New York: Knopf, 1930; reprint, New York: Cambridge University Press, 1996): 49 (page citations are to the reprint edition).

Example 1-3: *Etudes Transcendantales 1* by Brian Ferneyhough, mm. 1-3.



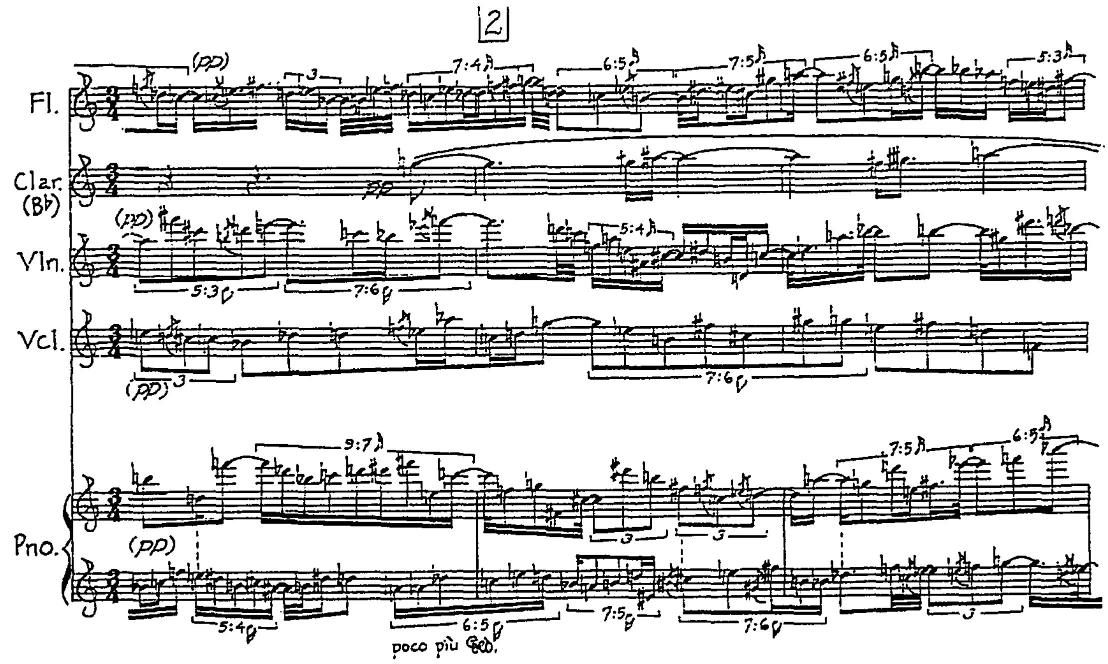
Kampela uses a similar procedure in *Phalanges* for solo harp, but instead of using the irrational meter notation, he uses, for example, the symbol:  in the bottom part of the time signature, as we see in the second measure of the piece presented in Example 1-4. We will carefully examine this excerpt in Chapter 5.

Example 1-4: *Phalanges* for solo harp, by Arthur Kampela, mm. 1-2.



Although Finnissy's music does not present nested ratios, he uses series of different consecutive ratios in independent lines, each line dividing the measure differently. The ratios sometimes cross the barlines, disrupting the regularity of the meter, as we see in Example 1-5:

Example 1-5: *Banumbirr* by Michael Finnissy–consecutive ratios in different lines.



This work will offer practical solutions to interpreters for dealing with the kinds of rhythmic problems presented above. In the past, Cowell had imagined complex rhythms reproduced in a player-piano roll.[3] We can imagine how computers can be helpful to interpreters in the future, solving the arithmetics for complex rhythms, and making it possible to hear the shifting metronome speeds of the ratios, without having to use a metronome. In the meantime, while there is no software available to solve such

[3] Cowell, 65.

problems quickly, performers have to rely on their own intellectual abilities. The purpose of the present study is to offer different techniques to address the problems encountered in complex rhythms.

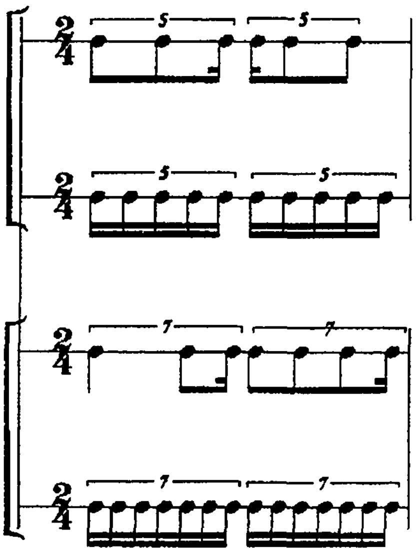
Pedagogical Precedents

While composers have been exploring different ways of dealing with rhythm since the beginning of the last century, performance education has still been conservative in terms of rhythmic training. Except for those instruments, such as percussion, whose usage grew in importance in twentieth-century music, curriculum rhythmic training has been very limited.

If we take a look at Robert Starer's rhythmic educational book,[4] we have an idea of how far musician training goes in conservatories in the United States. Chapters 1 through 4 deal with binary and ternary subdivisions of the beat up to the normal sixteenth-note subdivision. Chapter 5 mixes both binary and ternary subdivisions of the beat, including dotted eighth-note notation for duplets in compound time signature that were rarely used before Elliott Carter's notation.[5] Chapter 7 uses quintuplets and septuplets sixteenth notes in one voice (sometimes grouped in quintuplet eight or quarter notes–see example 1-6) against either quarter notes or their respective quintuplets and septuplets sixteenth notes in the other voice.

[4] Robert Starer, *Rhythmic Training* (Milwaukee: MCA Music Publishing, 1969; reprint, 1999). A standard sight-reading book used in music schools and conservatories in both undergraduate and graduate courses in the USA.
[5] Arthur Weisberg, *Performing Twentieth-Century Music: A Handbook for Conductors and Instrumentalists* (New Haven: Yale University Press, 1993): 67.

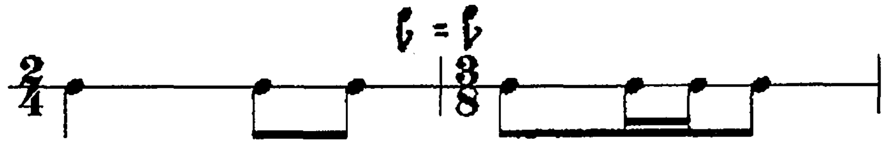
Example 1-6: Quintuplets and septuplets sixteenth notes as they appear in Starer's book, chapter 7.



Starer's Chapter 9 includes even one-hundred-twenty-eighth and two-hundred-fifty-sixth notes with the observations "occasionally found" and "rarely found," respectively, but although those notes make a "black score," they still preserve the binary subdivision of the whole note in the chapter. Chapter 10 presents metric modulation by applying meter changes preserving binary subdivision such as an eighth note subdivision in 2/4 modulating to 3/8, or a sixteenth note from 4/4 to 5/16, etc. (Example 1-7).

Example 1-7: metric modulation from 2/4 to 3/8; and from 4/4 to 5/16.

a



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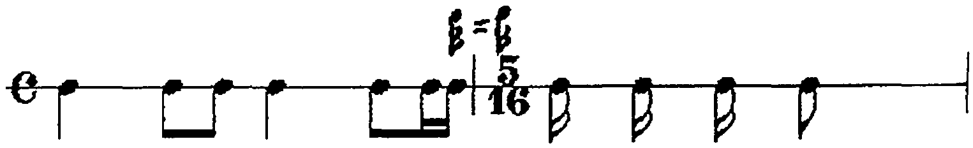

Starer's last chapter is dedicated to polyrhythms using subdivisions of the beat in two against three, three against four, two against five, and three against five. Although the book provides a solid basic rhythmic training, and its contents are pretty much what a performer is expected to accomplish rhythmically as a professional musician, the training does not provide tools for the performer willing to develop rhythmic reading and coordination skills to approach a more complex notation.

Of course, conservatory curriculum is concerned with the preparation of the performer to audition for orchestral jobs or, in the case of solo instruments, to prepare for a solo or chamber music career. Contemporary music is a specific subject approached as such in either analysis classes or contemporary music ensembles. One rarely finds music by Stravinsky, Bartók, Webern, Schoenberg, or Berg, not to mention more recent composers, in lists of audition repertoire.

Hence, traditional rhythmic education is perfectly sufficient to approach music through the nineteenth century, and a great deal of twentieth-century music as well, but it is not enough to cope with the independence of rhythmic layers in Elliott Carter's music, and the more complicated polyrhythms of the New Complexity School. As Cowell argued back in 1930, "It is true that the average performer finds cross-rhythms hard to play accurately; but how much time does the average performer spend in practicing them? . . . Surely they are as well worth learning as the scales, which students sometimes practice hours a day for years."[6]

Four Practical Solutions

Several articles discuss the validity of the notation posed by new complexists, but few texts deal with how to solve its rhythmic problems in performance. Weisberg's guidebook for conductors and instrumentalists[7] explains clearly the concept of metric modulation developed by Carter and gives examples of different cases and notation. He teaches how to calculate new metronome markings and the least common denominator among different figures (tools that will be explained later and used to approach complex rhythmic notation in this work), and proposes rewriting some rhythms in order to better understand such changes. He uses examples from classical standard repertoire and Carter's music, and although it is a good introduction to the rhythmic development that occurred in twentieth-century music, it does not deal directly with the extremes reached by complexists. Arthur Kampela's dissertation discusses his approach to complex

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[6] Cowell, 64.
[7] Weisberg, 21-69.

rhythms in his own compositions,[8] but no systematic work aimed at performers exists to cover the difficulties posed by New Complexity scores.

In the present study, I intend to offer a guide for performers who have to face these difficulties, and hence elevate the performance of these rhythms from frightened guesswork to real interpretive command.

This work focuses on the following repertoire:

- *La Chute d'Icare* (1988), *Intermedio alla Ciaccona* (1986), and *Etudes Transcendantales* 1 (1987), by Brian Ferneyhough.
- *Banumbirr* (1986), and ... *above earth's shadow* (1986), by Michael Finnissy.
- *A Knife All Blade* (1998), *Phalanges* (1995), and *Quimbanda* (1999) by Arthur Kampela.

The pieces above will serve to illustrate four strategies that will help to read and practice the changes of speed as they occur in polyrhythms using single tuplets or nested rhythms. Each composer uses different techniques to approach rhythmic changes. While Ferneyhough and Kampela use nested rhythms thoroughly, Finnissy rarely does, using different combinations of single tuplets in independent layers instead. They all offer a variety of situations that will serve to illustrate the four strategies that can be used either in combination or separately, depending on the circumstances. I will devote one chapter to each of them, as follows:

[8] Arthur Kampela, "Micro-Metric Modulation: New Directions in the Theory of Complex Rhythms" (DMA diss., Columbia University): 1998.

Chapter 2 – Strategy 1: Finding least common denominators (LCD) between different layers.

Chapter 3 – Strategy 2: Calculating the metronome marking of a specific ratio.

Chapter 4 – Strategy 3: Finding new metronome markings in irrational meters.

Chapter 5 – Strategy 4: Calculating the metronome marking of the last sub-ratio in a nested rhythm.

The LCD of the first strategy is used to combine different layers of rhythms, or superimposed ratios of the same layer, so as to find the degree of approximation and distance between different rhythmic frames. In the first case (different layers), we will calculate a numerical scale and build grids in order to visually compare the placement of the rhythmic figures of two concomitant lines. In this case, the technique will be applied in Finnissy's music where the grids are built between the line containing consecutive ratios and the regular division of the meter. In the second situation (same layer with superimposed ratios), we will use the same technique so as to find the speed of a secondary ratio when compared to the first-level ratio of the nested rhythm. We will use Ferneyhough's music to illustrate this technique.

The second strategy is used to practice the speed of an entire ratio. In several occasions in the music of the three composers examined here, we will find rhythmic gestures whose speeds are very close to body limits. Finding metronome markings for those gestures can give the frame with which the performer can get prepared to speed changes.

Strategy 1 can be combined with Strategy 2 in situations where the scale built with the LCD can be exercised with the metronome on the speed of one of the ratios. The LCD scale will give the relationship between two ratios, and the metronome will frame both layers in a single gesture. This will be especially helpful in Ferneyhough's music. In Finnissy's music, both strategies 1 and 2 can be combined by setting the metronome on the new speed, while establishing the relationship between modified and regular figures. In Chapter 3, we will learn how to combine both strategies in detail.

Strategy 3 approaches the specific case of irrational meters as they appear in Ferneyhough's music. We will learn in Chapter 4 how to calculate the speed of the new figures transformed in such meters. Strategy 4 can be applied in cases where adjacent ratios share the same speed, as we will examine in the music of the Brazilian composer, Arthur Kampela. In this case, finding the speed of one ratio will give the speed of the following one. The procedure used by Kampela gives the performer the time to adjust to altered ratios. The fourth strategy applies only to Ferneyhough's and Finnissy's music to calculate new ratio speeds as an alternative to Strategy 2.

Chapter 2 - Strategy 1: Least Common Denominator

Concept

Finding the Least Common Denominator (LCD) between complex polyrhythms can help to solve some problems found in the New Complexity. In studying the long-range polyrhythms of Carter, John Link works with the concept of maximum conversion and diversion that, when applied to smaller scale rhythms, can be very useful to performers. Comparing two different rhythmic layers, he makes a grid to establish the coincident points and the "span of maximum conversion and diversion"[9] between large-scale structures. Here, we are more interested in establishing the degree of conversion and diversion on a smaller scale, between *notes*.

The LCD between two or more numbers is the smallest number, which, divided by each of them, results in an integer. If we have one layer with five pulsations, and one with three pulsations, the LCD will be 3 x 5 = 15. We can see an example of the use of the LCD strategy at a smaller rhythmic level in Weisberg's[10] solution to conducting different rhythmic layers. He uses an example from Elliott Carter's Double Concerto for Harpsichord, Piano and Two Chamber Orchestras. While the whole orchestra has a 5/8 time signature, the oboe part implies a 3/4 measure. Hence, the LCD between the two layers is: 5 x 3 = 15. It is easier to understand by looking at the grid in Example 2-1. The sixteenth-note subdivision shows the degree of approximation between the notes of both layers.

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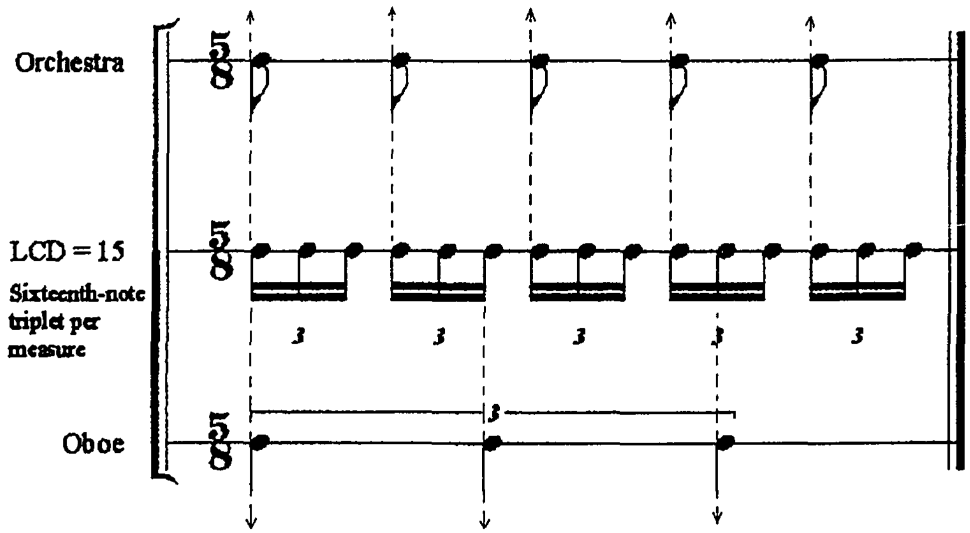
[9] John Link, "Long-Range Polyrhythms in Elliott Carter's Recent Music." (Ph. D. diss., Graduate School and University Center of CUNY, 1994): 10.
[10] Weisberg, 66.

Example 2-1: Three pulsations against five, sharing a sixteenth-note subdivision.



Percussionist Steven Schick briefly describes how he uses the least common denominator approach[11] to learn some spots in Ferneyhough's *Bone Alphabet*, but his grids are far more complicated than the one above. It is interesting how the word "classic" has different meanings for different instrumentalists. For Schick, works by Stockhausen and Berio are "classic" in terms of "conventional percussion arrangements."[12] For most other players, learning concepts of metric modulation, or developing the habit of rewriting rhythms to better read a seemingly complicated surface has no place in classical training. When reading nested rhythms, interpreter's first tool is

[11] Weisberg, 22 uses *least common denominator* (LCD), while Steven Schick, "Developing an Interpretive Context: Learning Brian Ferneyhough's *Bone Alphabet*," *Perspectives of New Music* 32, no. 1 (1994): 138 and Weisser, "Notational practice in contemporary music: a critique of three compositional models, Luciano Berio, John Cage, and Brian Ferneyhough" (Ph. D. diss., Graduate School and University Center of CUNY, 1998): 227 use *least common multiple* (LCM). The LCD will always be the LCM.
[12] Schick, 149.

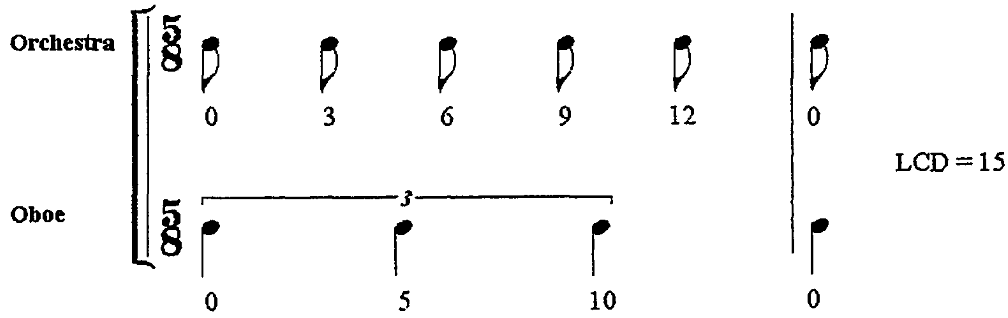
to guess the change of speed instead of precisely understanding the rhythmic relationship between the tuplets.

It took eight to nine months for Schick to learn that piece. He writes that he glued each measure in a grid and learned the piece measure by measure.[13] At certain moments he could not count the subdivisions, but he could understand the degree of approximation from one layer to the other, which is very close to the concept of the span of maximum conversion used by Link in Carter's long-range polyrhythms, but on a smaller level, in other words, applied to a performance context.

Schick builds his grids finding the LCD between two layers, and applies an n-increment scale to both layers so as to visualize the degree of conversion between them. We can understand his approach by applying it to the two rhythmic layers of Carter's Double Concerto examined in Example 2-1. Here we will have a fifteen-increment scale as shown in Example 2-2. The eighth notes of the orchestra layer account for three increments and the quarter notes of the oboe account for five increments each. Notice that the scale starts over at zero, meaning: 0=15.[14]

[13] Ibid., 136.
[14] Following Schick (138-39), I am starting the scale at zero, to preserve clarity between the arithmetic and music notation.

Example 2-2: A fifteen-increment scale applied to three pulsations against five.



Schick's decision in Ferneyhough's case was to understand the rhythmic relationships first, then to make performance choices. If the interpreter simply guesses at first, he may be right, but by becoming aware of the degrees of approximation (conversion) or distance between the layers (diversion), the performance will be much more confident and, as a consequence, closer to either the composer's or interpreter's own choices.

Overview

In this chapter, we will use the LCD strategy to deal with the following situations:

1. A line containing consecutive ratios altering the regular division of the meter, as seen in Finnissy's *... above earth's shadow* (1986).
2. A bottom ratio in a nested rhythm as it relates to its upper ratios, as we will examine in Ferneyhough's *La Chute d'Icare* (1988).

3. Two independent rhythmic lines whose relationship are not integral multiples of each other; in other words, they present different measure divisions, and different ratios subdividing the meter. We will examine Ferneyhough's *La Chute d'Icare* in this case.

The LCD strategy can work as a stage to the third strategy–Calculating the metronome marking of a specific ratio–that will be described in the third chapter. They are treated separately, firstly, due to the complexity of presenting both strategies together, and secondly, because there are cases in which Strategy 3 works by itself, as we will see in an example taken from *La Chute d'Icare* later in Chapter 3, where it will be important to determine the speed of a musical gesture for technical purposes.

Consecutive Ratios in a Single Line Altering the Regular Meter

Finnissy's *... above earth's shadow* presents many different consecutive ratios, offers detailed information in terms of articulation and microtones, and its rhythm is weaved in a continuous polyphony. The independent voices flow as in the Chopin's Piano Etude op. 25 n. 2, where the two hands are required to execute different accentuations: the right hand works in eighth-note triplets, while the left plays quarter-note triplets. Those figures "fit" one into the other in the regular binary subdivision, but the ideal performance is to make the lines flow rather than fit (see Example 2-3).

Example 2-3: Chopin Piano Etude op. 25, n. 2, mm. 1-6.

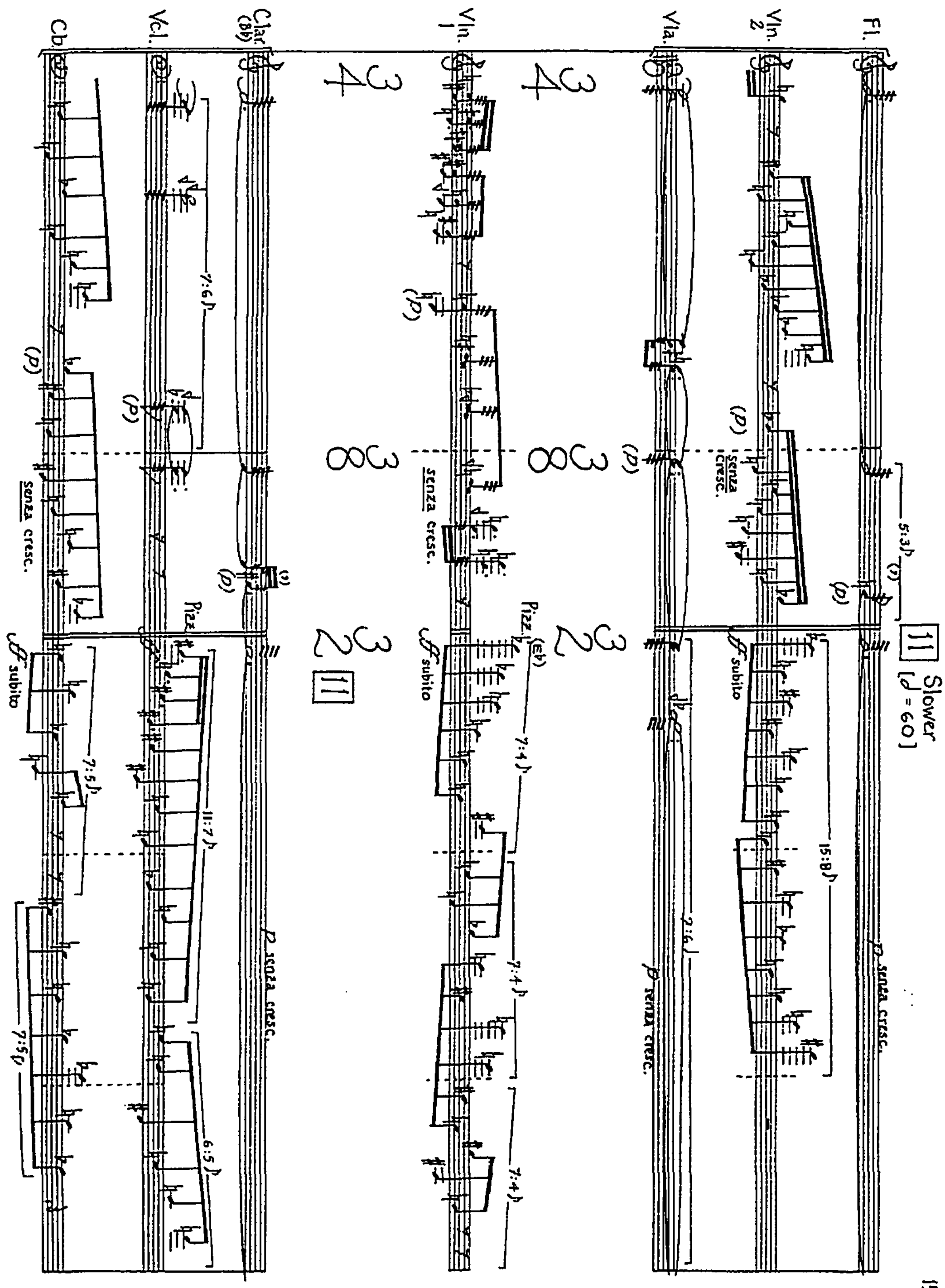
In some spots of ... *above earth's shadow* there are written instructions to interpreters indicating that the co-ordination of the pulse is only approximate. At Rehearsal no. 1 of the score, we read: "The co-ordination of the two violin parts is approximate (their pulse independently and unpredictably fluctuating between ♪120 and 176). Vertical coincidences are loosely indicated by the distribution of notes within bars–although the dotted bar-line is not divisive, and has no rhythmic function other than to place the conductor's down-beats as reference points."[15] We can infer here that, although the notation is very detailed, the composer allows interpreters to compromise rhythmic precision in favor of the flow of the music. Finnissy makes clear that the barlines and dotted barlines are only frames to guide interpreters in the several occasions where notes are grouped together while crossing the meter. Later in R10 through the end, he refers to

[15] Michael Finnissy, ... *above earth's shadow* (London: United Music Publishers, 1986): 2.

the same written indication, and he uses tuplets in R11 crossing the dotted barlines (see Example 2-4).

The barlines here are mainly used for visual purposes. The rhythmic distribution of note values becomes more accessible to the interpreter through those frames. The dotted barlines work as a written indication for the conductor, who, in turn, makes clear to interpreters the approximate location of their notes. Once the performer visualizes the meter, even though it does not work as such in terms of strong and weak accentuations, it is possible to use the frames as reference points. Although the notes do not have to be placed precisely as the composer indicates in the score, having those visual references helps the ensemble to play together while preserving the flow of the music.

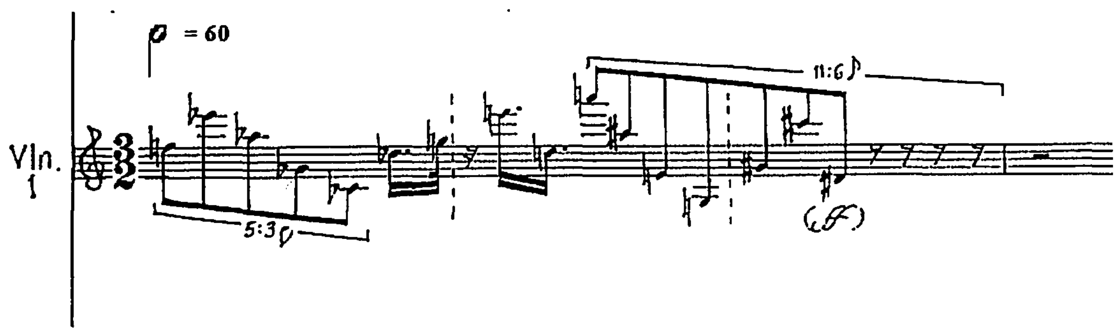
Example 2-4: Michael Finnissy's ... *above earth's shadow,* R11: tuplets crossing dotted barlines.



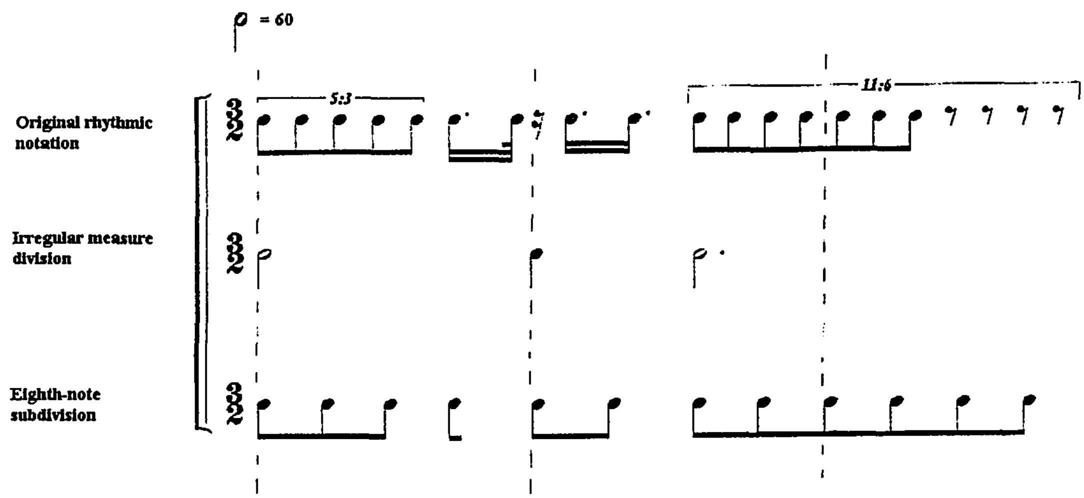
Example 2-5A shows the first violin part in four measures after R12. The time signature here is 3/2, the metronome marking of the half note is 60, and dotted barlines indicate the placement of the half notes. Only the rhythm of the first violin part is transcribed in the first line of Example 2-5B, and in the second line we see the uneven distribution of the measure into one half note, a quarter note, and a dotted half note, according to the rhythmic gestures. The third line shows the eighth-note subdivision of the measure irregularly grouped.

Example 2-5

A: First violin part, four measures after R12, p. 20 of ... *above earth's shadow* by Michael Finnissy.



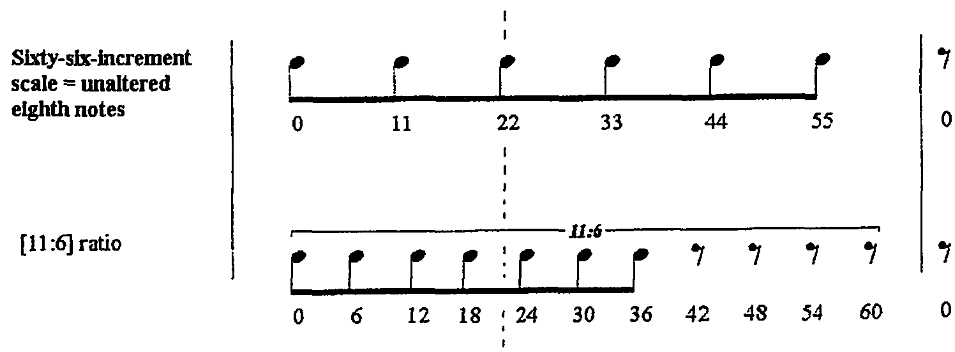
B: Irregular subdivision of the eighth notes in the fourth measure after R12, p. 20 of *... above earth's shadow* by Michael Finnissy.



The rhythm in the beginning of the measure is not too hard because it looks like it works around the half-note division of the bar, but the [11:6] ratio in the second half creates a disturbance in the meter. We could visualize the division of the measure as two equal parts (dotted half notes), but we would then make the first part too long to think of as a single gesture–especially considering the sixteenth-note rest in the second half-note "beat." First, we will isolate the [11:6] ratio, and make a grid applying the LCD strategy between the modified and normal figures. The LCD will be 6 x 11 = 66. We can see the degree of conversion and diversion among them in Example 2-6.[16]

[16] Remember that 0=66.

Example 2-6: A sixty-six-increment scale to calculate the degree of conversion and diversion between modified and normal figures in the violin part of four measures after R12, p. 20 of ... *above earth's shadow* by Michael Finnissy.



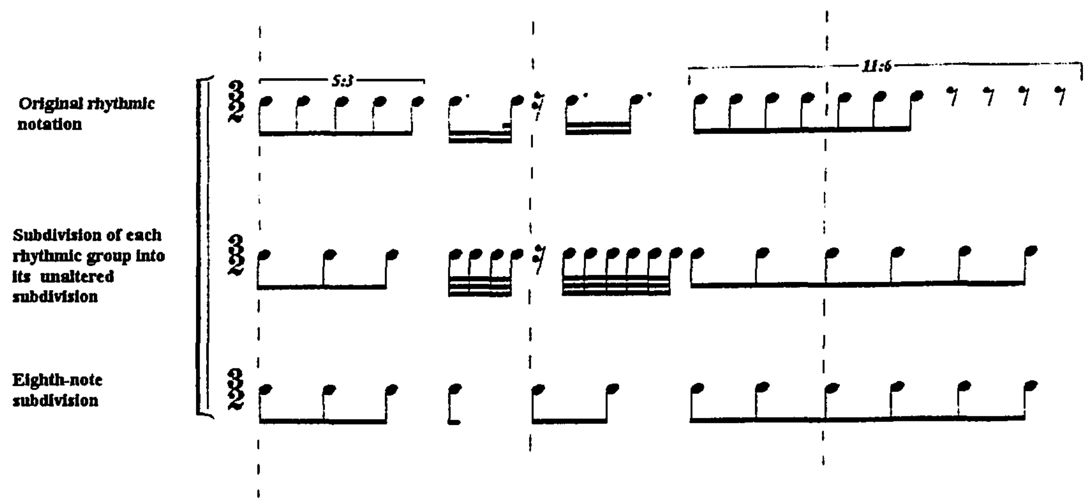
Notice in Example 2-6 that, although Finnissy allows interpreters some freedom in terms of rhythmic realization, the placement of the dotted barlines is very precise. The altered fifth eighth note (on number 24 of the sixty-six-increment scale) is placed right after the normal third eighth note (on number 22) of the scale. Since it seems important to Finnissy to notate the music precisely, I believe that the interpreter should understand the notation as much as the composer does.

If the performer is not aware of the degree of the conversion and diversion between the tuplet and the normal figure in the example above, he or she might play the fifth altered eighth note on the beat, since, visually, it appears to be correct. Although we understand that the composer allows such imprecision by his observation at R1 of the score, I still insist on the idea that the interpreter will feel a lot more confident in being aware of the rhythmic precision, and will still be able to play with the intended flow. I believe that studying the rhythms precisely will actually help the performer to play them fluently.

Obtaining a Fluent Line in a Series of Single Ratios: An Exercise

One can argue that breaking the line in such diagrams as we built in Example 2-6 can obstruct the flow of the music. After visualizing and exercising the [11:6] ratio in that grid, I suggest the following procedure: in Example 2-7, another grid is built to offer a reference to help to obtain the flow of the entire first violin line in this measure. The entire rhythm of the first violin is transcribed in the first line. In the second line, the ratios are written down as normal rhythmic figures before undergoing the ratio alteration, and the normal figures are reduced to their subdivisions. The third line gives the eighth-note subdivision. As an exercise, I suggest the following steps: first, the performer should practice the second line only while beating the eighth-note subdivision of the third line. In the second step, the performer should practice the written rhythm presented in the first line while beating the eighth notes of the third line as reference. The subdivisions practiced before should stay in the memory and will help to obtain the necessary flow. It might be difficult to maintain the continuity of the eighth notes in the first attempts, but it can be helpful to stop first at the first dotted line so as to lead the gesture to the rest, and then start over at the same place, and perform the rest of the measure.

Example 2-7: Rhythmic drill for the first violin line in four measures after R12, p. 20 of *... above earth's shadow* by Michael Finnissy.



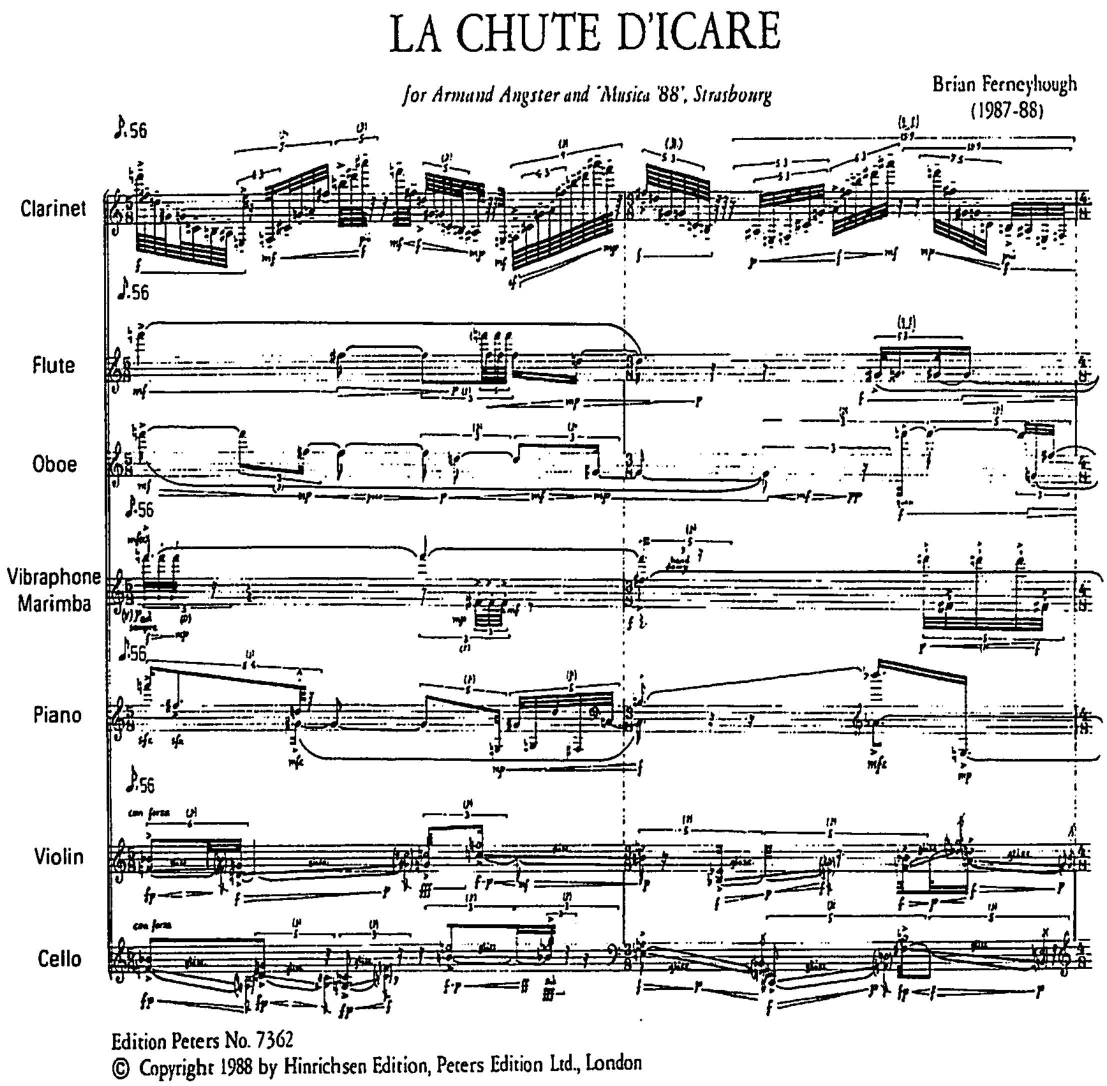
A Bottom Ratio in a Nested Rhythm Against its Upper Ratio

If we look at the first measure of *La Chute d'Icare* for solo clarinet and chamber ensemble by Ferneyhough[17] (see Example 2-8), we see that all instruments are playing different rhythms. At first glance it looks complicated, but after a more careful examination, one notices that all the instruments are playing vertically together. In other words, they all have a clear division of the bar in five eighth-note beats in the 5/8 time signature (that's not the case in the second measure, though, which we will examine later in the dissertation). The clarinet part even presents accents in every first note of each beat. The crucial question is: what is the intention of the composer? Does he want to give a clear feeling of the beat, does he want the performers to "hear" the beat while diverting

[17] Brian Ferneyhough, *La Chute d'Icare* (London: Peters Edition, 1988).

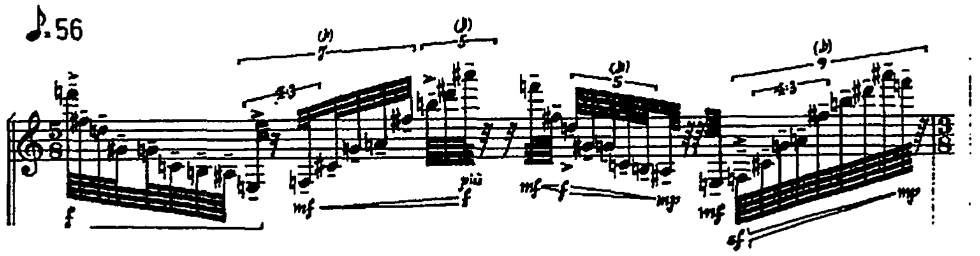
from it (as opposed to Carter's music in Example 2-1, where he clearly wants to establish a rhythmic independence among the layers) or is he only giving the ensemble a chance to establish the beat before destabilizing it in the second measure?

Example 2-8: Ferneyhough, *La Chute d'Icare*, mm. 1-2.



Before we try to answer that question, let's examine the clarinet part in the first measure from the perspective of the interpreter (Example 2-9). How will the performer approach the nested rhythms that change from beat to beat? The first beat is not a problem, since we are in the realm of traditional binary subdivision (eight sixty-fourth notes for an eighth note).

Example 2-9: ***La Chute d'Icare,*** **clarinet part, m. 1: one-level and two-level ratios.**



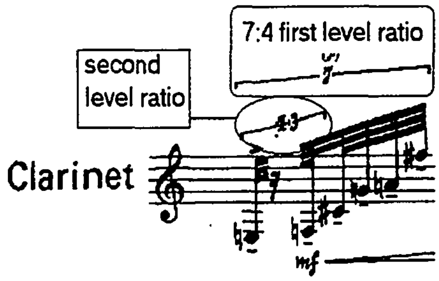
However, in the second beat there is a subdivision of seven thirty-second notes in the place of four thirty-second notes[18] in the first-level ratio[19] (see Example 2-10).

---

[18] To understand why the seven thirty-second notes replace four third-seconds and not eight sixty-fourth notes (a figure of a different kind), we have to double the number of thirty-second notes that would actually fit in the beat (four), which will equal eight sixty-fourths. Any number of an altered ratio of the beat exceeding eight will be notated as sixty-fourth notes. Any number under eight will be notated as thirty-second notes. "It amounts to the same as saying that 4 sixteenth notes will become 8 thirty-second notes only when they double their value. All ratios in between, such as 5:4, 6:4, 7:4, will be represented by a sixteenth note figure." (Kampela, 36).

[19] According to Kampela, "neutral" or "zero" level refers to rhythmic values that involve "integer multiples of the main beat. The introduction of any ratio is the establishment of a relationship–or, more appropriately, a struggle–between a frame of metric reference and a specific rhythm deviation from it. As the first frame of reference is necessarily the metronome marking speed, we can consider any contraction or enlargement of a certain pulse or span as the first level of rhythmic transformation. Therefore, ratio levels refer to the arrangement of speed levels, their vertical distribution in a chain of ratios." (p. 4).

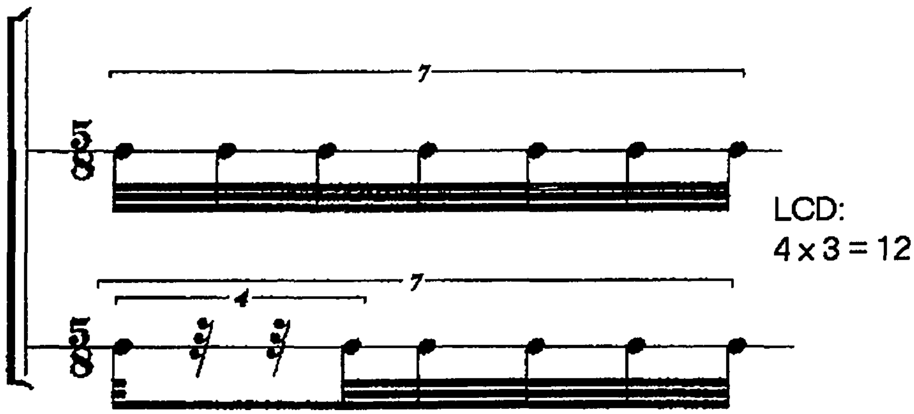
Example 2-10: Second beat of first measure of *La Chute d'Icare* – clarinet part.



The change between the first beat and the first-level ratio of the second beat would be smooth if we didn't have the second-level ratio right at the beginning of the beat [4:3]. We have, then, in the [4:3] second-level ratio, four thirty-second notes replacing three thirty-second notes of the [7:4] first-level ratio.

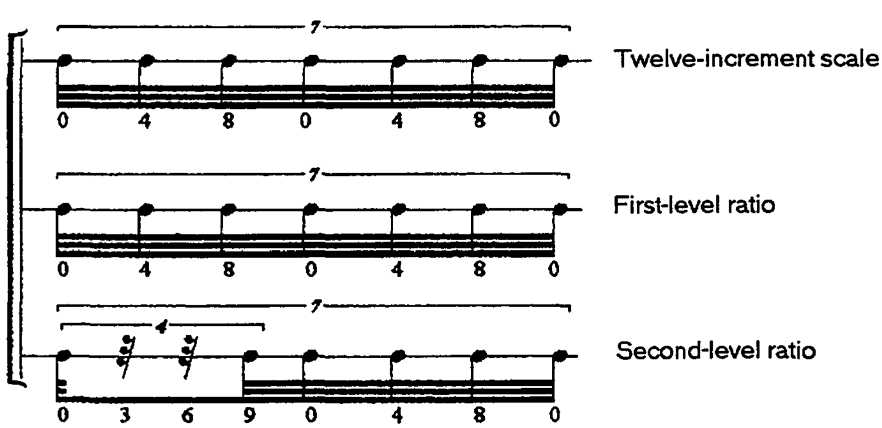
Imagine that the [7:4] ratio and [4:3] ratio are two simultaneous rhythmic layers instead of a single line, as shown in Example 2-11, and apply the least common denominator approach to the first three thirty-second notes of ratio [7:4] and to the sub-ratio [4:3].

Example 2-11: Second beat of *La Chute d'Icare,* clarinet part – two ratio levels superimposed.



Then, we can build a grid as in Example 2-12:[20]

Example 2-12: Using a twelve-increment scale to calculate the degree of conversion and diversion among ratios.



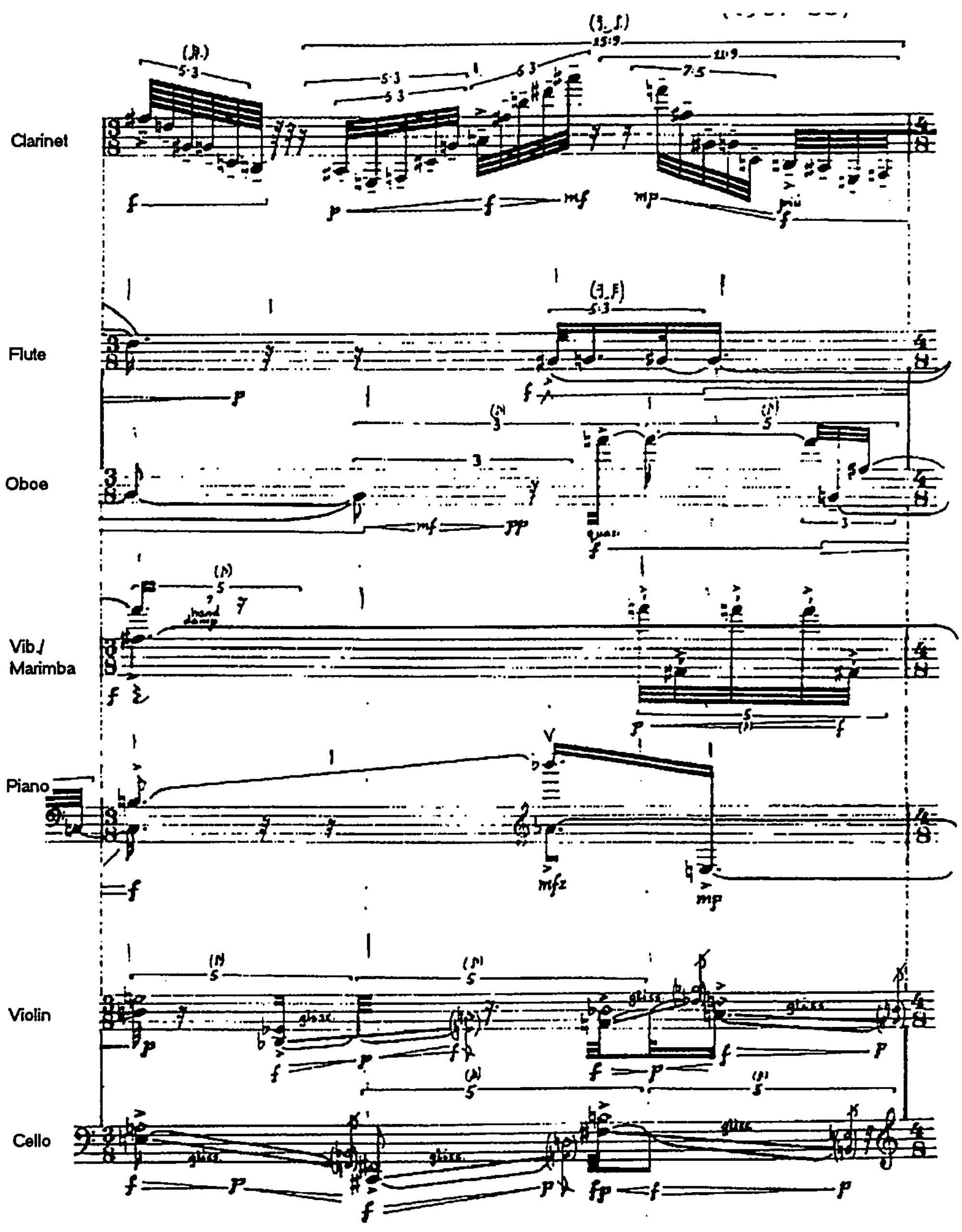
[20] Notice that 0=12.

In Example 2-12, one sees that the twelve-increment scale is applied according to the LCD obtained between the two rhythmic layers. Hence the thirty-second notes of the first layer will account for four increments and those of the second layer will account for three increments each.

The rhythm above is quite simple if we think in terms of three against four. The problem starts with the speed (MM ♪ = 56), which makes the thirty-second notes too fast to subdivide, and the two-ratio gesture. The grid above, applied in combination with Strategy 2, will give us sufficient tools to acquire the precision that the specific notation requires, as we will see in Chapter 3.

We will now examine a more complex case where we can apply the LCD strategy in a nested rhythm. Here is the second measure of *La Chute d'Icare* (Example 2-13):

Example 2-13: ***La Chute d'Icare*** **by Brian Ferneyhough, m. 2.**



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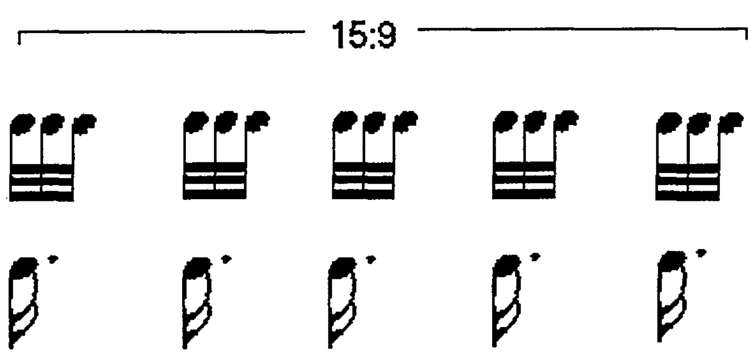
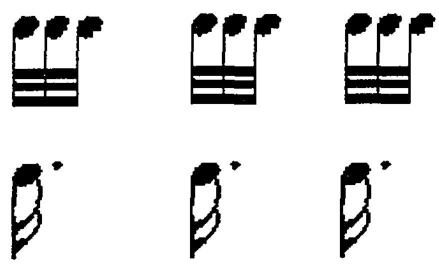
Although the clarinet part had already presented nested rhythms in m. 1, the five beats were clearly identifiable visually and audibly (see Example 2-8). The clarinet motion in the [15:9] ratio in m. 2 totally destabilizes any sense of meter. We could expect a symmetrical division of the fifteen new rhythmic figures into five equal parts of three notes (Example 2-14A), since the piano and flute parts, as well as the clarinet part in the beginning of the measure, suggest a division of the measure into dotted figures. In this case, instead of having three groups of dotted sixteenth notes of the neutral level (the unaltered nine thirty-second notes–Example 2-14B), we would simply add two more groups to be played in the same speed of the original one.

Example 2-14:

A: First-level ratio in the nested rhythm of the clarinet part in m. 2 of Ferneyhough's *La Chute d'Icare:* an imaginary equal subdivision.



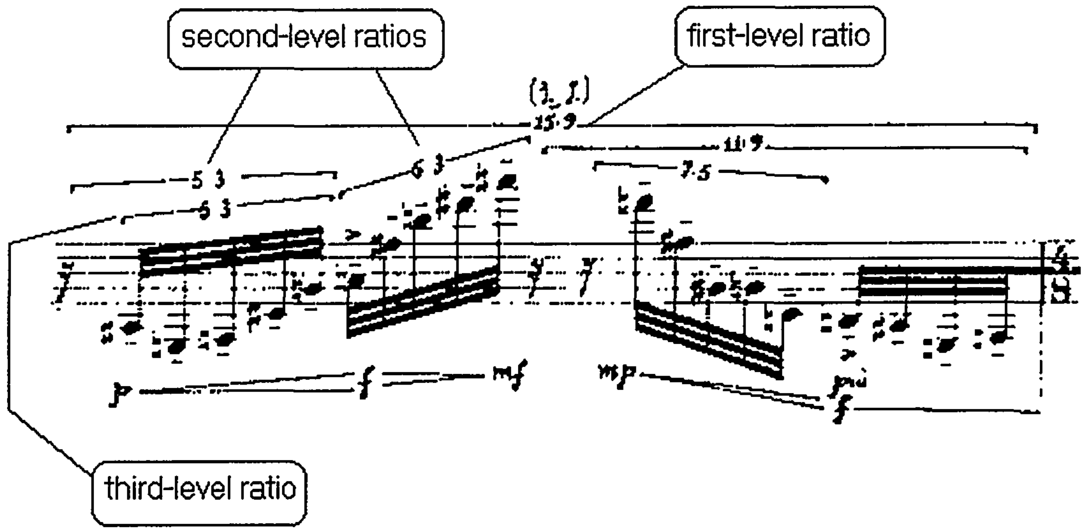
B: Neutral level thirty-second notes in m. 2 of the clarinet part of Ferneyhough's *La Chute d'Icare:* an imaginary subdivision.



Notice that the [15:9] first-level ratio of the clarinet part and the [5:3] ratio of the flute part share the same transformed thirty-second note speed (Example 2-13). Their fractions show their relationship: $\frac{3}{5} = \frac{9}{15}$.[21] Should the [15:9] ratio be the only alteration here in the clarinet part, we could relate the flute and piano parts to the clarinet speed. However, the thirty-second note of the [15:9] ratio in the clarinet is altered right at the beginning of that ratio, when a [5:3] second-level ratio appears, followed by a [5:3] third-level ratio (Example 2-15).

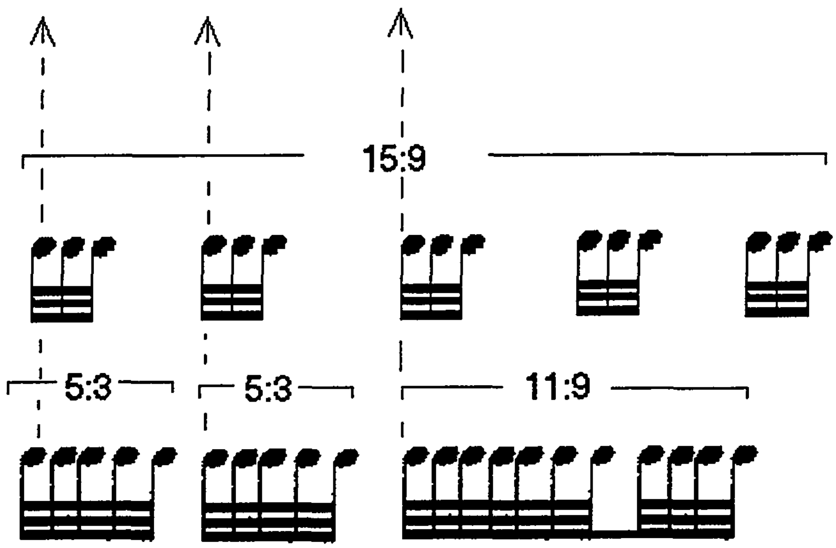
[21] I will recall this example later in Chapter 3 when finding the new metronome speed of a ratio in one or more ratio levels.

Example 2-15: Nested ratios in m.2 in the clarinet part of *La Chute d'Icare* by Brian Ferneyhough.



Ferneyhough chose to divide the first-level ratio into unequal sub-ratios that do not follow any predictable division. The first six thirty-second notes of the first-level ratio are arranged in two groups of three notes that are further modified in [5:3] ratios (second-level ratios); but the remaining nine thirty-second notes are unevenly grouped together in a [11:9] second-level ratio (see Example 2-16).

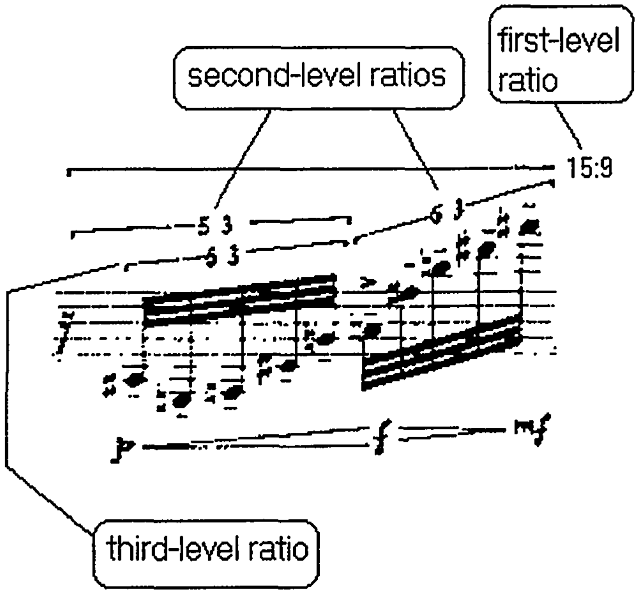
Example 2-16: First and second-level ratio relationship in m. 2 of the clarinet part of *La Chute d'Icare* by Brian Ferneyhough.



While the [15:9] first-level ratio does not distinguish the clarinet layer from the flute [5:3] ratio in this measure, the [11:9] second-level ratio takes away any hope for the clarinetist to find a secure metrical reference (beat) or a single note speed reference (subdivision). The situation becomes even more complicated when the third-level ratios appear.

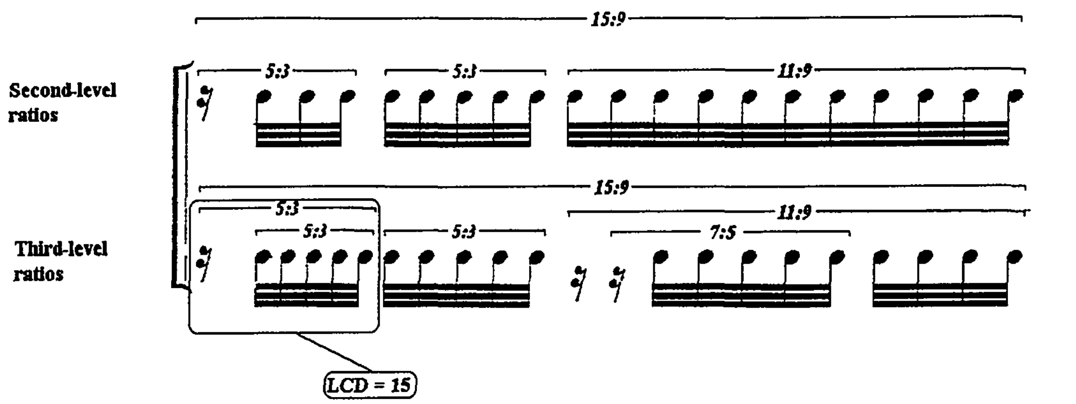
When we examined the second beat of the clarinet part in m.1 in Example 2-10, both ratios started at the same time. Here in m. 2, the [5:3] third-level ratio starts after the [5:3] second-level ratio (Example 2-17). The first [5:3] second-level ratio starts in a sixteenth rest, and it rapidly leads to a [5:3] third-level ratio. The latter, in turn, leads to the next [5:3] first-level ratio. In other words, the [5:3] third-level ratio is framed by two [5:3] second-level ratios.

Example 2-17: Second and third-level ratio relationship in m. 2 of the clarinet part of *La Chute d'Icare* by Brian Ferneyhough.



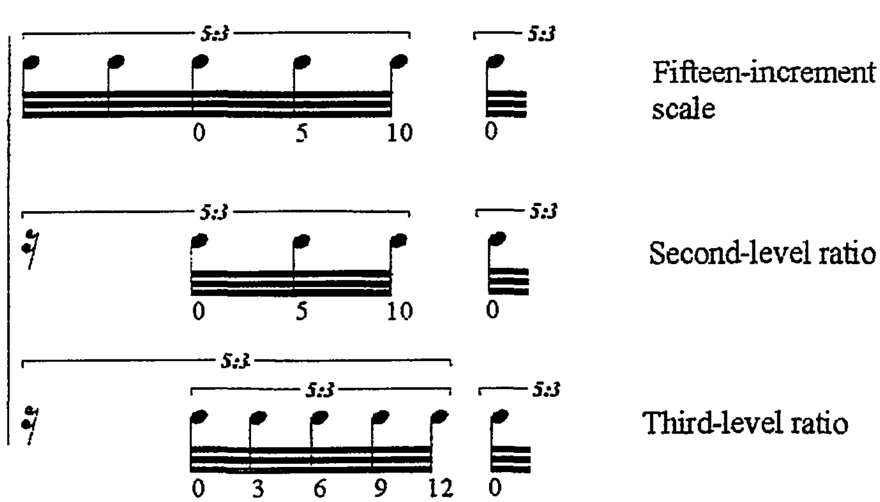
Here we will find the LCD and build a grid to understand the change of speed between the second and third-level ratios. Consider, as we did before in m. 1, that both ratios are two simultaneous rhythmic layers instead of a single line, and apply the least common denominator approach to the last three thirty-second notes of the second-level ratio and to the third-level ratio. The LCD between those layers is 3 x 5 = 15 (Example 2-18).

Example 2-18: Second measure of *La Chute d'Icare,* clarinet part: [5:3] second and third-level ratios superimposed.



Then, isolating the second and third [5:3] ratios, we can build a grid as in Example 2-19:[22]

Example 2-19: A fifteen-increment scale to calculate the degree of conversion and diversion between the [5:3] second and third-level ratios in the clarinet part of m. 2 of *La Chute d'Icare*.



[22] Because the third-level ratio starts two thirty-second notes later than the second-level ratio, the coincident point 0 (remember that 0=15) happens in the next [5:3] second-level ratio.

The same system should be applied for the [7:5] third-level ratio, where the LCD is 7 x 5 = 35. In order to be able to connect all the ratios embedded in the [15:9] first-level ratio, it will be necessary to find the metronome speed of all of them, as we will learn in the next chapters.

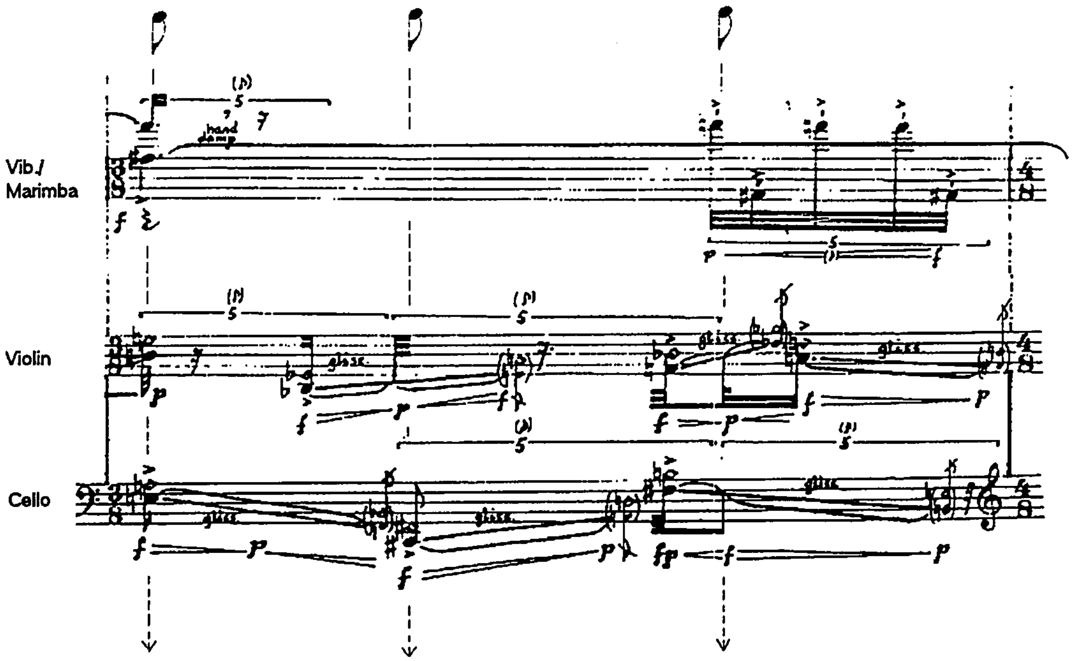
Two Independent Rhythmic Lines Whose Relationship are not Integral Multiples of Each Other

We worked with altered ratios against a given meter, and a bottom ratio against its upper ratio. We didn't address the problem of having several different rhythmic lines against each other, and we will now use the LCD strategy to approach this kind of problem.

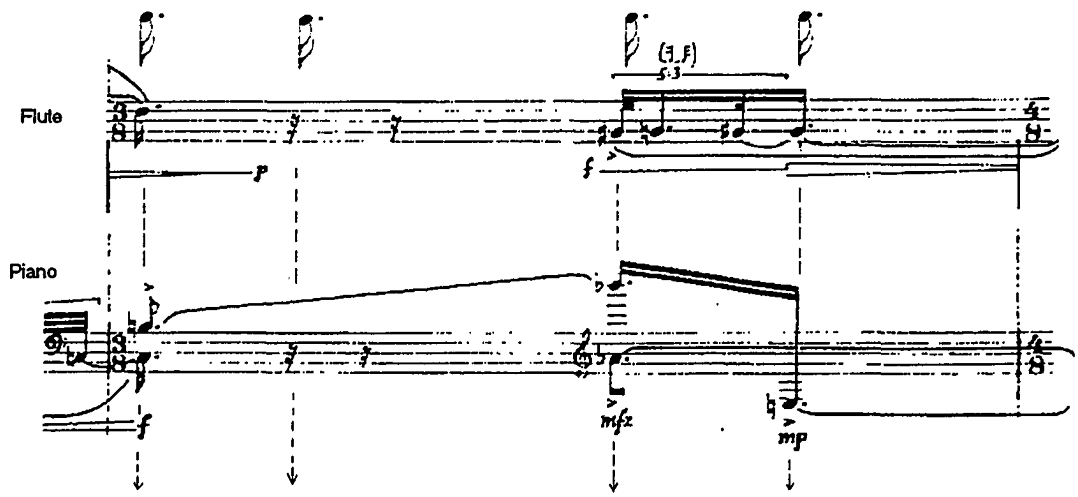
When examining the first measure of *La Chute* by Ferneyhough before, we observed that the eighth-note division of the 5/8 bar was clearly presented in all instruments. However, in the second bar, it is difficult to visualize the division of the 3/8 measure in three eighth notes in instruments other than vibraphone/marimba, violin and cello (see Example 2-20A)[23]. Here, we have lost the sense of meter, and three different metric layers work independently: the regular 3/8 time signature, a binary division of the measure suggested by dotted notes in the piano and flute lines (see Example 2-20B), and the independent clarinet line (Example 2-20C).

[23] Eighth notes are placed above the staff to help visualizing the meter division.

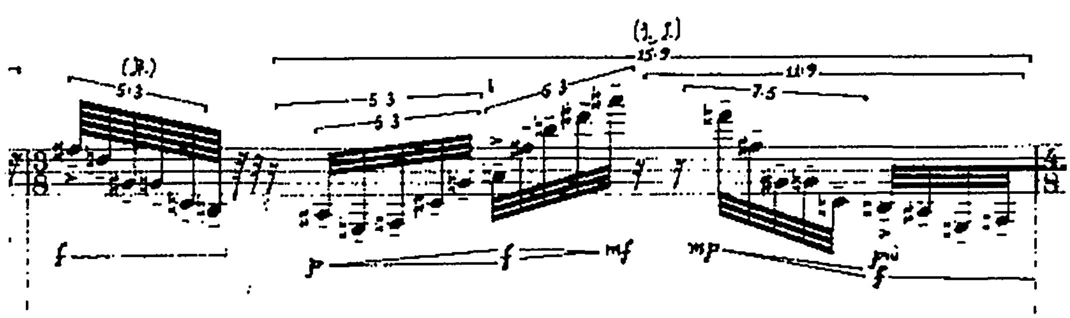
Example 2-20A: Vibraphone and marimba, violin, and cello parts in m. 2 of *La Chute d'Icare* by Brian Ferneyhough showing a regular 3/8 meter division.



B: Flute and piano parts in m. 2 of *La Chute d'Icare* by Brian Ferneyhough.

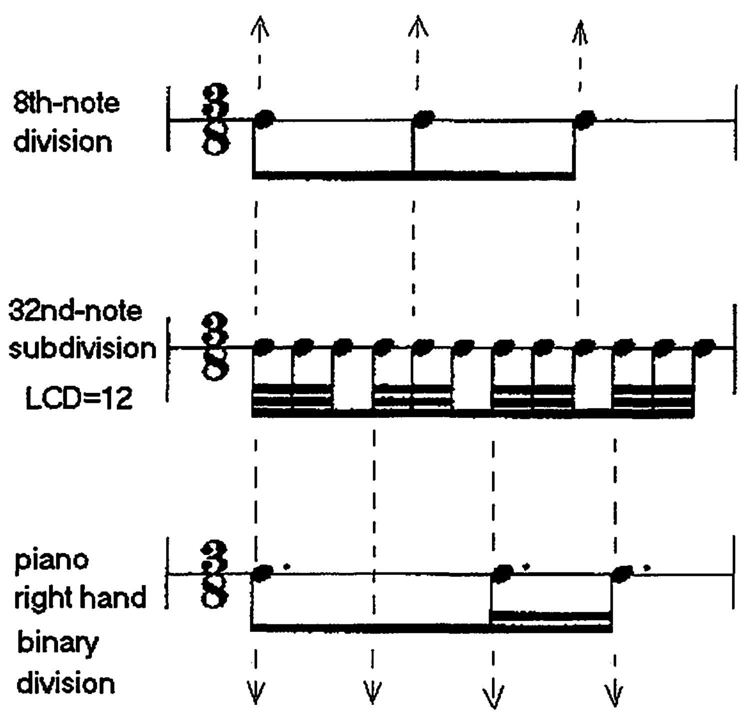


C: Clarinet part in m. 2 of *La Chute d'Icare* by Brian Ferneyhough.



The dotted notes of the flute and piano parts give us the sense of a binary division against the 3/8 time signature presented in the vibraphone/marimba, violin and cello voices altogether. We can visualize the relationship between both rhythmic layers in Example 2-21, where we have the eighth-note division of the measure in the first layer, the thirty-second-note subdivision in the second layer (LCD = 12), and the right-hand rhythm of the piano part in the third layer. The LCD here was calculated by multiplying the three eighth notes of the measure by four dotted sixteenth notes: 3 x 4 = 12.

Example 2-21: *La Chute d'Icare,* m.2: right-hand rhythm of the piano part suggesting a binary division of the measure.



A conductor here would be of a great help. He/she could choose to beat the dotted sixteenth note in m. 2, or the three eighth notes with one hand and four dotted sixteenth notes with the other hand, not an impossible task considering the metronome marking of 56 for an eighth note. Here we build a twelve-increment scale to give the conductor the span of maximum conversion and diversion so that he/she can organize the gesture and clarify the relationship between the layers suggested by the given meter and the binary division of the dotted notes. The [5:4] ratios that subdivide the beat of the instrument parts presented in Example 2-20A will not interfere in the binary division against a ternary division of the meter, since they all fit in a regular eighth note.

Although the flute part has a different subdivision of the dotted sixteenth note in ratio [5:3], its G# entrance (Example 2-20B) will be greatly facilitated if the conductor gives the dotted sixteenth-note division. The piano part will also work as a reference. With the "four-beat" measure division, the [5:3] ratio of the flute part will not represent any trouble.

The dotted sixteenth-note division of m. 2 will also facilitate the first downward gesture of the clarinet, since the initial [5:3] ratio embeds a dotted thirty-second note, and the nested rhythm starts in the second dotted sixteenth note of the measure. From then on, as we examine before in Examples 2-13 through 2-19, the clarinet receives a different treatment rhythmically.

As opposed to Finnissy's approach using dotted barlines, Ferneyhough doesn't seem to be concerned with indicating meter frames to performers. After the nested ratio series of the clarinet in the second measure starts, there is no abstract (meter) or visual frame to "fit" the ensemble into the clarinet solo. It is the clarinetist's task to figure how to deal with his/her own rhythmic challenges in order to work with the ensemble with a conductor's help, and the LCD grid presented in Example 2-19 can help the performer to deal with such challenges.

In the examples of Ferneyhough and Finnissy that we studied in this chapter, we can see that the decision to learn such pieces requires a lot of commitment from the interpreter. Working on each measure of those works can take a great amount of time, and putting the music together as a piece of art can take months. Besides all the technical difficulties presented, making graphics will require some effort, but will certainly help to figure out the rhythmic difficulties. Once the mathematics become familiar, the grids become easier to build, and the music will appear a lot clearer. I believe that the examples used above to illustrate the LCD strategy in this chapter will help to make polyrhythms and nested rhythms presented in the New Complexity in music more accessible to performers.

Chapter 3 - Strategy 2: Calculating changes of tempo by finding the new metronome marking of an entire ratio

In this chapter, we will calculate the speed of single ratios in terms of new metronome markings. This strategy will be used to project a fluent line when the music presents series of different single ratios (as they occur in Finnissy's music). It can help to frame musical gestures so the performer can practice within the altered speed limits (as opposed to the indicated metronome marking). It will also be used to compare different ratio speeds and relate them to one another within nested rhythms. In some cases, this technique can be combined with Strategy 1, as we will see in Finnissy's *Banumbirr* and Ferneyhough's *La Chute d'Icare.*

Calculating the Speed of a Single Ratio – Making Technical Choices

Here we will learn how to calculate the speed of an entire one-level ratio, and Weisberg's advice will be helpful to understand the procedure. He explains how to derive new metronome speeds: "Once the basic speed has been determined (for example, quarter = 100), it is possible to determine the speed of any metric unit." In order to obtain the speed of an eighth note, we double the value of the quarter; to find the speed of a half note, we divide the quarter's value by two, and so on: "These speeds are all related by a multiple of two: each is twice as fast or twice as slow as the adjacent speeds."[24]

In Example 3-1, the sixteenth notes are asymmetrically grouped along the 2/4 meter in a way that modifies its original accentuation. A [4:3] ratio affects even more the regularity of the measure:

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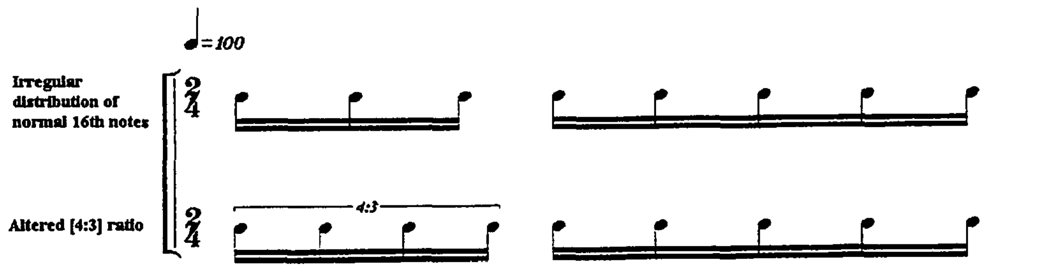
[24] Weisberg, 45.

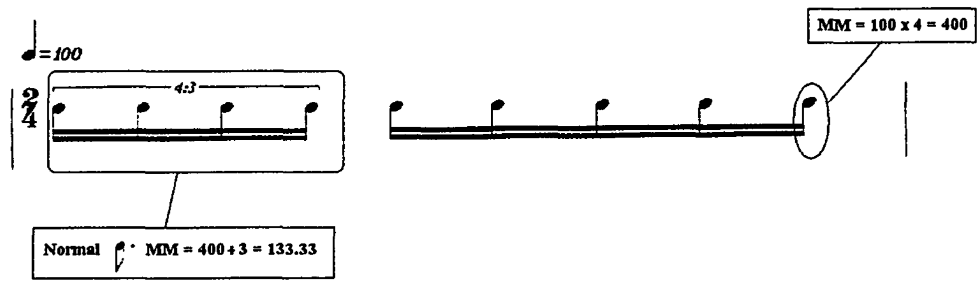
Example 3-1: A [4:3] single ratio modifying the regular division of the beat.



In order to find the speed of the [4:3] ratio of Example 3-1, we need to find the speed of a dotted eighth note, since it is the normal rhythmic figure that embeds the entire ratio (three original sixteenth notes). Weisberg explains that, if we want to find the speed of a dotted note, we have to "look for the largest normal unit that fits into both the normal"[25] note and dotted note. Here in Example 3-1, the unit that fits into both normal and dotted eighth notes is the sixteenth note. Hence, in the MM = 100 for a quarter note, the speed of the sixteenth note will be four times as fast: 4 x 100 = 400. The dotted eighth note contains three sixteenth notes. Hence, we should divide the speed of the sixteenth note by three, so as to find the speed of the dotted eighth note, as follows: 400 ÷ 3= 133.33–the speed of the entire [4:3] ratio (see Example 3-2).

[25] Ibid., 47.

Example 3-2: Calculating the speed of the entire [4:3] ratio.

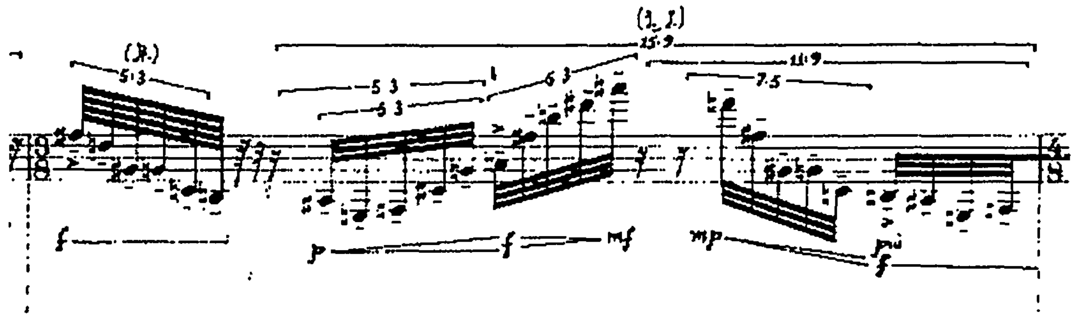


Knowing the speed of a ratio can help the interpreter to have a speed reference for both body and mind to work together. In Example 3-2, if the line is written, for example, for a wind instrument, the speed of about 133 beats per minute can serve as a reference for a fast double-tonguing, and 100 will be a calm (but still in the fast side) single tonguing. The [4:3] ratio and the normal sixteenth notes should be practiced separately, and the relationship between them will remain in the performer's memory.

The clarinet [5:3] ratio in the beginning of m. 2 in *La Chute d' Icare* is a good example of how finding a new metronome marking can be useful to the performer to train his/her body to learn its own limits for the possible physicality of the passage. The gesture in the MM = 56 is very fast, as we can see in Example 3-3, and the player will have to choose the kind of tonguing to use. Practicing with the metronome will offer the tool to make the technical choice.[26]

[26] I believe there is an extra sixty-fourth note in the clarinet part in m.2 of *La Chute d'Icare*. I understand that the first downward gesture of the clarinet in this measure, including the sixty-fourth and the thirty-second rests should account for a dotted sixteenth note, since the series of ratios that start in the first sixteenth rest (where [15:9] is the first-level ratio) is clearly notated to embrace three dotted sixteenth notes (in the score, a dotted sixteenth note + a dotted eighth note). It might be a copyist's mistake in case the manuscript uses two sixty-fourth rests instead of one thirty-second rest. But it also might be the composer's mistake, especially if the original notation is handwritten, because, visually, all the notes of the clarinet in

Example 3-3: Second measure of the clarinet part of *La Chute* by Brian Ferneyhough.



The speed of the [5:3] ratio of the clarinet in the beginning of m. 2 will be calculated by multiplying the MM = 56 (eighth-note speed) by eight to obtain the sixty-fourth-note speed, and divide it by three to obtain the speed of the dotted thirty-second note that embeds the ratio, as follows: 56 x 8 = 448 ÷3 = 149.33.

We can confirm that we have obtained the right metronome speed by checking the metronome marking for the flute [5:3] ratio in the middle of m.2 (third dotted sixteenth note in Example 3-4). If the ratio of the flute part is twice as slow (a dotted sixteenth note) as the speed of the clarinet [5:3] ratio calculated above, its speed should be 74.66 (149.33 ÷ 2). We can obtain the speed for the flute ratio using the following equation: 56 x 4 = 224 ÷ 3 = 74.66.

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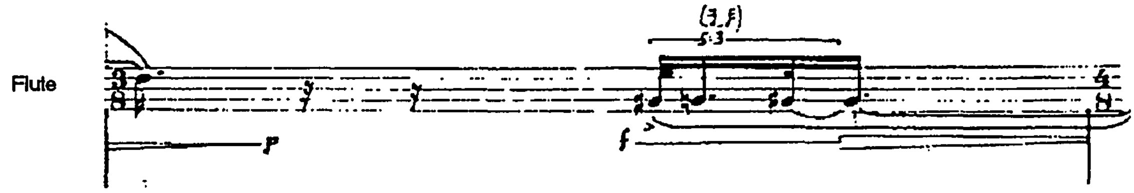
the beginning of the measure look like they are being grouped in a single gesture. In other words, the last sixty-fourth note of the gesture might have been taken as belonging to the [5:3] ratio. I believe that the sixty-fourth rest right after the downward gesture is the extraneous figure.

Example 3-4: Flute part in m. 2 of *La Chute d'Icare* by Brian Ferneyhough.



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The original metronome marking of 56 does not really help the clarinetist here in the second measure, since this measure does not offer the soloist much reference in terms of meter. When the performer practices that first [5:3] ratio here with the new metronome marking, he or she will realize that the gesture requires a very fast tonguing, perhaps almost reaching the limits of the impossibility.

Wright says: "an often-voiced irritation with Ferneyhough questions the need for the notation of the score to be based on a slow quaver pulse, and points to the intricacy as an inevitable consequence of any gratuitous attempt towards an all-embracing control of the performer. Ferneyhough himself admits to the differences between a notational ideal and the reality of performance, but views that positively, in terms of a performer's own involvement with the score as an integral part of the recreative process."[27]

While traditional notation requires some brainwork, the clarinet line in *La Chute* actually requires an enormous technical and intellectual involvement from the performer. Any attempt an interpreter makes to get involved with a composer's piece of art becomes part of his or her own art. The conversation between the composition and the interpreter makes the still object–the score–become live art. An analogy of such an involvement

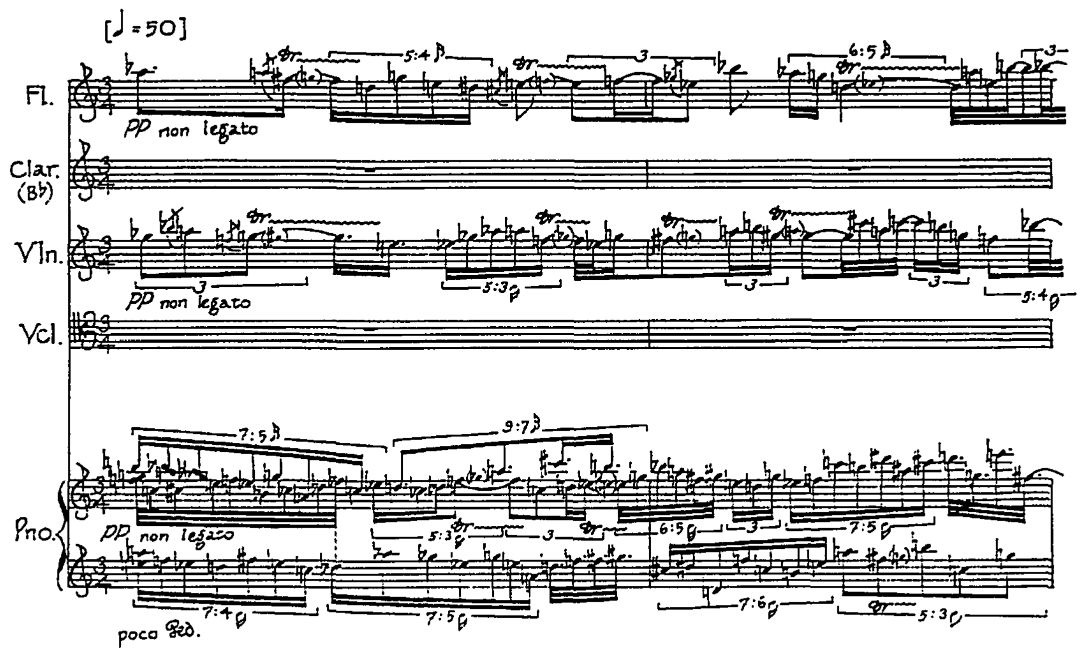
[27] David Wright, "Ferneyhough at Fifty," *The Musical Times* 134 (March 1993): 127.

would be a painting shown in a museum exhibition after years of being hidden from public eyes. Ferneyhough believes that the difficulties in his pieces, in truth, facilitate the conversation between the composition itself and the performer.

Calculating the Speed of a Single Ratio in a Series of Consecutive Ratios

In *Banumbirr* by Michael Finnissy (1986), we observe a series of consecutive single ratios, especially in the piano part. We will use the first rhythmic layer of the right hand of the piano part in m. 1 to study how to relate consecutive ratios to one another. By comparing different metronome markings of ratios, it is possible to have a sound picture of the change of speed. Example 3-5 shows the first two measures of the piece.

Example 3-5: B*anumbirr* by Michael Finnissy, mm. 1-2.



There are five independent rhythmic layers played by three instruments in the first measure. The piano part itself carries three different rhythmic lines in the first measure, two of them played by the right hand. Discussing Finnissy's piano music, Ferneyhough says that the piano "occupies a key position in the layout of his creative personality. In many of his compositions for ensemble, or voice and instruments, the piano is not only included, but tends, more often than not, to assume an authoritative role, to thrust itself into the foreground with such persistence that the entire texture is impregnated with its ubiquitous presence."[28] Later, when examining *Fall.*, Ferneyhough adds: "In a texture exemplary for its 'pianism', there is a constantly shifting degree of tension inherent in the relationship between left and right hands and organized, as it is, according to fundamentally diverse methods of phase length definition."[29] I believe that those comments on Finnissy's music can also be applied to describe his piano writing here in *Banumbirr.*

The following grid shows the first rhythmic layer of the right hand of the piano part in m. 1, and regular sixteenth notes as they are grouped before suffering ratio alterations (see Example 3-6). The regular sixteenth notes are asymmetrically grouped along the measure.

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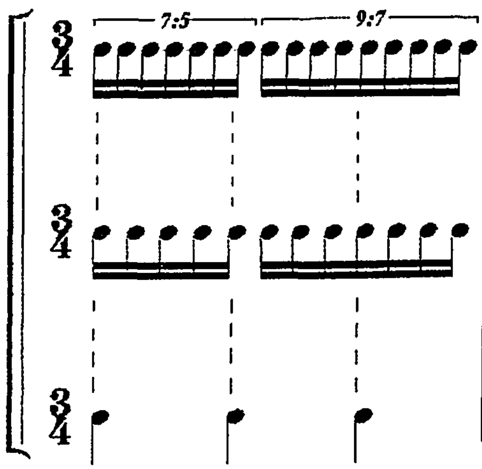
[28] Brian Ferneyhough, *Collected Writings,* ed. James Boros. Amsterdam: Harwood, 1995, 183.
[29] Ibid., 191.

Example 3-6: Asymmetric distribution of sixteenth notes in the first rhythmic layer–right hand of the piano part in m. 1 of *Banumbirr* by Michael Finnissy.

First rhythmic layer
Piano part – right hand

Regular sixteenth notes
unevenly distributed

Regular distribution of
quarter notes

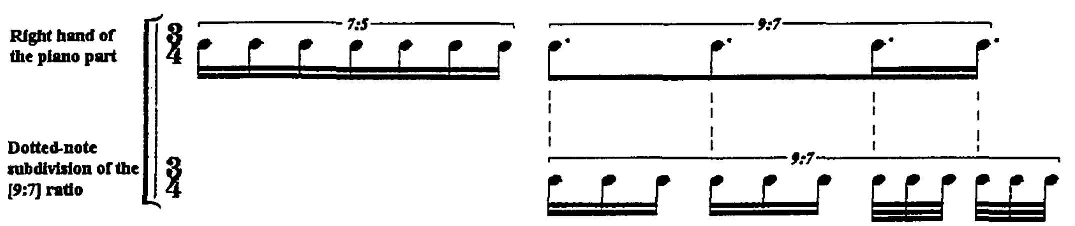


In order to acquire the flow suggested by the continuous character of the line where the time signature is only a vague remembrance of a ternary meter, I suggest calculating the metronome marking of each ratio of this measure. The speed of each ratio can be calculated by multiplying the regular sixteenth note by the given quarter-note metronome marking, and dividing it by the number of sixteenth notes that embeds the entire ratio.

The metronome marking of the initial ratio of the right hand in m. 1 is calculated by multiplying the regular four sixteenth notes by MM = 50, so we obtain the speed of one sixteenth note. Then, we divide the result by five (the number of regular sixteenth notes that fit in the [7:5] ratio, in other words, an eighth note and a dotted eighth note). The operation gives the following result: 4 x 50 = 200 ÷ 5 = 40. The same procedure will be applied to calculate the speed of the next ratio of the same line of the right hand: 4 x 50 = 200 ÷ 7 = 28.57.

Here in the second ratio we face a problem. The available metronomes do not offer a slower speed than 34 or 35 beats per minute. Apparently, the best solution would be to double the resulting speed (28.57 x 2 = 57.14), and check it with the metronome. Had the notation implied that the entire ratio should be played as a whole, then it would be appropriate to turn off the metronome so the performer would be able to imagine the speed of the entire ratio in approximately 28 beats per minute. However, the [9:7] ratio uses dotted eighth and sixteenth notes, as we see in Example 3-7.

Example 3-7: [9:7] ratio in m. 1 of *Banumbirr* by Michael Finnissy–first rhythmic layer of the right hand of the piano part.



Hence, the modified nine sixteenth notes are subdividing the ratio into three equal parts: three dotted eighth notes. So, the best solution for practice purposes would be multiplying the speed of the entire ratio by three, so we can obtain the speed of the modified dotted eighth note, as follows: 28.57 x 3 = 85.71. The resulting speed of the subdivision of the ratio is perfectly feasible with the metronome on. We will refer to this example again later in Chapter 5 when I will propose a different way to calculate the speed of the [9:7] ratio so we can compare the results we have obtained here.

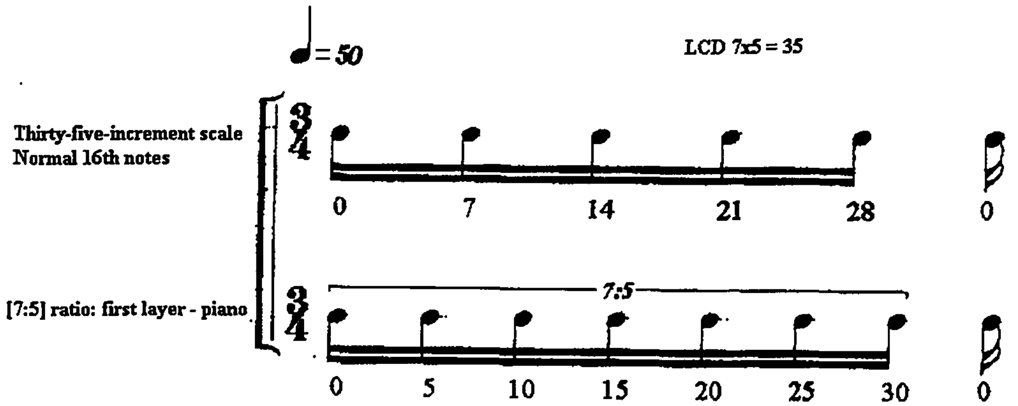
Combining Strategy 1 and 2 in a one-level ratio

When we calculated the speed of each ratio of the first layer of the right hand in the piano part in m. 1 of *Banumbirr* by Finnissy, we trusted in memorizing entire ratio speeds to operate the change from on ratio to the next. If the performer has access to a sequencer, he can program metronome changes from one ratio to another. In this way, the performer would be able to "fit" the number of notes he/she has to play in a determined span of time. Instead of having a regular metronome "click", the sequencer would click in irregular time spans (the speed of each entire ratio). The synthesizer cannot do the math, but can realize the tempo changes of the ratios. I imagine this procedure would be especially valuable when the rhythmic distribution of figures inside the ratios is even.

If a sequencer is not available, it is possible to practice with the metronome on the new speed in combination with the n-increment scale technique we learned in Chapter 2 showing the degree of conversion and diversion between two ratios in a nested rhythm. In *Banumbirr*, instead of having two-level ratios as we had in *La Chute d'Icare*, we have only one ratio at a time, but we can build a grid between the modified figures and the original ones. In the case of the first layer of the piano part in m. 1, the grid will be built between regular sixteenth and the modifying ratios.

We know that the speed of the regular sixteenth note is 200 beats per minute (MM= 50 x 4 = 200). We can set the metronome to that speed and practice one ratio at a time. The first ratio has five regular sixteenth notes. We can practice beating the regular figures with one hand, and speaking the seven modified sixteenth notes. Example 3-8 shows a grid built with the technique learned in the second chapter, and it shows the degree of conversion and diversion between the normal and transformed figures in a thirty-five-increment scale, where 0=35.

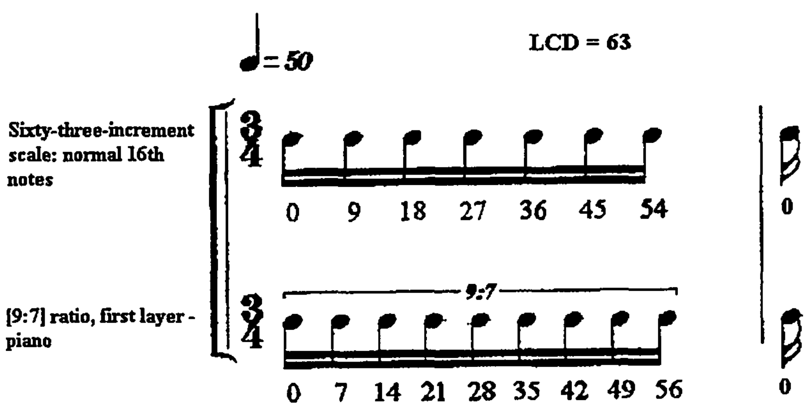
Example 3-8: A thirty-five-increment scale showing the degree of conversion and diversion between modified and normal figures in the [7:5] ratio – first rhythmic layer in m. 1 of the piano part of *Banumbirr* by Michael Finnissy.



We can either practice with the metronome at 200 for the sixteenth note (it would help to make the change between the two consecutive ratios of the first layer or at 40 for the entire ratio. If the metronome is set to the slower tempo, it is possible to establish the speed of the regular sixteenth note with one hand (perhaps using the fingers will make it easier to "frame" the number of notes inside the ratio) while performing the modified sixteenth notes with the voice. Then the performer should maintain the regular sixteenth-note beating with the fingers/hand while turning off the metronome in order to perform the next [9:7] ratio with the voice. Therefore, the reference will still be the regular sixteenth note. It seems a hard coordination, but remember that the pianist is supposed to be able to play three different rhythmic layers at the same time.

The grid for the next ratio of the same layer is built between seven regular sixteenth notes and nine "new" sixteenth notes. Notice that although the scale for the normal sixteenth notes of the grid shown in Example 3-8 receives the same increment as the following ratio of the grid in Example 3-9, it doesn't mean that they share the same speed, since they belong to different categories of values: the normal sixteenth and the "new" sixteenth note of the [9:7] ratio, respectively. In this ratio, the numbers for the normal figure increase every nine increments (see Example 3-9).[30]

Example 3-9: A sixty-three-increment scale showing the degree of conversion and diversion between modified and normal figures in the [9:7] ratio–first rhythmic layer in m. 1 of the piano part of *Banumbirr* by Michael Finnissy.



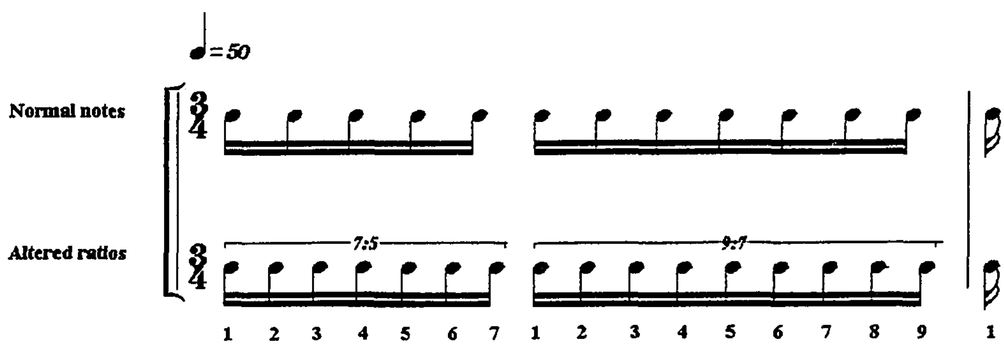
Obtaining a Fluent Line in a Series of Consecutive Single Ratios

If we practice both [7:5] and [9:7] ratios slowly as presented in Examples 3-8 and 3-9, we can later align them in another grid with the normal sixteenth notes only, taking

[30] The scale starts over in 0=63.

the scale numbers away in order to play both ratios fluently. I suggest, for example, fingering the normal notes with the metronome on, and saying the altered notes (counting them aloud), as in Example 3-10. In this way, we can set the metronome on the speed of the sixteenth note (200), and perform the notes of the ratios. When exercising looking at the grid, we should try to concentrate more in the regularity of both altered and unaltered speeds. The distance between the notes help to visualize the placement.

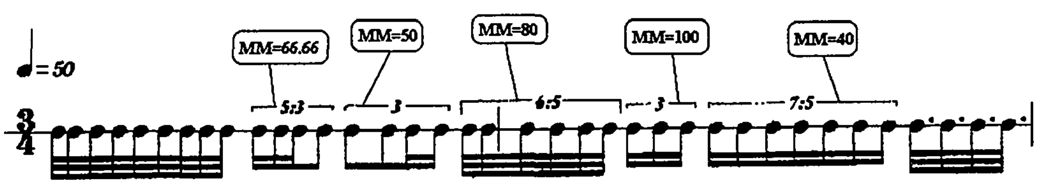
Example 3-10: [7:5] and [9:7] ratios in the first rhythmic layer in m. 1 of the piano part of *Banumbirr* by Michael Finnissy against their normal notes.



The second rhythmic layer of the piano part in m. 1 of *Banumbirr* should be practiced separately to acquire the suggested flow, and we can practice it stopping at the first note of every new ratio using a new metronome marking for each group. We will soon examine how to deal with the passage from the beginning nine thirty-second notes of this layer to the altered ratios (see Example 3-5), but first we will detail each ratio in terms of metronome speed.

Example 3-11 shows the isolated second rhythmic layer of the piano in mm. 1-2, and the metronome marking of each ratio. The speed of the [5:3] ratio is calculated by multiplying the speed of the quarter note by four in order to find the speed of the sixteenth note, and dividing it by three, so we can find the speed of the dotted eighth note that embeds the ratio. The same operation is used to find the speed of the next ratios, and we should always pay attention to which figure the alteration refers to. For example, in the next ratio, number 3 refers to eighth notes: three eighth notes substitute two. In this case, there is no need to calculate a new speed, since the ratio embeds the original quarter note. Another issue to remember is that the number that will be used in the division operation refers to the *regular* figure that embeds the ratio, and not the new one.

Example 3-11: Second rhythmic layer of the piano part, mm. 1-2 of *Banumbirr* by Michael Finnissy.



[5:3] 50 x 4 = 200 ÷ 3 = 66.66

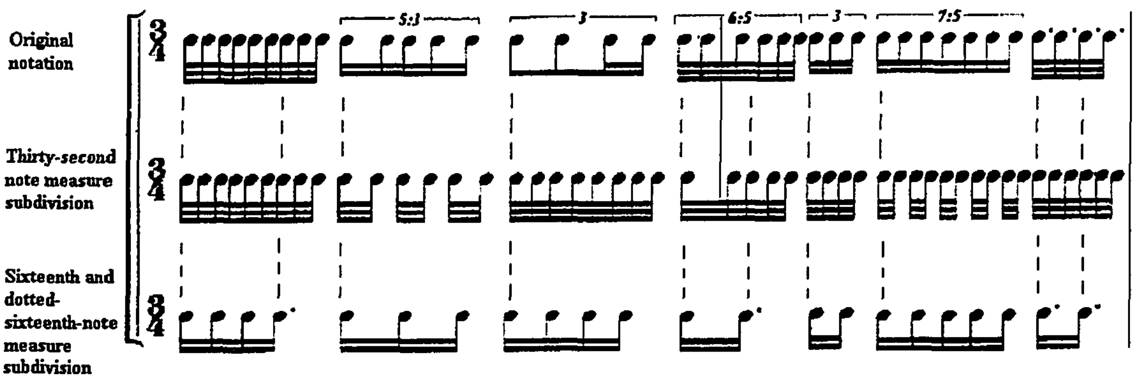
[6:5] 50 x 8 = 400 ÷ 5 = 80

[3] 50 x 4 = 200 ÷ 2 = 100 (this ratio refers to two sixteenth notes = an eighth note)

[7:5] 50 x 4 = 200 ÷ 5 = 40

The passage from one group to the other can be accomplished by maintaining either the sixteenth note or the dotted sixteenth note as reference, according to the need. In Example 3-12, the second layer of the piano in the first two measures are first distributed in regular thirty-second notes, and later grouped in sixteenth and dotted sixteenth notes as the ratios are grouped in the score, in other words, preserving the irregular distribution of the ternary meter. The barline between the two measures in the third staff is omitted in order to help to visualize those groupings.

Example 3-12: Sixteenth and dotted-sixteenth-note groupings of the second layer of the piano part in mm. 1-2 of *Banumbirr* by Michael Finnissy.



The measure subdivision in sixteenth and dotted sixteenth notes helps to bridge the passage from the first nine thirty-second notes to the next [5:3] ratio. The new five sixteenth notes of that ratio should fit in the three original ones that are kept in mind through that subdivision of the measure. The same is applied to the next passage, from the [5:3] ratio to the [3] ratio, where we can maintain the sixteenth note, and from the latter to the next [6:5] ratio, where we can think in one sixteenth and one dotted sixteenth note. I recommend practicing initially the rhythm of unaltered figures with the voice, for example, while tapping sixteenth and dotted sixteenth notes; then try the modified ratios with the same tapping.

The left hand of the piano in the first two measures of this piece presents the least complicated of all layers (Example 3-5). The beginning [7:4] ratio fits in a normal quarter note, therefore, there is no need to calculate a new ratio speed. Because the following

[7:5] ratio happens in the second quarter note of the measure, and it starts a new speed, it could perhaps receive a bit of accentuation. As the dotted barline shows, the ninth thirty-second note of the second layer of the right hand coincides with the initial note of the [7:5] ratio of the left hand, and clearly receives no emphasis. One can choose between emphasizing the contrast between both voices and accentuating the left hand, or minimizing the accentuation of the left hand to obtain a more homogeneous texture.

Since we have already calculated the [7:5] ratio speed for the right hand, and they both alter the sixteenth note, then the speed of the [7:5] ratio of the left hand will be the same: 40; but this information might not be very useful in this layer. Since it is a single line to be played by one hand and it is simpler than the other layers, it seems that practicing against normal sixteenth-note beating is enough to obtain a fluent line.

Although there is no written instruction as we saw in *... above earth's shadow* (1986) in Chapter 2 regarding the rhythmic precision with which the performer is expected to play, in my opinion, the three contrapuntal rhythmic lines presented in the piano part in this first measure clearly indicate Finnissy's choice of flow rather than precision in this piece. The broken lines presented in the score (Example 3-5, m. 1 of the piano part), as in *... above earth's shadow,* give the coincident points of two different lines, but they serve as points of reference, and do not seem to indicate any accentuation in the meter. Hence, when practicing the line as described above, it is important to keep in mind that the goal is to obtain a fluent line. Practicing with the suggested subdivisions should offer a point of reference (goals) to obtain the flow between different ratio speeds, and it is only valid if the continuous character of the piece is not compromised.

The composition has no rest points. There are only a few spots where the piano stops, but the pedal is maintained so harmonics remain vibrating while the other instruments keep playing. We can hardly break the piece into sections; we can find textural contrasts, such as places where there is more rhythmic and melodic activity, or more or less contrapuntal lines. Towards the end, ratios tend to give place to standard rhythmic divisions; in other words, the 3/4 meter is more pronounced, and one can even count it. Overall, the piece is a continuous discourse that transforms itself with no apparent predictable scheme. The rhythmic complexity should not overshadow the entropy created between all elements of the music, but should be understood as part of the process of recreating the piece. The final interpretive choices obey personal performance hierarchies. Ferneyhough comments on Finnissy's *Song 9* can be applied here in terms of such choices:

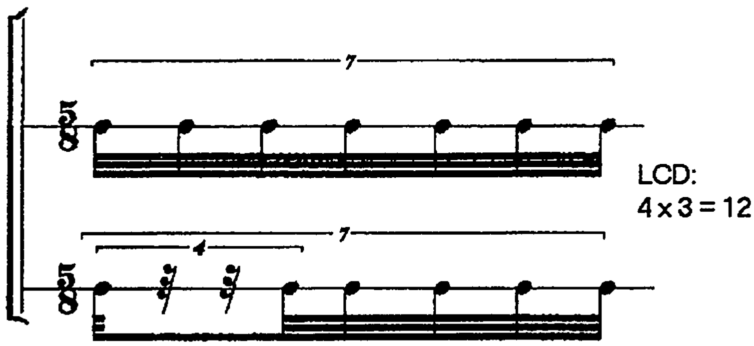
> The proportions specified (fourteen beats to be performed in the elapsed time of nine) can have little audible reality for the listener; more important for him are those aspects of the texture lying beyond the organizational scope of such techniques–extremes of register and the *'cantus firmus'* effect of a number of strategically placed *tenuto* notes being the most obvious among these. In the absence of more precise (verbal) instructions as to the interpretational context, it is for the player to approach the task of resolving the proliferating ambiguities left open by the score, modulating, but also significantly restructuring them in and through the filter mechanisms of his own personal repertoire of performance strategies.

Calculating the Speed of a Bottom Ratio in a Nested Rhythm

We will use *La Chute d'Icare* by Ferneyhough to learn how to find the speed of a bottom ratio in a nested rhythm. Remember that, in the second chapter, we calculated the

LCD as if the sub-ratio of second beat of *La Chute d'Icare* by Ferneyhough were a second rhythmic layer of the primary ratio. The example is reproduced in Example 3-13.

Example 3-13: Second beat of *La Chute d'Icare,* clarinet part–two ratio levels superimposed.



Calculating the change of speed of the sub-ratio [4:3] can help to obtain more precision when practicing the change from the sub-ratio to its [7:4] upper-ratio. The original metronome marking in *La Chute* is 56 for the eighth note. The speed of the thirty-second note in the first beat is 224, since the thirty-second note is four times as fast as the eighth note. However, in the second beat, the "new" thirty-second of the first-level ratio will be seven times as fast as the eighth; hence its speed is: 7 x 56 = 392 beats per second.

Remember that in the second-level ratio of the second beat, we have four thirty-second notes replacing three of the same kind. Three thirty-second notes of the first-level ratio count for a dotted sixteenth note. The dotted sixteenth note will then have a speed of 130.66 (392 ÷ 3). If four thirty-second notes replace three in the second-level ratio, they will be played in the same speed as a dotted sixteenth note of the first-level ratio; hence the 130.66 per minute.

Once we establish the speed of the second-level ratio, we will use the new metronome marking to learn the gesture of the second beat in relation to the first beat. In the same way that basic ear-training works with two different techniques–dictation and sight-reading–two or more ratio levels have to be incorporated in an updated ear-training for musicians. We usually compare the process of learning music notation to learning how to read words. We first start speaking, and then reading. Cognition of music does not differ. We listen, memorize sounds, imitate them, and only then do we understand those sounds by writing them out. In such a new texture resulting from the polyrhythms proposed by the New Complexity School, performers have to create that atmosphere of learning music in beginning stages. Sight-reading complex rhythms is not possible, at least not today.

Practicing the change from eight notes in the first beat to seven notes in the second beat at the metronome marking of 56 is not complicated, as I said before. Once you get that change with precision, change the metronome to the second-level ratio [4:3] speed. There is no time to adapt to the first altered speed [7:4] before getting into the second level of alteration. However, if we practice the second-level ratio [4:3] in the metronome marking of approximate 130, and then incorporate the new speed to that of the [7] first ratio, in other words, "catching" the speed of the seven-note ratio on the fourth note, we have the sound picture of how that change operates.

As Schick observed, Ferneyhough himself is against the practice of changing metronome markings to approach his notation of nested rhythms. "In rehearsal

Ferneyhough clearly expressed his desire that the performer not translate polyrhythmic composites into shifting tempi. He feels that polyrhythms seen as shifting tempi imply a reorientation of the overall metrical point of view. And, of course, there is a big difference between changing meters and changing speeds." But as a performer, Schick adds: "Nevertheless, as a stage in the learning process, this technique can be very valuable."[31]

Speaking about Schick's approach to one passage of *Bone Alphabet*, Weisser[32] recalls Ferneyhough's criticism of performers who make no differentiation between tempo change and metric change when approaching irrational rhythms. Weisser says: "Given Ferneyhough's comments on how performers have approached irrational meters (thinking of them as tempo rather than metrical changes), one would imagine him being not wholly quiescent with this technique."[33]

For the interpreter, however, calculating the speed of the "new," transformed figures notated as tuplets in chains can be a helpful tool to understand and practice the changes of ratios, and once a performer grasps the speed change and practices it with a metronome, ratio changes will be subconsciously absorbed.

Combining Strategy 1 and 2 in a Nested Rhythm

We will now combine strategies 1 and 2 as we did earlier in this chapter with *Banumbirr* by Finnissy. The difference is that, in Finnissy, we were dealing with a single ratio; therefore, the relative speed was the given meter. Here in *La Chute d'Icare* by

[31] Schick, 139-40.
[32] Weisser, 206.
[33] Weisser, 230.

Ferneyhough, we are dealing with a nested ratio; therefore, the reference to the bottom ratio will be its upper-ratio speed.

We learned that the new speed of the entire [4:3] second-level ratio of Example 3-13 is 130.66. We can practice with the metronome on the new speed in combination with the two-imaginary-layer grid we had built in Chapter 2 showing the degree of conversion and diversion between different level ratios (see Example 3-14).

Example 3-14: A twelve-increment scale to calculate the degree of conversion and diversion among ratios in the second beat of *La Chute d'Icare* by Brian Ferneyhough, clarinet part.

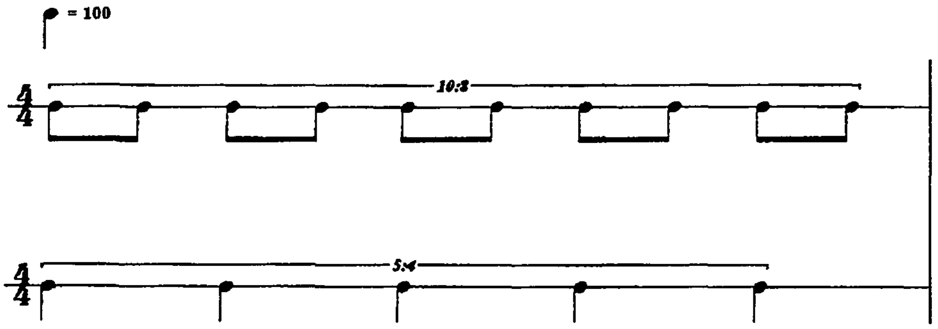
I tried, for instance, tapping the first three thirty-second notes of the [7] first-level ratio in the metronome marking approximate to the speed of 130, while saying the rhythm of the [4:3] second-level ratio. The result is that the first layer (tapping) will give you the speed of the first ratio [7:4]; the one that is hard to catch after we pass through the sub-ratio speed. In other words, when you turn off the metronome, you can continue the gesture of the whole second beat of the piece (clarinet solo part) smoothly, because your brain, through practicing the two speeds at the same time, keeps the memory of the two-ratio relationship. Of course, during the real performance, it is impossible to think about changing metronome speeds, but it is important to listen to how the passage should sound before being able to translate separate parts into fluent music. Practicing in a slower tempo as in conventional study is also recommended until one obtains the accuracy and coordination to reach the required speed. The passage discussed above results in an uneven rhythm that would be impossible to notate precisely in conventional writing.

Chapter 4 –Strategy 3: Finding New Metronome Markings in Irrational Meters

We will now examine a piece by Ferneyhough that uses irrational meters, in other words, time signatures referring to rhythmic figures that divide the whole note into non-standard subdivisions. According to Weisser, "Irrational lengths are based on triplet or quintuplet subdivisions of the normal beat, so what looks like an eighth note in a 1/10 bar has four-fifths of its normal value in 1/8."[34] In order to better understand it, we can examine the relationship between the eighth notes of the 1/10 and 1/8 bars, and compare them with the normal eighth notes and the altered ones of a [10:8] ratio. It is easier to visualize if we translate the [10:8] ratio into the $\frac{8}{10}$ fraction. If the [10:8] ratio refers to eighth notes, a [5:4] ratio will refer to quarter notes, and their fractions are equivalent: $\frac{8}{10} = \frac{4}{5}$; they both occupies the same time-space, and both figures have four-fifths of their respective normal values, as we can see in Example 4-1.

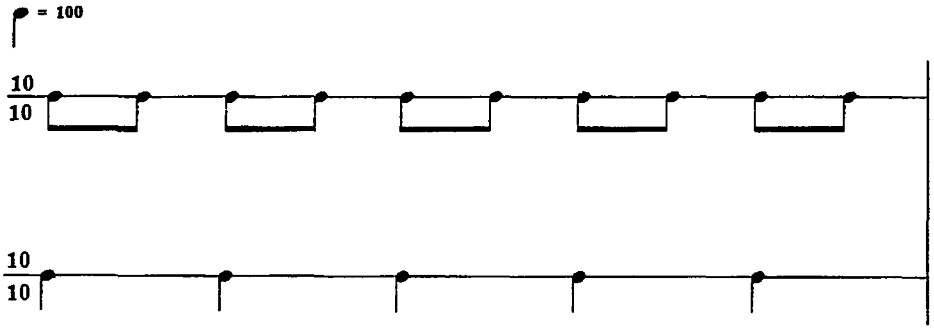
[34] Weisser, 206.

Example 4-1: Equivalence between a [10:8] and a [5:4] ratio, altering eighth notes and quarter notes, respectively.



If we translate Example 4-1 into an irrational meter, we have a 10/10 bar, as shown in Example 4-2.

Example 4-2: Quintuplet eighth and quarter notes translated into irrational meters.

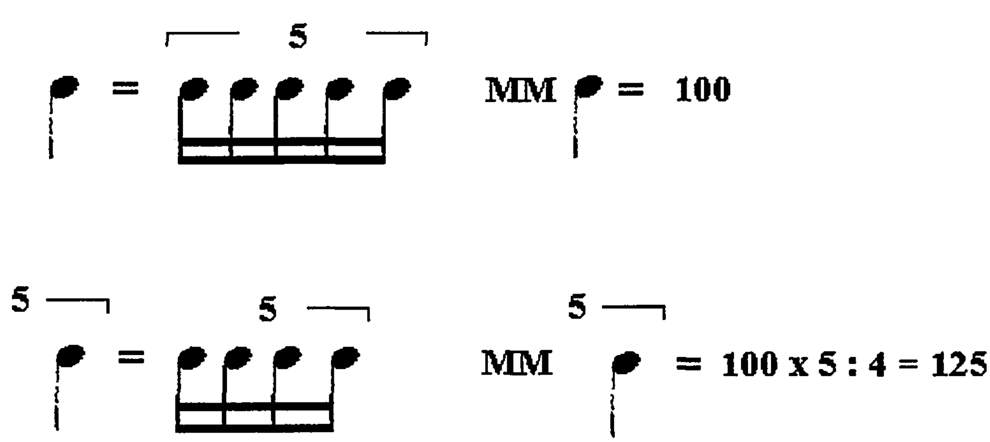


In a 10/10 bar, the bottom number 10 substitutes a normal eighth note, and it is equivalent to a quintuplet eighth note (consequently, the new quarter note is equivalent to a quintuplet quarter note). If we have a bottom number 20, it refers to a quintuplet sixteenth, and a bottom number 12 to a triplet eighth, and so on.

The crucial question here is how we can find the speed of the new notes in an irrational meter. We can think in terms of metronome speeds so we can understand it from a more practical point of view. In Example 4-1, we have the metronome marking of 100 for a quarter note, and we want to find the new quarter note speed for the 10/10 time signature. In order to find it, we have to ask ourselves the same question Weisberg suggests to find the speed of a note altered by a tuplet. He proposes two ways to calculate metric modulation: the "small method" and the "large method."[35]

We want to find the speed of a quintuplet quarter in the MM = 100 above. In the "small method," we have to find which quintuplet unit fits into a quintuplet quarter, which in this case is a quintuplet sixteenth (Example 4-3).

Example 4-3: Calculating change of speed from quarter note to quintuplet quarter note. Weisberg's small method: quintuplet sixteenth notes fitting into a quintuplet quarter.



[35] Weisberg, 45.

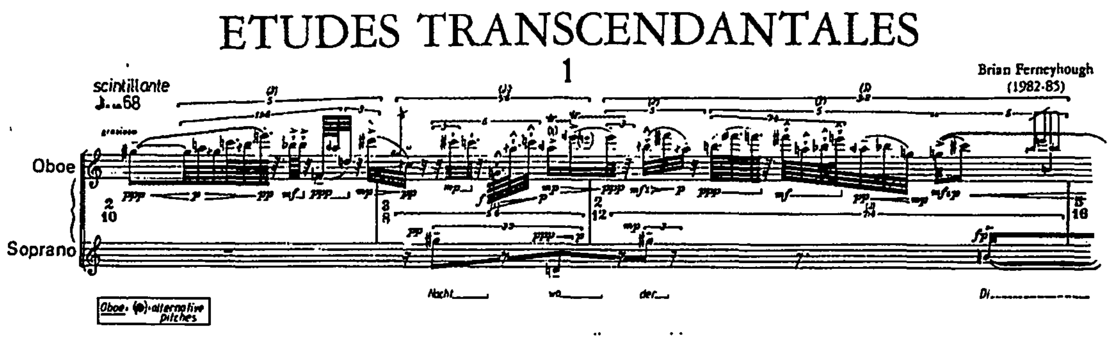
Therefore, we multiply 100 by 5, and we find the speed of a single quintuplet sixteenth note: 500 beats per minute. Since we have four quintuplet sixteenth notes in a quintuplet quarter, we divide 500 by 4: $500 \div 4 = 125$. The speed of the quarter note of the 10/10 bar will be 125. If we invert the operation here, we can clearly see what Weisser means by "four-fifths of its normal value;" the speed of the quarter note of a 10/10 bar (125) is four-fifths of the speed of the normal quarter note (100): $125 \times \frac{4}{5} = 100$. If we want to find the speed of the eighth note, we just multiply the speed of the quarter note by two: $125 \times 2 = 250$.

The "large method" should give us the same result. According to Weisberg, to find the new metronome speed for the quintuplet quarter note of the example above through this method, we should ask which normal unit a quintuplet quarter fits into. The answer is a whole note. Since the whole note speed is $100 \div 4 = 25$, the quintuplet quarter is five times as fast as the whole note. Its speed is expressed by the operation: $25 \times 5 = 125$.

Alternating Normal and Irrational Meters

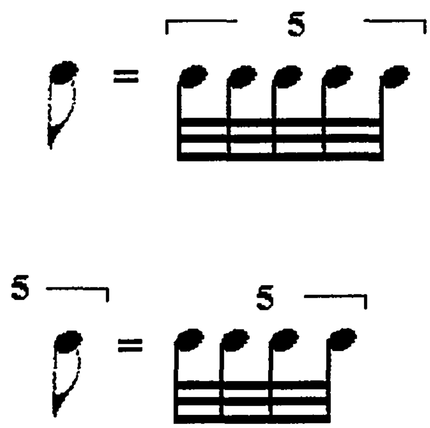
In *Etudes Transcendantales 1* (1987) for flute, oboe, harpsichord, cello, and soprano, Ferneyhough alternates normal and irrational meters. We can see the first three measures of the piece in Example 4-4.

Example 4-4: ***Etudes Transcendantales 1*** **by Brian Ferneyhough, mm. 1-3.**



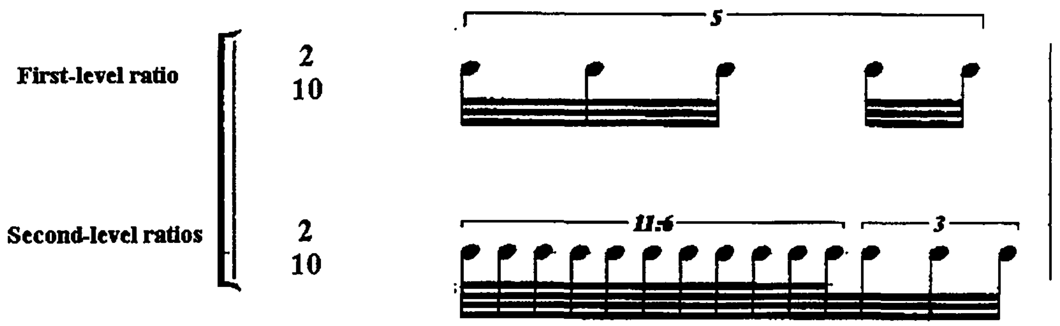
The metronome marking is approximately 68 for a sixteenth note. The first measure presents a 2/10 time signature. Remember that number 10 refers to a quintuplet eighth note. The speed of a normal eighth note is: 68 ÷ 2 = 34. In order to find the speed of a quintuplet eighth note using the "small method," we have to imagine, as we did before, the quintuplet unit that fits into a normal eighth note: a quintuplet thirty-second note. Hence, the speed of the eighth note of the 2/10 bar will be: 34 x 5 = 170 ÷ 4 = 42.5 (Example 4-5).

Example 4-5: Calculating change of speed from eighth note to quintuplet eighth note. Weisberg's small method: quintuplet thirty-second notes fitting into a quintuplet eighth.



This information is very useful in the first measure of the piece, as we can see in the score, since the first beat presents a single eighth note, and the second beat embeds a series of ratios that fits into an eighth note. In the first-level ratio, number five refers to thirty-second notes. The [11:6] second-level ratio embeds a dotted sixteenth note of the first-level ratio (three thirty-second notes), and the [3] second-level ratio alters two thirty-second notes of the first-level ratio (see Example 4-6).

Example 4-6: First-level ratio subdivision into secondary ratios–second eighth note of m. 1 of *Etudes Transcendantales 1* by Brian Ferneyhough.

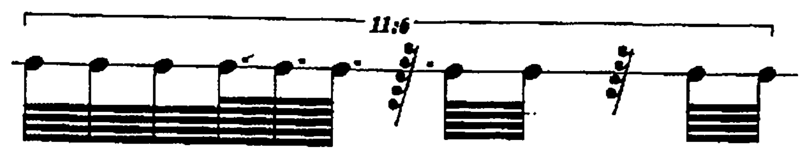


In order to find the speed of the secondary ratios, we first have to find the metronome speed for the modified thirty-second note of the first-level ratio. Hence, this speed is calculated by multiplying the speed of the eighth note of the 2/10 bar by five: 42.5 x 5 = 212.5. The speed of the [11:6] ratio is calculated by dividing that result by three, so as to find the speed of the dotted sixteenth note: 212.5 ÷ 3 = 70.83. The speed of the [3] ratio is the speed of a sixteenth note of the first-level ratio. Therefore, we have to divide the speed of the thirty-second note we obtained above by two, as follows: 212.5 ÷ 2 = 106.25.

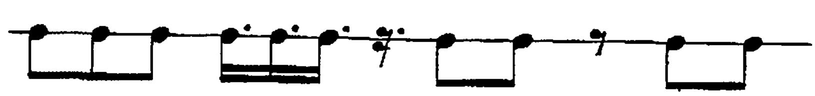
In Chapter 3, when we examined the second beat of *La Chute d'Icare* (Example 3-13), we practiced the change of speed from the second-level ratio back to the first-level ratio using the metronome on the speed of the second-level ratio. In the [11:6] second-level ratio here, we face an extra problem: the rhythm in that ratio is not even. As we can see in Example 4-7, we have sixty-fourth notes and dotted one-hundred-twenty-eighth notes. It is already hard to play eleven thirty-second notes in the metronome speed of approximately 70.86, the speed of the entire ratio. It is recommended to start practicing the rhythm of that ratio in a much slower metronome speed. I don't think that making a grid using LCD will be helpful here, since the rhythm inside the ratio in this case is more complicated than the example we observed in *La Chute*. In order to make the rhythm more familiar, I suggest 'translating' the original figures as they are presented in the score in [11:6] ratio into larger figures, as in Example 4-7.

Example 4-7: Rhythm of [11:6] ratio of m. 1 of *Etudes Transcendantales 1* by Brian Ferneyhough: original writing, and using larger rhythmic units instead.

Original writing

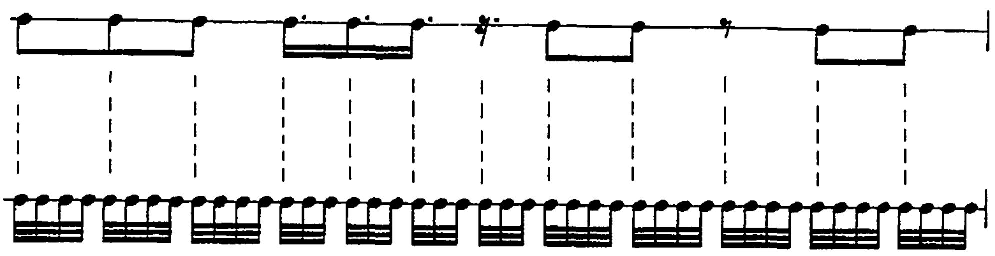


Larger figures



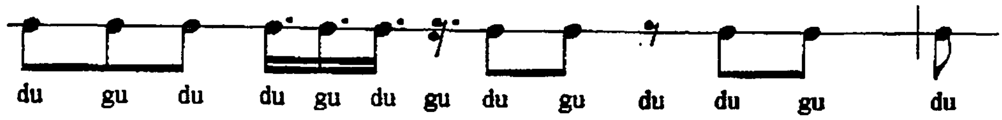
I believe that reading the rhythm with larger figures makes it more understandable in the early stages of learning. In that way, we can subdivide the rhythm into smaller units so that we can better see the rhythmic relationship between the figures (Example 4-8).

Example 4-8: Rhythmic subdivision of the [11:6] second-level ratio of m. 1 of *Etudes Transcendantales 1* by Brian Ferneyhough, written in larger figures than the original.



The next step is designating syllables to each note of the [11:6] ratio, including the rests, as in Example 4-9. We should start practicing saying the syllables with a slower metronome speed. I suggest setting the metronome in about half of original speed for the ratio. Hence, we can start with the metronome on 35 beats per minute. I will use here the syllables 'Du' and 'Gu' as in a light double tonguing, and will include here the first note of the next ratio. It is also possible, if one prefers, to tap with the fingers instead of articulating the rhythm with the voice.

Example 4-9: Using syllables to practice the rhythm of the [11:6] second-level ratio of m. 1 of *Etudes Transcendantales* 1 by Brian Ferneyhough.



Once we get used to the speed alterations inside the ratio, we can leave out the rests, always maintaining the correct rhythmic space for them, but without pronouncing their designated syllables. The original articulation will help to speed up the metronome gradually. Although the slurs make the requested speed possible (articulating the rhythm in approximately 70.86 beats per minute is, at least for me, impossible), practicing it with articulation in an earlier stage and a slower pace makes the rhythm more understandable.

Establishing the correct rhythmic relationship between the figures as described above will help the performer to express the unevenness of the material presented here. Finding the metronome marking for each secondary ratio to practice them separately offers technical and intellectual support for the performer, and it builds a frame of reference that is hard to see just by looking at the score.

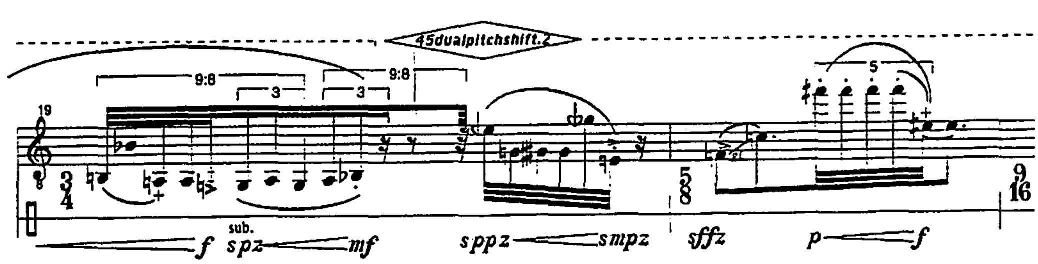
What remains to be solved in this first measure is how to perform the consecutive ratios fluently. Since we cannot count on a grid here, I suggest practicing the simple rhythm of five thirty-second notes of the first ratio with the metronome on its speed: 42.5 beats per minute. The [3] second-level ratio will be easy to fit in. After practicing the more complicated [11:6] ratio as suggested above, we can practice both secondary ratios with the metronome on the speed of the first-level ratio. That should also be exercised in a slower tempo as we did before. I think the result here might not be so precise, but the relationship between the speeds of the figures will become clearer through this process. The same work should be done with the ratios that follow throughout the music, and the whole procedure can take months. It is part of the conception of art in the New Complexity.

Chapter 5 - Strategy 4: Calculating the metronome marking of the last sub-ratio in a nested rhythm

The Brazilian composer Arthur Kampela uses a technique he calls "micro-metric modulation" derived from Carter's metric modulation. His idea is to give the performer the chance to adapt to speed changes in nested rhythms through writing consecutive different ratios (and sub-ratios) sharing the same metronome speed.

In *Quimbanda* (1999), for electric guitar, we see an example of adjacent ratios sharing the same speed. In this example, the nested ratios [9:8 – 3] and [3 – 9:8] in m. 19 are intentionally arranged so the bottom [3] adjacent ratios share the same sixteenth-note speed (see Example 5-1). Notice that the [9:8] first-level ratio refers to thirty-second notes and not to sixteenth notes.

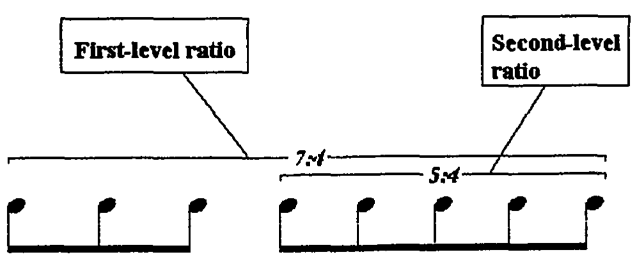
Example 5-1: *Quimbanda,* for electric guitar by Arthur Kampela, m. 19–bottom [3] ratios sharing the same speed.



Because Kampela's notation doesn't always make the common speed obvious, we will need to learn how to find a new metronome marking of a sub-ratio in a nested rhythm and compare it with the adjacent ratio of a different chain. The technique used in this chapter will not only be applied in Kampela's music, but will also allow more flexibility to deal with altering ratio speeds, offering an alternative to Strategy 2 to calculate new metronome markings in the music of Ferneyhough and Finnissy as well.

We will find the speed of the last sub-ratio in a nested rhythm using the algebraic principle of commutative and associative properties of the multiplication operation. Kampela reminds us of the algebraic principle that says that the order in which two numbers are multiplied does not affect the product.[36] This concept is important when we deal with micro-metric modulation, since we will use the basic multiplication operation between fractions to find the speed of the last sub-ratio. We can think of a [7:4] ratio as a $\frac{4}{7}$ fraction, meaning seven rhythmic figures replacing four of the same kind. We add a [5:4] second-level ratio to the first-level one, as we can see in Example 5-2:

Example 5-2: Two-level ratio chain.

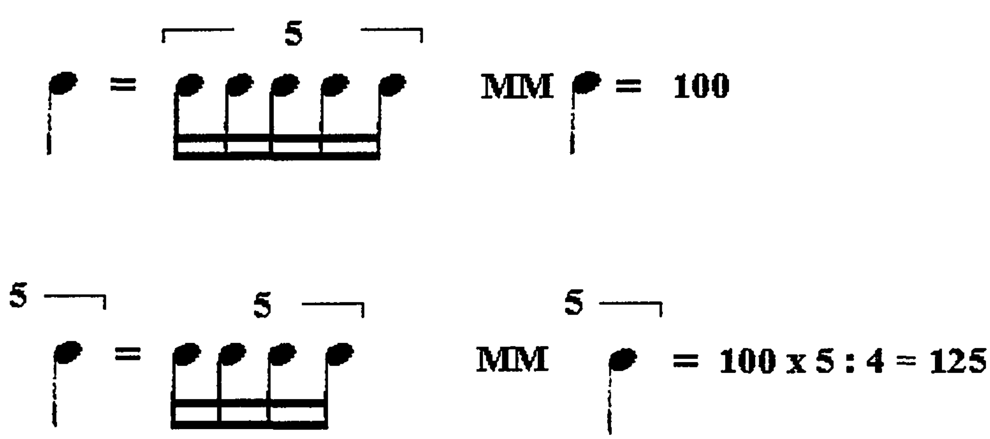


Kampela says that by multiplying the fractions obtained from a series of ratios in a nested rhythm we can find the final speed of a bottom ratio. For the chain in Example 5-2, the operation would give us the following result: $\frac{4}{7}\times\frac{4}{5}=\frac{16}{35}$. The resulting fraction

[36] Kampela, "Micro-Metric Modulation," 37.

staying by itself does not tell us much about the speed, but it expresses $\frac{16}{35}$ of the new metronome marking of the [5:4] bottom ratio. If we assume that the original metronome marking here is 100 for a quarter note, we can obtain the new metronome marking from that fraction. We can find the new metronome marking by multiplying the original quarter note speed (100) by the denominator and dividing it by the numerator of the fraction ($100 \times 35 = 3500 \div 16 = 218.75$–new quarter note metronome marking). This operation is shown in Kampela,[37] and it can be more easily understood by looking at a simpler operation using integer values, as we did in Chapter 4 using Weisberg's "small method."[38] Remember the example provided in that chapter and reproduced in Example 5-3 to illustrate Weisberg's "small method" to calculate metric modulation:

Example 5-3: Quintuplet sixteenth notes fitting into a quintuplet quarter.

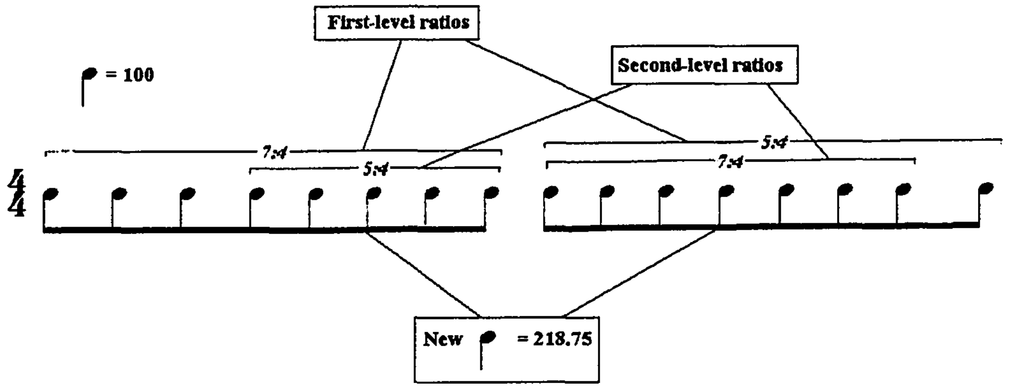


[37] Kampela, "Micro-metric modulation", 24.
[38] Weisberg, 45.

Look at Example 5-3 above where the ratio for the quintuplet quarter note is 5:4 (five quarter notes replacing four regular ones), resulting in the fractional number $\frac{4}{5}$, and compare with the operation applied in Example 5-2. We calculated the new metronome marking for the fractional number $\frac{16}{35}$ above by multiplying the original MM = 100 by the denominator 35, and multiplying by the numerator 16, resulting in the new MM = 218.75. It is exactly what we have done with the quintuplet quarter note. We multiplied the MM = 100 by the denominator 5, and divided it by 4, resulting in the new MM = 125. Since the operation is obtained directly from the metronome marking and the fraction, for fractional numbers, I'd rather use the "small" as opposed to the "large method."

The new metronome marking speed is important in micro-metric modulation, as we can see in Example 5-4 that shows two nested rhythms whose ratios exchange positions; in other words, in the first chain of ratios, we have [7:4] upper-ratio and [5:4] sub-ratio, and in the second chain, we have the [5:4] ratio in the top and the [7:4] ratio in the bottom. The commutative and associative properties show mathematically how, no matter the position in which the ratios are presented, they share the same final speed.

Example 5-4: Micro-metric modulation between two-level ratios.



Final speed for both [5:4] and [7:4] second-level ratios: $\frac{4}{7}\times\frac{4}{5}=\frac{4}{5}\times\frac{4}{7}=\frac{16}{35}$

By being aware of the new metronome marking that can be found from the resulting fractional number of the multiplication operation, the performer will be able to practice subdividing the quarter note into eighth notes from the [5:4] sub-ratio in the first chain, and that speed will be maintained up to the [7:4] sub-ratio in the beginning of the next chain.

Kampela explains: "The concept of continuation is crucial if we want to develop a theory of micro-metric modulation. In order to link a rhythmic figure (or previous ratio) to a new one, it is necessary to have equivalent rhythmic speeds on both sides of the ratios-chain. This algebraic principle is known as commutative and/or associative property. It states that the terms of an operation will produce the same result independent of the orders of its factors."[39] He adds: "The commutative and associative properties guarantee not only the mathematical background for the numerical results but, more

[39] Ibid., 6.

important musically, they make it possible to access a diverse array of rhythmic configurations."[40]

Adjacent Ratios Sharing the Same Speed

Kampela uses the micro-metrical modulation technique in his String Quartet[41] to deal with a sudden change of ratio such as the one examined in Ferneyhough's music of Chapter 2 (Example 2-10), where the sub-ratio happens in the beginning of the beat. Discussing his compositional procedures, Kampela says he takes into account, "On one side, purely structural considerations, which are more related to rhythmic envelopes and the distribution and connection of sound materials; on the other," he adds, he considers "the implied need to overcome instrumental constraints when accessing extended-technique effects or new timbral nuances. This struggle between compositional hierarchies and instrumental *limitations* is a constant preoccupation of my music."[42]

By "rhythmic envelopes" he means nested rhythms, irrational meters,[43] and changes of metronome markings. The micro-metric modulation gives the performer a level of subdivision that works as a bridge between two different groups of ratios. With that technique, adjacent ratios share the same metronome speed and, consequently, the subdivisions are maintained from ratio to ratio.

Kampela says:

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[40] Ibid., 37

[41] Kampela, *A Knife All Blade* for String Quartet (partial fulfillment, DMA diss., Columbia University, 1998).

[42] Kampela, "*A Knife All Blade*: Deciding the Side Not to Take," *Current Musicology* 67-8 (Special Issue 2002): 169.

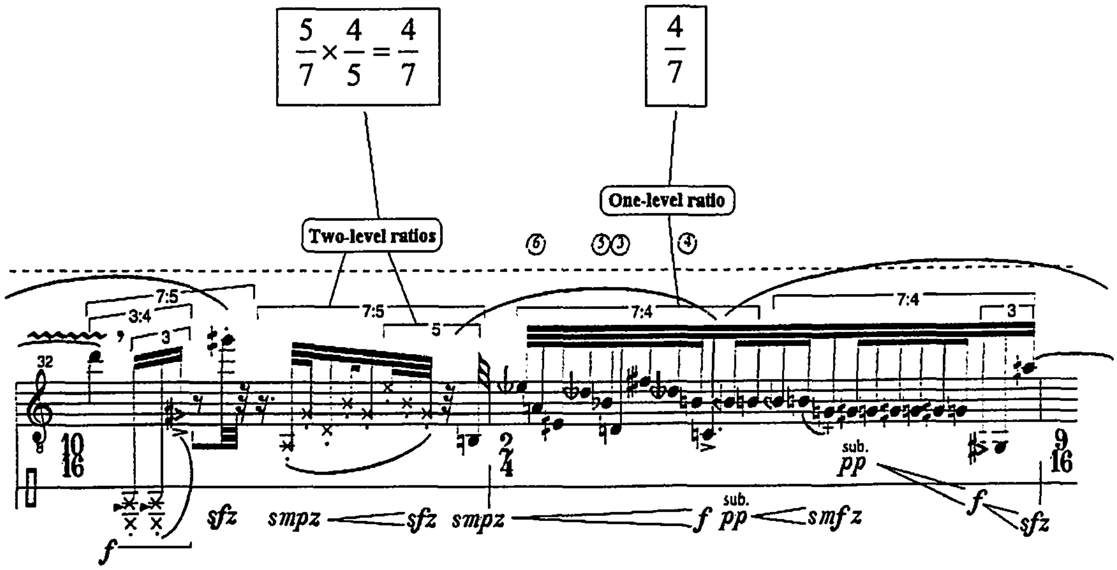
[43] Kampela prefers the term "non-integral" meter. Ibid., 192.

> The micro-metric modulation presents specific ways to work with complex rhythmic material. Its primary intention is to allow the performer to see rhythmic relationships that are not easily discernible at first sight, as they are "buried" under contrasting rhythmic configurations in the music surface. I am also implying that you *cannot work* with complex rhythms adopting an arbitrary permutational standpoint . . . It all springs from motoric constraints that are "conditioned" or "enveloped" by physic laws. So even if the brain cannot handle the "immediate math" of a new rhythm (it helps to know that a particle of what you've just played is in the same speed of what will happen next, rhythmically speaking), the composer–being aware of a common-denominator relationship between two rhythmic points–can provide a feasible route for the "hands to handle".[44]

In Example 5-5 of *Quimbanda*, the common speed between the ratios is not as obvious as in the Example 5-1. The ratios of the [7:5 - 5] two-level group of m. 32 are translated into the following fractions: $\frac{5}{7}$ (since 5 sixteenth notes are replaced by 7); $\frac{4}{5}$ (4 sixteenths replaced by 5). If we multiply the fractions of the two-level group of ratios, we obtain the final speed of the [5] secondary ratio. The resulting fractional number shows that the [5] second-level ratio in m. 32 shares the same speed with the [7:4] ratio of m. 33.

[44] Ibid., 192.

Example 5-5: *Quimbanda* for electric guitar by Arthur Kampela, m. 32-3 – [7:5 – 5] two-level group of ratios and [7:4] ratio sharing the same final speed.

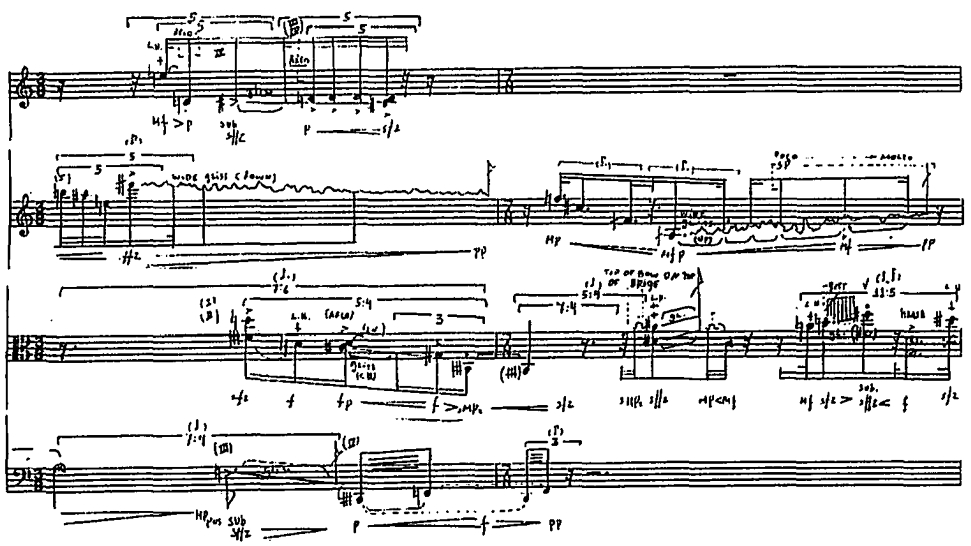


Notice that the micro-metric modulation that occurs between the sub-ratio [5] of m. 32 and the ratio [7:4] of m. 33 in Example 5-5 is prepared by the [7:5] first-level ratio at the beginning of m. 32, and it is followed by a [7:4] first-level ratio in the second half of m. 33. This example shows how the [5] second-level ratio–the pivot point where the micro-metric modulation occurs–works as a bridge between two different speeds: the [7:5] first-level ratio of m. 32, and the [7:4] ratios in m. 33. That gives the performer the opportunity to accommodate him/herself to the change.

The metronome marking here is 77 for the quarter note. That speed expresses $\frac{4}{7}$ of the new metronome marking of the [5] bottom ratio at the end of m. 32 and the [7:4] ratio in m. 33. We can find the new metronome marking by multiplying the original quarter note speed (77) by the denominator and dividing it by the numerator of the fractional speed (77 x 7 = 539 ÷ 4 = 134.75–new quarter note metronome marking).

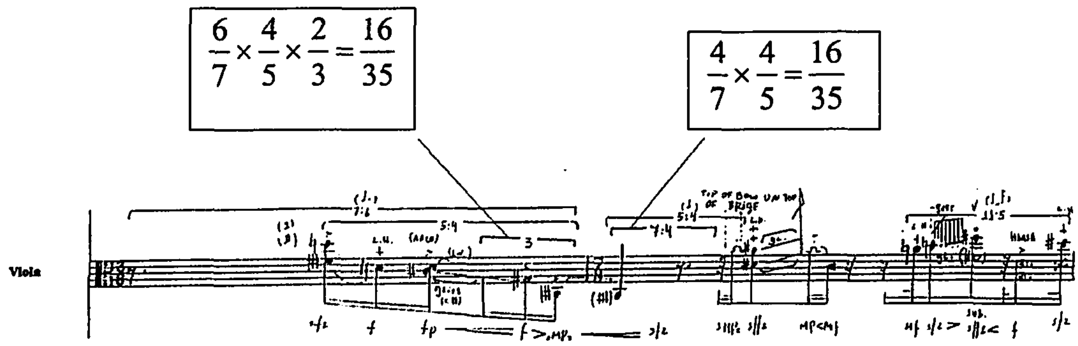
Another example of micro-metric modulation occurs in mm. 155-56 of *A Knife All Blade* in the viola part (see Example 5-6).

Example 5-6: *A Knife All Blade* for String Quartet by Arthur Kampela, mm. 155-56.



Look at the first group of ratios in the viola part in m. 155 [7:6 - 5:4 - 3]. Those ratios are translated into the following fractions: $\frac{6}{7}$; $\frac{4}{5}$; and $\frac{2}{3}$. The second group of ratios presented in m. 156 has only one sub-ratio [7:4] under the first-level ratio [5:4]. Example 5-7 shows the arithmetic that gives the final speeds of the last ratio [3] of the chain to which it belongs, and that of the [7:4] second-level ratio of the beginning of m. 156. The final speed of the second-level ratio (which is presented at the beginning of m. 156) is the same final speed of the third level ratio of the previous chain given, at this time, at the end of the beat. This procedure gives the performer the chance to "adapt" to the new chain by maintaining the same speed of adjacent sub-ratios.

Example 5-7: Final speed of the chain of ratios in the viola part of *A Knife All Blade* by Arthur Kampela, m. 155-56.



The metronome speed here is 45 for the quarter note. That metronome marking expresses $\frac{16}{35}$ of the new metronome marking of the bottom ratio in both chains above. In other words, the fractional number will give the same metronome marking to the bottom ratio in each of the chains. We will find the new metronome marking by multiplying the original quarter note speed (45) by the denominator and dividing it by the numerator of the fractional speed (45 x 35 = 1575 ÷ 16 = 98.4375–new quarter note metronome marking) as we did in *Quimbanda.*

In *A Knife All Blade*, the speed of the sixteenth notes in both [3] third-level ratio of m. 155 and the [7:4] second-level ratio of m.156 will be the same. Maintaining the sixteenth note subdivision in the beginning of m. 156 makes the passage from one ratio to the other smooth. However, the nested ratios here are minor problems compared with what follows.

After the [7:4] second-level ratio of m. 156 in the viola part, we have the time space of a sixteenth note belonging to the [5:4] first-level ratio that, in turn, leads to regular subdivisions of the 7/8 time signature. The only other instrument in action here is the second violin that does not help the viola player to return to the regular 'beat' after performing series of nested ratios (Example 5-6). Although the second violin line has no ratio alterations, the dotted note subdivisions of the measure and the "wide glissando" required by the score obscure the sense of meter.

Remember that the metronome marking we found for the bottom ratios of the viola part in mm. 155-56 is 98.4375. We know that the speed of the sixteenth note will be four times as fast: 98.4375 x 4 = 393.75. This information has no use for practice purposes, since a metronome won't give us such a speed, but once we calculate the speed of the regular sixteenth note and that of the first-level ratio, we can see that the intention of the composer here is to obtain a written-out deceleration.

In order to find the speed of the sixteenth note in all levels, we have to find each metronome marking as well. We know that the regular MM = 45, and the metronome speed of the second-level ratio is 98.4375. Here is the arithmetic for the [5:4] first-level ratio: 45 x 5 = 225 ÷ 4 = 56.25. Compare the different sixteenth-note speeds calculated in Example 5-8:

Example 5-8: Rhythmic deceleration of the sixteenth note in the viola part in m. 156 of *A Knife All Blade* by Arthur Kampela from the [7:4] second-level ratio to the [5:4] first-level ratio, and to the regular (non-altered) division.

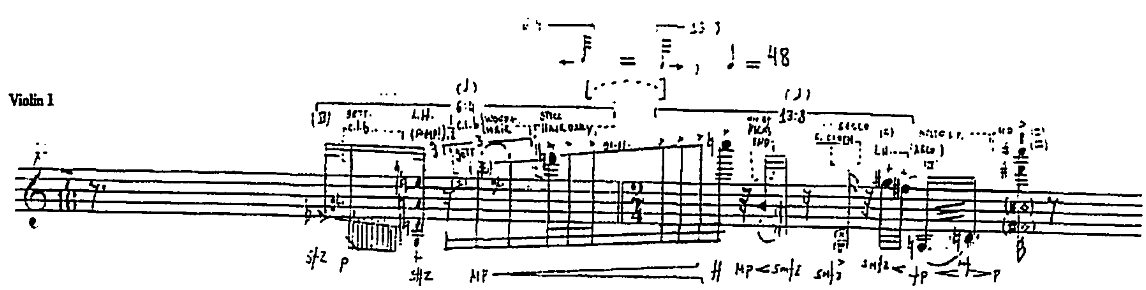
Sixteenth note speed in the [7:4] second-level ratio:	98.4375 x 4	=	393.75
Sixteenth note speed in the [5:4] first-level ratio:	56.25 x 4	=	225
Regular sixteenth note speed:	45 x 4	=	180

Although the ensemble is a string quartet, a conductor here would be of a great help, and the part to focus on should be the second violin, where it is possible to maintain a regular sixteenth note subdivision. In any case, for the viola player, it is important to understand the relationship between the different speed levels of his or her music part; otherwise, it would be impossible to figure out the written-out flexibility of the rhythm. Understanding that relationship is more important than precision.

Accessing a New metronome Marking Using Ratios Sharing the Same Speed

In Part C–Proposition II of *A Knife All Blade,* Kampela prepares a metronome-marking change using ratios sharing the same speed. Look at Example 5-9, where the metronome speed in m. 20 is 52 for a quarter note, and it changes to 48 in m. 21.

Example 5-9: ***A Knife All Blade*** **by Arthur Kampela, first violin part, mm. 20-1.**



The "micro-metric modulation" is indicated above the staff. It says that the thirty-second note belonging to the [6:4] first-level ratio in m. 20 is maintained in the [13:8] ratio in m. 21. In order to understand how it occurs, we have to calculate the metronome speed for those ratios according to their respective metronome markings. In this example, we won't find the same resulting fractions as we did in Example 5-7, but we'll still find ratios sharing the same speed.

We obtain the $\frac{4}{6}$ fractional number for the [6:4] first-level ratio in m. 20. Since we have MM = 52, in order to calculate the new metronome marking for that ratio, we have to make the following operation: 52 x 6 = 312 ÷ 4 = 78. Therefore, the new metronome marking for that ratio is 78.

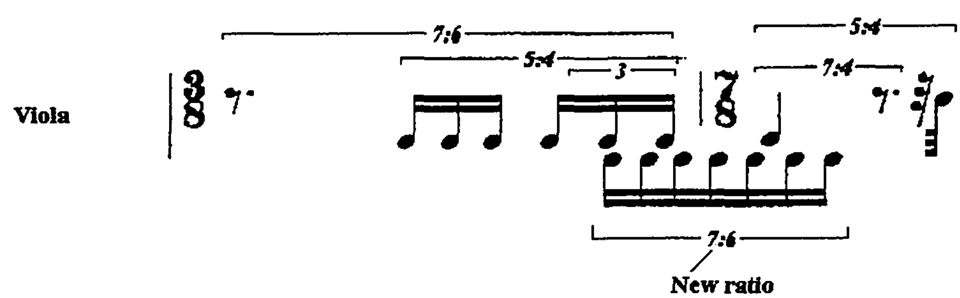
We follow the same procedure for the [13:8] ratio in m. 21. Since we translate that ratio into the $\frac{8}{13}$ fractional number, and we have MM = 48, we obtain the new metronome marking for that ratio with the following operation: 48 x 13 = 624 ÷ 8 = 78. Although speed similarities between the ratios here are hidden beneath the surface, since their fractional numbers are not the same, the notation of the micro-metric modulation is very precise, and the new metronome marking of the piece is accessed through it. In this example, the entire [13:8] ratio embeds a quarter note in MM = 48. The passage to the new metronome marking is helped by the micro-metric modulation.

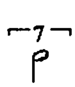
Obtaining New Subdivisions Between Two Adjacent Ratios

Occasionally, Kampela adds a new ratio between two adjacent ratios sharing the same final speed, furthering even more the possibility of obtaining meter alterations. He explains: "Starting with the notion of "prolongation," in which rhythms that pertain to different rhythmic configurations present a common denominator speed, we can think of subdivisions occurring halfway between ratios that belong to distinct metric hierarchies."[45]

Pretend that we create a new rhythmic layer originated in the viola line we analyzed in *A Knife all Blade* in Example 5-7. Here is what Kampela proposes: the possibility of creating a new ratio between two different ones that share the same final speed. In Example 5-7, the [3] third-level ratio of m. 155 has the same speed of the [7:4] second-level ratio of m. 156. The [7:6] new (arbitrary) ratio in Example 5-10 is created between both.

Example 5-10: Rhythm of the viola part of *A Knife All Blade* by Arthur Kampela, mm. 155-56 with a new (fictitious) [7:6] ratio created between the two adjacent ratios sharing the same speed–bottom ratios [3] and [7:4].

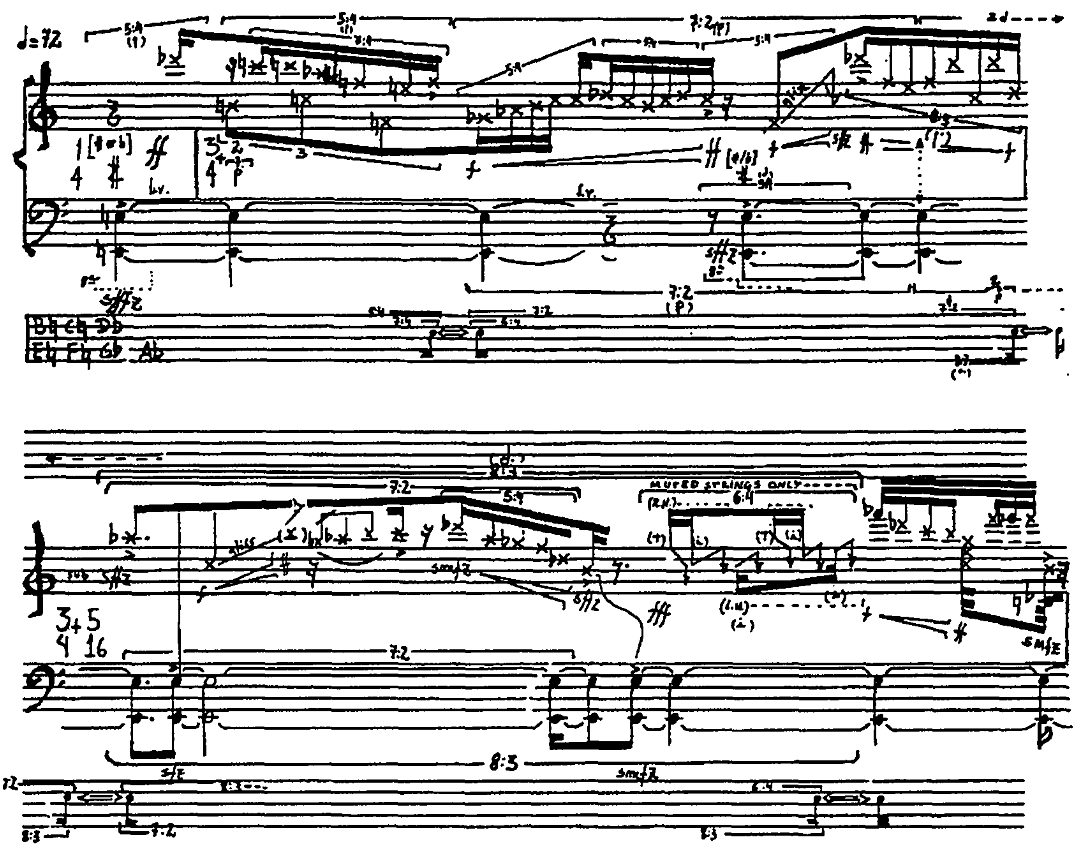


This technique is used in Kampela's *Phalanges*[46] for solo harp. Before analyzing the rhythmic alteration occurring in Example 5-11, we have to understand the notation of the irrational meter that Kampela uses here in the second measure of the piece. By the symbol  in the bottom part of the compound time signature, he means a septuplet

[45] Kampela, "*A Knife All Blade*: Deciding," 182-83.
[46] Kampela, *Phalanges* for solo harp, score (1995): author's manuscript, 5.

that fits into a half note, in other words, a septuplet eighth note. Therefore, the compound time signature is a 3/4 plus two beats of septuplet eighth notes. Had he used a number instead of the rhythmic figure in the bottom, the time signature would be read as 2/14.

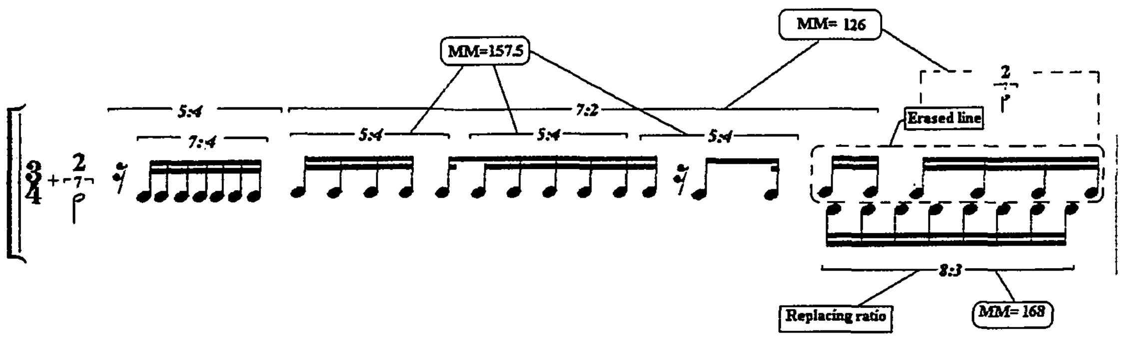
Example 5-11: ***Phalanges*** **for solo harp, by Arthur Kampela, mm. 1-3.**



Notice that, in the [7:2] ratio in m. 2, the numbers do not refer to the same rhythmic values. Here, seven eighth notes substitute *two quarter notes* (or seven eighth notes substitute four eighth notes). Hence, the speed of those eighth notes will be translated into the $\frac{4}{7}$ fraction. In the 2/ ⌐7¬ ♪ time signature, the septuplet eighth note represents the beat unit. In other words, we maintain here the same relationship where seven eighth notes substitute the normal four; therefore, we obtain the same fraction as in the [7:2] ratio: $\frac{4}{7}$. That proves that the sixteenth notes of the [7:2] first-level ratio and those of the 2/ $\overset{7}{♪}$ time signature share the same speed.

At the end of the second measure of Example 5-11, we should have only four sixteenth notes, since, at the end of the bar, we have two septuplet eighth notes belonging to the 2/ $\overset{7}{♪}$ part of the compound time signature. Instead, Kampela alters the higher line of the harp as if it were a new parallel voice. He 'erases' the last two sixteenth notes belonging to the [7:2] ratio and the original two eighth notes of the 2/ $\overset{7}{♪}$ time signature–giving us the total of six sixteenth notes–and substitutes them with a new [8:3] ratio created from the two adjacent ones. Notice that the new ratio substitutes three *eighth* notes by eight *sixteenth* notes (Example 5-12).

Example 5-12: Rhythm of the upper voice of the treble clef in m. 2 of *Phalanges* for solo harp by Arthur Kampela–a new [8:3] ratio replacing the 'erased' line at the end of the bar.



We find the metronome speed for the [7:2] ratio by multiplying the metronome marking by the denominator and dividing by the numerator of the fractional number. Since the original metronome marking in this piece is 72 for a quarter note, the speed of the [7:2] ratio will be: 72 x 7 = 504 ÷ 4 = 126.[47] The speed of the sixteenth note of both the [7:2] ratio and that of the 2/ $\overset{7}{♩}$ time signature are the same: 126 x 4 = 504.[48] However, since the [8:3] ratio is a second-level ratio, we have to calculate the final speed for it by multiplying the fractional numbers for both the [7:2] and [8:3] ratios. Number six is used in Example 5-13 to the [8:3] ratio in order to maintain the correct numerical relationship between rhythmic figures.

Example 5-13: Calculating the final speed of the [8:3] sub-ratio in m. 2 of *Phalanges* for solo harp by Arthur Kampela.

$$\frac{4}{7} \times \frac{6}{8} = \frac{3}{7}$$

New MM: 72 x 7 = 504 ÷ 3 = 168

New sixteenth note: 168 x 4 = 672

Example 5-14 shows the same operation to find the speed of the sixteenth note of the [5:4] secondary ratios that come right before the [8:3] secondary ratio.

[47] Notice that the division operation is done with number four, not two, because we have to be aware of the figure to which the ratio refers, in this case, seven eighth notes replace four of the same kind, not two.
[48] For the [7:2] ratio, that result is obtained by the operation with the original MM = 72 x 7 = 504.

Example 5-14: Calculating the final speed of the [5:4] secondary ratios in m. 2 of *Phalanges* for solo harp by Arthur Kampela.

$$\frac{4}{7} \times \frac{4}{5} = \frac{16}{35}$$

New MM: 72 x 35 = 2520 ÷ 16 = 157.5

New sixteenth note: 157.5 x 4 = 630.

If we compare the results obtained in Example 5-13 with those obtained in Example 5-14, we notice that the sixteenth note of the former is slightly slower than the same figure of the latter. The sixteenth-note speed for the [5:4] secondary ratios is 630, and for the [8:3] sub-ratio, it is 672. Therefore, the composer's intention here is to obtain a written out accelerando from the series of [5:4] sub-ratios to the [8:3] sub-ratio at the end of the bar.

Another important issue involving the [8:3] sub-ratio is that it serves as a bridge between mm. 2 and 3. Look at the beginning of m. 3 in Example 5-11. For the first dotted half note, we have a [8:3] ratio, meaning eight eighth notes replacing six of the same kind, and modified immediately by a [7:2] second-level ratio, meaning seven eighth notes replacing four of the same kind. The following arithmetic obtained between fractional numbers shows the final speed of the [7:2] second-level ratio in the beginning of m. 3 (see Example 5-15):

Example 5-15: Final speed of the [7:2] sub-ratio at the beginning of m. 3 of *Phalanges* for solo harp by Arthur Kampela.

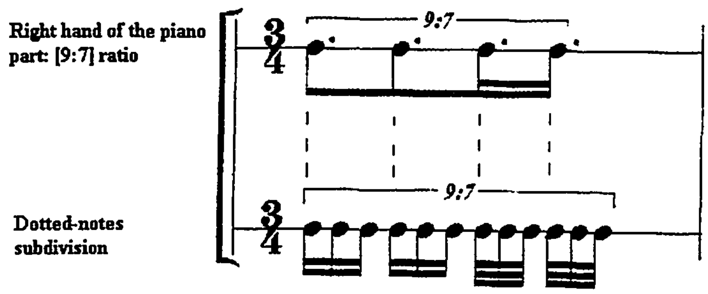
$$\frac{6}{8} \times \frac{4}{7} = \frac{3}{7}$$

Compare this result with the fractional number obtained for the final speed of the [8:3] secondary ratio in m. 2 in Example 5-13, and we can observe that they share the same speed. Even though the [8:3] first-level ratio in m. 3 and the [8:3] second-level ratio in m. 2 do not refer to the same figure, the same numerical relationship is maintained in the fractions. The [8:3] second-level ratio added at the end of the second bar was created to connect two different speeds in mm. 2-3. The purpose of the micro-metric modulation is to create a smooth transition to new speeds, and, in this way, help both the mind and body of a performer to respond to speed changes accordingly.

Fractional Number Operations in Ratios that do Not Share the Same Speed

The operations described above in this chapter to find the final speed of a sub-ratio is also helpful to work with ratios that do not share the same speed with adjacent ones. In Finnissy, fractional number operations can serve as alternatives to strategy 2 to find the speed of a sub-ratio. Example 5-16 shows an excerpt we examined in Chapter 3 of *Banunbirr* by Finnissy. There, we first calculated the speed of the entire [9:7] ratio by multiplying the regular sixteenth note by the given MM = 50 for the quarter note, and dividing it by the number of sixteenth notes that embed the entire ratio (7). The operation gives the following result: 4 x 50 = 200 ÷ 7 = 28.57. Remember that the resulting speed was too slow to be exercised with the help of a metronome. Therefore, we multiplied the speed we obtained by three, since the ratio was subdivided in three equal parts of dotted eighth notes. The speed of the dotted eighth note was 85.71.

Example 5-16: [9:7] ratio in m. 1 of *Banumbirr* by Michael Finnissy–first rhythmic layer of the right hand of the piano part.



From what we learn with the operation using fractional numbers to find the metronome marking of a ratio described above, we can use it as an alternative method to find the speed we obtained previously in Chapter 3 for the dotted eighth note. We should first find the speed of the new quarter note. The [9:7] ratio reflects the following fractional number: $\frac{7}{9}$. We will find the speed of the new quarter note using the "small method", multiplying the original metronome marking (MM = 50) by the denominator, and dividing it by the numerator, as follows: 50 x 9 = 450 ÷ 7 = 64.28.

We should then multiply 64.28 by four, so we can find the sixteenth note speed: 64.28 x 4 = 257.12. Now we can divide it by three to obtain the speed of the dotted eighth note: 257.12 ÷ 3 = 85.706666. In Chapter 3, we had obtained 85.71 for the dotted eight note implied by the [9:7] ratio; it is feasible to practice the ratio at that speed. Here we offer a different way to determine the same result.

Chapter 6: Conclusion

Historical Background

A number of musical movements became current during the 1980's in both Europe and North America. On one hand, the terms Minimalism, Neoromanticism,[49] New Simplicity,[50] or "Neue Einfachkeit"[51] try to embrace principles of composers such as Arvo Pärt, Henryk Górecki, Aaron Kernis, John Adams, and Phillip Glass. On the other hand, there is the New Complexity represented by the British composers Brian Ferneyhough and Michael Finnissy, later followed by their compatriots Richard Barret, Chris Dench, and James Dillon. Toop says: "The term New Complexity is primarily an open refutation of New Simplicity, just as another widely used label, 'maximalism,' is to be understood at least partly as 'antiminimalism.'"[52]

According to Weisser, the Belgian musicologist Harry Halbreich was the first to use the term New Complexity in reaction to the "Neue Einfachkeit" movement in Europe. Although the movement started with British composers, they received initial support in continental Europe, later spreading across America, Australia and Europe. Ferneyhough, the leading composer of the New Complexity School, was coordinator of the summer composition program in Darmstadt between 1982 and 1996, and because of his activities there, the group of followers were even called the Second Darmstadt School by

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[49] Brian Ferneyhough, "Form–Figure–Style: An Intermediate Assessment," *Perspectives of New Music* 31, no. 1 (1993): 36.
[50] Richard Toop call them "New Simplicists" in "On Complexity," *Perspectives of New Music* 31, no. 1 (1993): 44.
[51] This term is translated by Weisser as "New Easiness." Benedict Weisser, "Notational practice in contemporary music: a critique of three compositional models, Luciano Berio, John Cage, and Brian Ferneyhough." (Ph. D. diss., Graduate School and University Center of CUNY, 1998): 184.
[52] Ibid., 54.

Mahnkopf[53] in reference to the group of serialists of the 1950's: Boulez, Stockhausen, Nono, and Maderna. Ferneyhough became internationally prominent after being awarded prizes for three consecutive years (1968-70) at the Gaudeamus Composer's Competition for his Sonatas for string quartet, *Epicle* and Missa Brevis, respectively.

Aesthetic Issues

To summarize the style characteristics of the New Complexity is to risk minimizing the significant differences of style among individual composers, but, in general, the "complexists" prefer to write for acoustic instruments, and their scores are extremely detailed in every musical aspect, such as dynamic, articulation, rhythm, pitch, meter, and timber. Microtones and extended techniques are combined with regular pitches, and, at the same time, small rhythmic figures and nested rhythms are written in uncommon and constantly changing meters.

The ideas of Ferneyhough, Finnissy and their followers have raised controversial discussions. Critics of the New Complexity School argue that the complexists are more concerned about the scores than how they sound. Silverman, one of the critics of complexists' writing, says: "They all write notes. And more notes. More than can be played: more than can be imagined." Scoffing, he adds that "those special 'graphic' pens with little tubes instead of nibs are better suited than the quill-based pens from which conventional music notation arose. These greatly facilitate the writing, if not the imagining, of microtonal clusters and off-clusters, quarter-tone or even (now disowned) twelfth-tone (!) passages (Michael Finnissy), hemidemisemiquavers or treble-dotted

[53] Claus-Steffen Mahnkopf, *Kritik der neuen Musik* (Kassel: Bärenreiter Verlag, 1998).

quavers in proportions such as Michael Finnissy's 28:26:33 ½ or 7:4 + 6:5 in the time of 9:7 against 6:6 + 7:6 etc., and plenty of yet more obscure proportions which I have not been able to decipher." And later, he adds: "So, is it all about nothing? To restate an earlier question, do they have any particular sounds in mind, or doesn't it matter?"[54]

In a more moderate language, Ulman criticizes complex notation, questioning the playability of such scores. He believes the "score becomes an intimidation mechanism, staving off critical scrutiny by cultivating incomprehension, substituting colorful notation and verbal detail for musical detail, and depending on an inevitable inaccuracy of interpretation for either a genuinely improvisatory performative power or a final excuse for the failure of the material to present itself audibly."[55] He asks: "if notation can signify richness and multivalency, may it not also conceal their absence?"[56] Despite his criticism, Ulman sees in the New Complexity in music an "antidote to the sterility of 'academic serialism,'" as well as to the "New Simplicity."[57]

On the other side, supporting the new complexists, the Australian theorist Richard Toop discusses the "difficult" path chosen by complexists as opposed to the "easy" one of the "simplicists":

> Is there not, then, a third way, a "via media," an Aristotelian mean? Frankly, I think not. Schönberg once wrote that the middle path is the only one that does not lead to Rome. Personally, it's not only the middle path that I would discard, but the hypothetical "lower" one too (in my terms, a simplicist path). It is possible that radical simplicity, to the extent that it is potentially free from compromise, the perpetual whorehouse of the "via media," might also lead to some kind of *urbs aeterna* (given the theological preoccupations of a Pärt, a Tavener, or a Górecki, where else would it lead?). But for the most part, it's a dull, dumb path, and I doubt whether its Rome is worth reaching. Yet at the same time, one must recognize that

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[54] Julian Silverman, "Britcomplexity", review of *Aspects of Complexity in Recent British Music,* ed. by Tom Morgan, *Tempo* 197 (July 1996): 34.
[55] Erik Ulman, "Some Thoughts on the New Complexity." *Perspectives of New Music* 32, no.1 (1994): 205.
[56] Ulman, 205.
[57] Ibid., 205.

the "upper path" is by no means an exclusive transit lane for the so-called "New Complexists."[58]

Performance Issues

Weisser describes the reactions of some authors who are against the notational practices of the New Complexity School, and uses Roger Marsh's rewriting[59] of a rhythm from the Irvine Arditti's recording[60] of *Intermedio alla Ciaccona* (1986) by Ferneyhough. Weisser provides both Marsh's transcription and the original notation, as in the Examples 6-1A and B:

[58] Toop, 44.
[59] Weisser, 215.
[60] Ferneyhough, *Intermedio alla Ciaccona,* Irvine Arditti, Etcetera KTC 1070.

Example 6-1A: ***Intermedio alla Ciaccona*** **by Ferneyhough, mm. 1-4.**

B: Marsh's transcription of example 6-1A.

Listening to the recording, I agree with Marsh in that Irvine Arditti rushes into the second dyad at the second measure, considering the fastest metronome marking suggested in the score (♪=60). At the same time, I cannot agree with his transcription, since the speed of Marsh's sixteenth note would be 120 beats per second, and Arditti plays the dyad [C#-D] to [A quarter-tone flat-Bb] approximately at the speed of 87 beats per second. Actually, neither Marsh's transcription nor Arditti's interpretation is right. Should the gesture from the second dyad to the third one as played by Arditti be read from Marsh's transcription, it would still sound agogic, in other words, slower than a regular sixteenth note in MM ♪=60.

Considering the MM ♪=60, the final speed of the [5:3] second-level ratio is calculated in Example 6-2:

Example 6-2: final speed in sub-ratio [5:3].

$$\frac{4}{7}\times\frac{3}{5}=\frac{12}{35} \qquad \textbf{MM=60} \;\Rightarrow 60\times 35 = 2100 \div 12 = 175$$

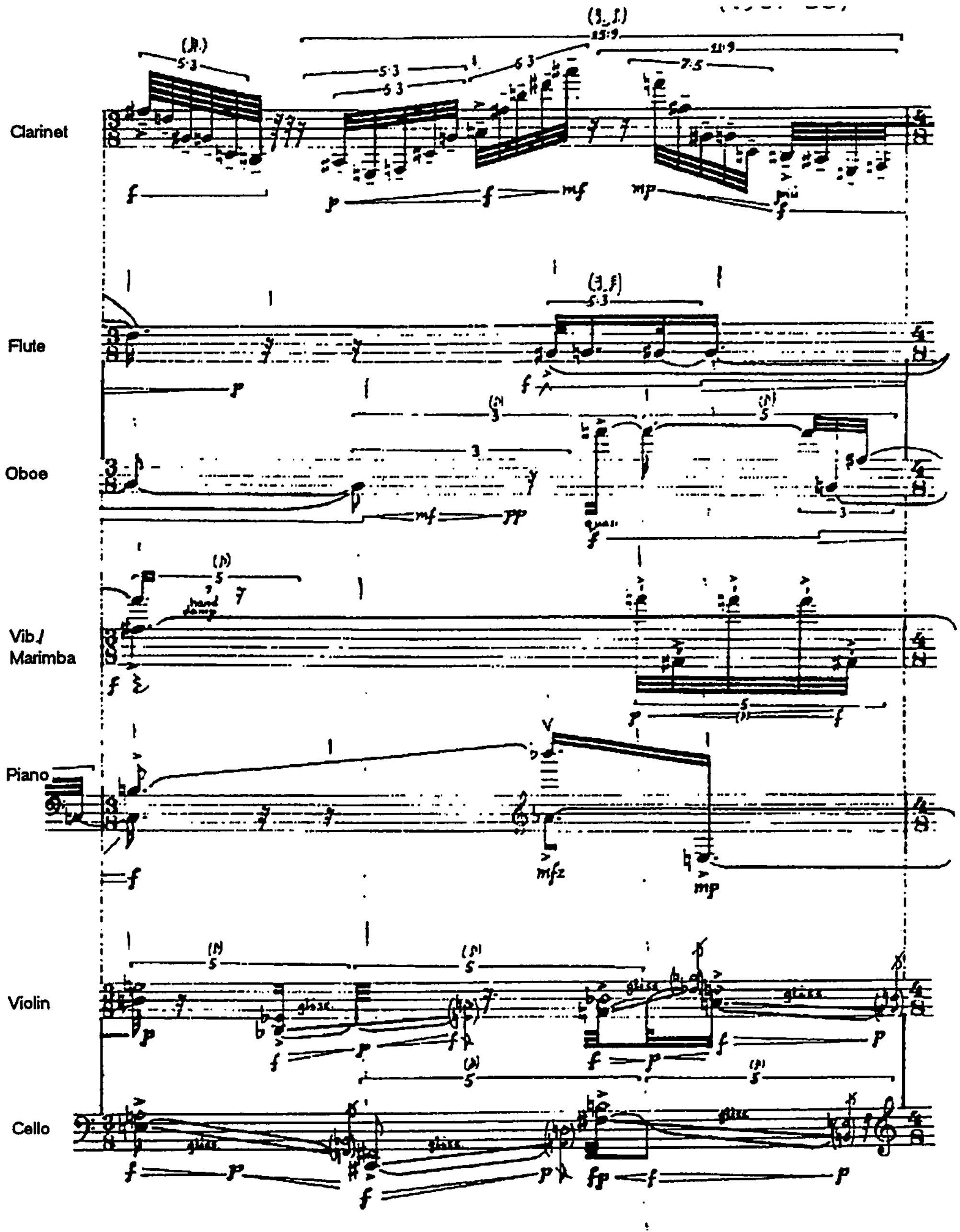
That operation gives us the speed of the eighth note of the [5:3] sub-ratio (175 beats per second). Therefore, although Arditti plays it much slower than it should be, Marsh's transcription is not correct either. I think the best interpretive solution here is to calculate the speed of the entire [5:3] second-level ratio by multiplying the new MM = 175 by four in order to find the speed of the new thirty-second note, and dividing it by five (new sixteenth notes that embed the ratio): 175 x 4 = 700 ÷ 5 = 140. The result shows that the speed of the entire sub-ratio is faster than the speed of the original sixteenth note (MM = 60 x 2 = 120). Playing the first measure while subdividing it into sixteenth notes can help to think of the [5:3] sub-ratio as an acceleration of the original sixteenth note. The entire sub-ratio should be practiced with the metronome on 140.

Discussing tonal music rhythm, Lester observes: "our notational system does not insist that durations be equally long with mechanical precision, but rather that durations of somewhat differing lengths are heard as functionally equivalent even while we recognize their clock-time differences."[61] In the case of *La Chute d'Icare* by Ferneyhough we studied in this work, for example, the listener probably will not be able to discern the metric changes, but rather will hear a series of *accelerandi* and *ritardandi* among small rhythmic figures.

If we look at the second measure we studied in Chapters 2 and 3 of *La Chuted'Icare,* we can "visualize" the three eighth-note beats in the cello, violin and oboe parts, but these beats are hardly audible, apparently on purpose (see Example 6-3).

[61] Joel Lester, "Notated and Heard Meter," *Perspectives of New Music* 24, no. 2 (1986):120.

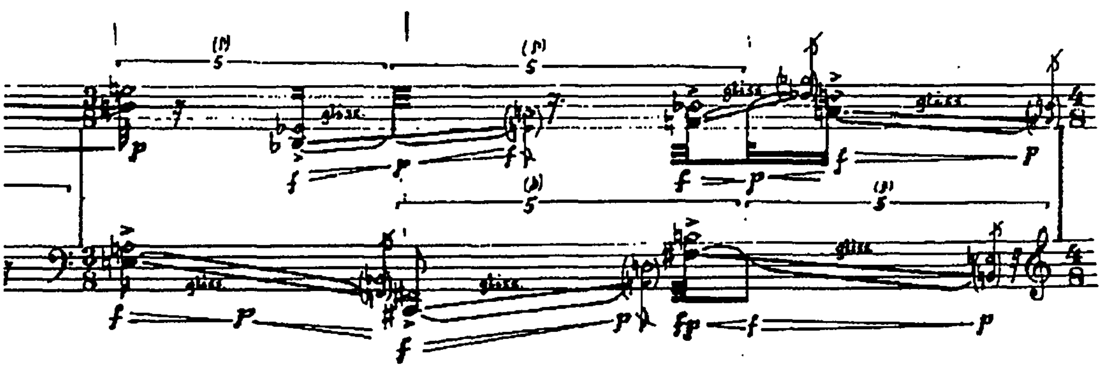
Example 6-3: *La Chute d'Icare* by Brian Ferneyhough, m. 2.



Edition Peters No.7362

Look at the dynamics in the violin part in Example 6-4. There is a decrescendo from forte to piano between the last sixteenth note of the first beat and the first thirty-second note of the second beat. Without articulating the first note of the second beat (glissando), there is a *crescendo* to forte that ends in an *appoggiatura* right before a dotted sixteenth rest. The same happens in the third beat, a *decrescendo* and *glissando* through the beat, disguising the pulse. There is no way one can hear an eighth-note click in such a passage. The cello voice gives a clear second beat, but the same is not true about the third beat.

Example 6-4: Violin and cello parts in m. 2 of *La Chute d'Icare* by Brian Ferneyhough.



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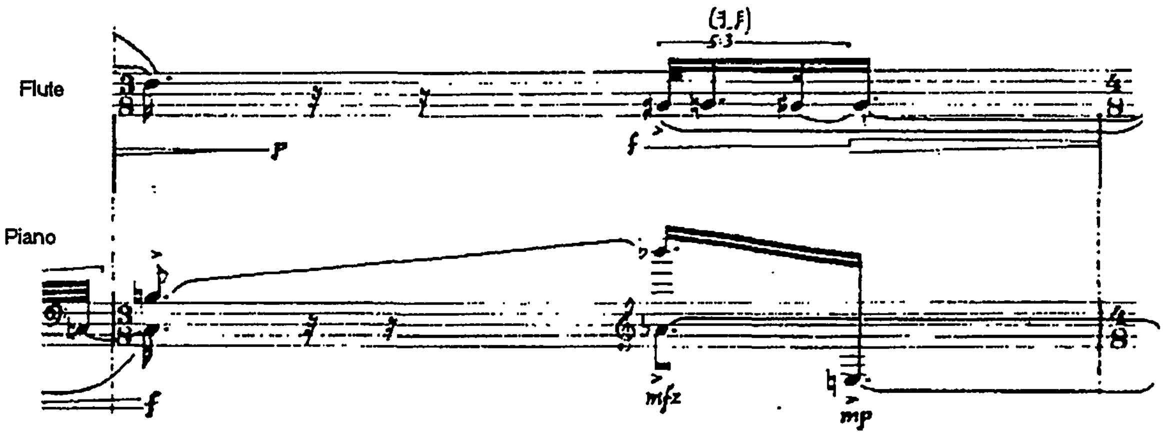
The instruments that present the binary division of the measure into dotted sixteenth notes (piano and flute) have no second "pulse" in the measure (see Example 6-5).

Example 6-5: Flute and piano parts in m. 2 of *La Chute d'Icare* by Brian Ferneyhough.



The meter here and its macro-level alteration (the binary division of the measure) can be helpful to performers in order to "visualize" time frames. The meter is as much an abstraction as the way human beings organize the day itself into hours, minutes, and seconds. Repeated patterns are related in an apparently symmetric frame; in reality, they are not exactly symmetric in nature, but only an approximation of a pattern. Meter here in this measure and in the following ones is not audible; it is an abstraction, since we don't hear accentuations as we do in traditional music.

When discussing Milton Babbitt's *Arie da Capo* rhythmic notation, Lester observes: "That the rhythmic notation does not accurately represent the perceived rhythmic structures is more a reflection on the system of notation we have inherited than on the music."[62] Lester says there is a gap between the precision performers strive to accomplish and the actual result for the listener. I would say that the challenge for the performer playing a piece such as *La Chute* is mastering the details in practice and rehearsals in order to obtain fluency in performance, and this is the ultimate goal in any kind of music. For the listener, this music articulates a paradigm of accentuations, speeds and non-symmetrical rhythms, offering, not the secure field of the apparently constant meter, but the realm of a seemingly chaotic discourse of rhythms.

Because the hierarchies of accentuations are so clear in tonal music, we have a limited paradigm of choices in terms of direction of gestures. Lester says: "In tonal music, the accentual profile of the music creates and commonly reinforces the metric hierarchy for much of the piece. Accents caused by a variety of factors establish *pulses*–regularly recurring impulses–on several levels. The accents that most convincingly group pulses to create the interaction of levels that is the metric hierarchy are harmonic-change accents, durational accents, and textural accents."[63] He adds: "And metrical ambiguity, when it does arise in tonal music, virtually always affects only one or two levels of the metric hierarchy, the higher or lower levels remain constant."[64]

Frequently in music of the New Complexity, as opposed to tonal music, the amount of textural, dynamic, rhythmic, and pitch information is so intense that it offers a multiplicity of interpretational choices. The performer has to make one choice at a time, and the selected possibility does not have to be the same for every performance. The flexibility lies exactly in the surfeit of ambiguities. Ferneyhough says: "It's just that most stylistic conventions aim at large-scale equilibrium between containing frame and degree

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[62] Lester, 126.
[63] Lester, 119.
[64] Lester, 120.

of permitted deviation of component details, whereas what I am aiming at is pretty much the reverse, in that what, in other music, might be seen as enhancing embellishment is constantly causing a high level of uncertainty about what the implied scale of the relationship 'frame / detail' might be."[65]

Ferneyhough admits that the complexity of his notation can be problematic to the interpreter, but he says that "this is part of the point, if one imagines that the performer has to remain relatively conscious of the need to be always re-evaluating visual, contextual and sonic correlates."[66] He says: "If the score may be understood as being a constant 'token' of the work of which it is the notated form, any and all performances which represent a conscious attempt to realize that score are valid interpretations."[67] I would not assume, though, that his intention is to make his music sound as improvised, but rather complex. Ferneyhough defines complexity as "an ACTIVE projection of multiplicity (in the sense of incorporating alternative and competing trajectories as constituent contradictions making out an essential element of their expressive substance)."[68]

On the other hand, Kampela says that his intention "is to be able to access a wide spectrum of sonic materials."[69] He adds: "Contrary to the notion of *infinite* array of possibilities, where decisions would be lost due to lack of constraints, I would like to argue that when there is a struggle between materials to coexist and cohere, they naturally

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[65] Boros, 115.
[66] Ferneyhough, *Collected Writings,* 71.
[67] Ibid.
[68] Ibid., 69.
[69] Kampela, "*A Knife All Blade*: Deciding," 167.

develop strategic priorities, and order themselves in such a way that the compositional flow is enhanced."[70]

The asymmetric rhythmic spaces found in pieces such as *La Chute* can result in performances with a large margin of imprecision. Lester points out that, in tonal music, *rubato*, agogic gestures, *ritenuto* and *rallentando* are understood as such without altering the rhythmic "reading" of figures notated by the composer. I agree that tonal language provides such clarity. In Ferneyhough's music, however, one cannot expect the same experience, since clarity does not seem to be the main point of the New Complexity.

Ulman says that he heard a performance of a piece by a composer of the New Complexity School that was played with a *rubato* where the rhythmic notation was regular. He criticizes it asking: if the "rhythmic notation was generally a written rubato,"[71] why play with *rubato* if the notation does not require one to do so? In New Complexity music, I believe that if the performer reaches a state of knowledge of the piece such that the musical gesture can be as convincing as it is in tonal music, the performer can feel free to take some liberties with the sanction of the composer. The clarity of the gesture will translate the richness, not of the music notation, but of the new concept of rhythm of the New Complexity in music.

Some of the most frequent questions about complex music are: what are the limits of playability? Are performers required to play exactly what is written? Ferneyhough answers: "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

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[70] Ibid.
[71] Ulman, 205.

reproduction; nor am I suggesting that this would even be desirable."[72] He adds: "One chooses degrees of notational precision with the intention of suggesting appropriate interpretational approaches to the text at hand, not with the aim of eliminating performer autonomy. Quite the opposite!"[73] Finnissy clearly states in *...above earth's shadow* that the interpreter doesn't have to be precise.[74] I personally think that the relationship between the rhythmic "phrases" or gestures are more important than precision. Absolute precision seems to be impossible.

An interesting feature of this music is that, although it sounds very contradictory, the rhythmic notation is so detailed that it tends to free the mind from the over control of the perfect subdivisions by the performer at some point. I believe that, in performance, the music will work mainly with the unconscious part of the brain because the speed of gestures, after the arduous practice with subdivisions, grids, and metronome, becomes closer to the body memory than to the rational mind. And this is what a performer strives to accomplish in any kind of music: gestures rather than control.

Final Remarks

It is still impossible to predict if the rhythms of The New Complexity in music will be played more precisely in the future. For example, if we listen to the first recordings of Ives' music, we notice easily how far the performers were from the scores that nowadays are performed much closer to what is notated. I am sure that the same happened with several other "new" techniques used by composers of the past, such as

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[72] Ferneyhough, *Collected*, 70.
[73] Ibid., 71.
[74] Finnissy, ... *above*, 2.

Debussy, Stravinsky, even Beethoven. As Wright puts: "There are instances of other composers, like Carter and even Tippet, whose music, once thought too difficult to warrant the trouble, is now regularly scheduled."[75]

Since we are talking about music being composed in the present time, the conversation between interpreter and composer creates an opportunity for mutual adaptation. I believe that the tools proposed here will help the interpreter not only to approach complex rhythms so as to perform them, but also to acquire a level of craftsmanship that will elevate the discussion between composers and performers.
A great deal of what has been written about the New Complexity in music has been focused on compositional style, aesthetics, and principles; the writings are mainly directed to composers and musicologists. Little has been written aimed at performers, or by a performer, even though that music has been played for over two decades. I hope the present work will help to fill out this lacuna.

I believe the repertoire used here to illustrate the four strategies to approach complex rhythms serves to point out some of the greatest difficulties presented in the New Complexity in music. The difficulties encountered in those scores are not reduced to complex rhythms, since other aspects of the notation are complex as well, but I hope this work will help performers to get started on those scores without prejudice or fear. As Weisberg says, "It is not a performer's job, however, to predict [if new principles will last], but to perform as well as possible."[76]

Although New Complexity music is not limited to small ensemble and solo music, due to the difficulties encountered in the learning and rehearsal process, large

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[75] Ibid.
[76] Weisberg, 1.

orchestral pieces are not common. Ferneyhough has one piece for large orchestra, *La Terre est un Homme* (1979). Most of his works are either for solo, chamber music, voice, or ensembles no larger than twenty instruments. The same happens in Finnissy's and Kampela's works. It is hard to imagine a performance of a piece of New Complexity music for large ensemble without spending a long time to rehearse.

I believe the music of the New Complexity School is worth it to go through the amount of commitment demanded from the interpreter. Working on each measure of those works can take a great amount of time, and putting the music together as a piece of art can take months. Besides all the technical difficulties presented, making graphics will require some effort, but will certainly help to figure out the rhythmic difficulties. Once the mathematics become familiar, the grids become easier to build, and the music will appear a lot clearer.

My personal experience performing music of the New Complexity music happened before I wrote this work. I haven't yet, since I studied the strategies proposed here, had the opportunity to perform an entire piece practicing with the tools suggested in this paper, but I believe those strategies will help my own process of learning New Complexity scores and make them more accessible to the average performer.

The scores studied in this work offer a wealth of information that goes beyond the difficulties of the notation. The interpreter is challenged intellectually and technically, and a new kind of musical perception is proposed. I believe that criticism has to be made on the basis of a real knowledge of the music. The critics do not make a point simply by refusing the difficulties implied on the score. It is necessary to provide the tools to understand the music in order to either enjoy it or dismiss it.

I don't believe that the interpreter should be concerned with the mathematics while *playing* a complex piece. The goal of the strategies offered here is to establish methods to approach the music in learning stages. Ferneyhough says he is not satisfied with understanding complexity in his music only in mathematical terms. He is interested in exploring different levels of ordering perception "when attempting to make sense of borderline states."[77] He says the amount of information in his music is not intended to confuse, but rather to "offer concurrent, competing, and sometimes contradictory middle-ground 'micro-narratives.'" Discussing the relationship between "states of stability and instability" in his music, he adds: "the sort of grid–or matrix-orientated formal techniques I usually use tend to bring about momentary clarifications where partial aspects of independently-moving patterns suddenly coincide, creating sudden, unexpected 'windows.'"[78]

Separating all the aspects of the notation–an abstraction process that is necessary in any kind of music, especially when it gets too difficult to sight-read–becomes imperative when approaching scores of the New Complexity, and the rhythmic aspect is one of the main challenges a musician can find in those scores.

The only tools we human beings have to measure time for now are the clock and the metronome, and both are related. This study based on calculating different speeds and common denominators between different ratios help to give the performer a frame to practice rhythmic changes not easily perceived. The interpreter equipped with these four strategies will be able to approach the most complex rhythmic challenges in the New Complexity repertoire. The works are difficult by nature, but not impossible to handle.

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[77] James Boros, "Composing a Viable (if Transitory) Self: Brian Ferneyhough in Conversation with James Boros," *Perspectives of New Music* 32, no.1 (1994): 114-15.
[78] Ibid., 115.

List of Works Cited

Adlington, Robert. Review of *Carceri d'Invernzione* III, by Brian Ferneyhough. *The Musical Times* 135 (July 1994): 450.

Boros, James. "Composing a Viable (if Transitory) Self: Brian Ferneyhough in Conversation with James Boros." *Perspectives of New Music* 32, no.1 (1994): 114-30.

Cowell, Henry. *New Musical Resources.* New York: Something Else Press, 1969.

Cross, Jonathan. "Vive la Différence." *The Musical Times* 137 (March 1996): 7-13.

Ferneyhough, Brian. *Collected Writings,* ed. James Boros. Amsterdam: Harwood, 1995.

________. *Etudes Transcendentales/Intermedio* II from *Carceri d'Invenzione.* London: Peters, 1987.

________. "Form-Figure-Style: An Intermediate Assessment." *Perspectives of New Music* 31, no. 1 (1993): 32-40.

________. *La Chute d'Icare.* London: Peters, 1988.

________. "Il Tempo della Figura." *Perspectives of New Music* 31, no. 1 (1993), 10-19.

________. "The Tactility of Time (Darmstadt Lecture 1988)." *Perspectives of New Music* 31, no.1 (1993): 20-30.

Finnissy, Michael. *... above earth's shadow.* London: United Music Publishers, 1986.

________. *Banumbirr.* London: United Music Publishers, 1986.

Griffiths, Paul. *New Sounds, New Personalities.* London: Faber Music Ltd., 1985.

Harvey, Jonathan. "Brian Ferneyhough." *The Musical Times* 120 (September 1979): 723-28.

Kampela, Arthur. "Micro-Metric Modulation: New Directions in the Theory of Complex Rhythms." DMA diss., Columbia University, 1998.

________. *A Knife All Blade* for String Quartet. Partial fulfillment, DMA diss., Columbia University, 1998.

________. "*A Knife All Blade*: Deciding the Side Not to Take. *Current Musicology* 67-68

(Special Issue 2002): 167-93.

________. *Phalanges* for solo harp. Score. 1995. Author's manuscript.

________. *Quimbanda* for Electric Guitar. Score. 1999. Author's manuscript.

Lester, Joel. "Notated and Heard Meter." *Perspectives of New Music* 24, no. 2 (1986): 116-28.

Link, John. "Long-Range Polyrhythms in Elliott Carter's Recent Music." Ph. D. diss., Graduate School and University Center of CUNY, 1994.

Mahnkopf, Claus-Steffen. *Kritik der neuen Musik.* Kassel: Bärenreiter Verlag, 1998.

Pace, Ian. "The Panorama of Michael Finnissy." *Tempo* 196 (April 1996): 25-35.

Schick, Steven. "Developing an Interpretive Context: Learning Brian Ferneyhough's *Bone Alphabet.*" *Perspectives of New Music* 32, no. 1 (1994): 132-53.

Silverman, Julian. "Britcomplexity." Review of *Aspects of Complexity in Recent British Music,* by Tom Morgan. *Tempo* 197 (July 1996): 33-7.

Starer, Robert. *Rhythmic Training.* Milwaukee: MCA Music Publishing, 1969; reprint, 1999.

Toop, Richard. "On Complexity." *Perspectives of New Music* 31, no. 1 (1993): 42-57.

________. 'Prima Le Parole…' (On the Sketches for Ferneyhough's *Carceri d'Invenzione* I-III)." *Perspectives of New Music* 32, no. 1 (1994), 154-75.

Truax, Barry. "The Inner and Outer Complexity of Music." *Perspectives of New Music* 32, no. 1 (1994): 176-93.

Ulman, Erik. "Some Thoughts on the New Complexity." *Perspectives of New Music* 32, no. 1 (1994): 202-6.

Weisberg, Arthur. *Performing Twentieth-Century Music: A Handbook for Conductors and Instrumentalists.* New Haven: Yale University Press, 1993.

Weisser, Benedict. "Notational practice in contemporary music: a critique of three compositional models, Luciano Berio, John Cage, and Brian Ferneyhough." Ph. D. diss., Graduate School and University Center of CUNY, 1998.

Williams, Alastair. "Adorno and the Semantics of Modernism." *Perspectives of New Music* 37, no. 2 (1999): 29-50.

Wright, David. "Ferneyhough at Fifty." *The Musical Times* 134 (March 1993): 125-28.