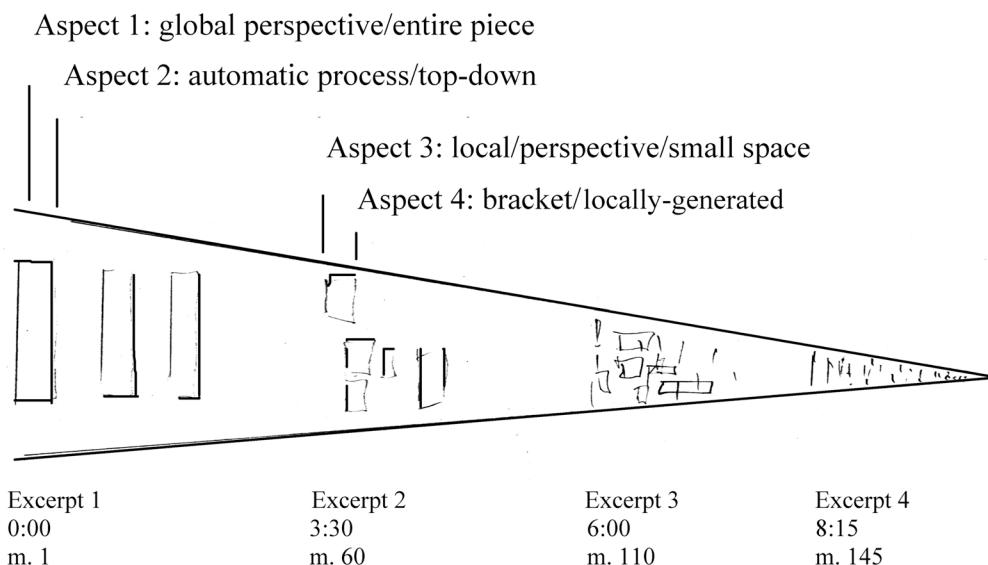


Aspects of Temporal Organization in Brian Ferneyhough's *Carceri d'Invenzione III*¹

Cordula Paetzold

Brian Ferneyhough describes the "tension-field between tempo and meter" as the central idea of his work *Carceri d'Invenzione III*.² Simply formulated, the piece could be described as a single process, in which the structurally significant events (here called "trigger impulses" and always played by at least one of the percussion instruments) gradually penetrate more and more deeply into the musical surface and eventually dissolve into the surrounding texture, such that the sharp textural contrasts at the beginning become a relatively constant flow (see Example 1).



Example 1: "Tension-field between tempo and meter"

But the process does not unfold in as simple and linear a fashion as this diagram suggests. Rather, the processes are formed out of differentiated, interlocked levels of tempo, meter, and rhythm, as we will soon observe in detail. In this manner, a network of interlocking large surfaces and intricately detailed developments eventually unfolds, resulting in a large-scale compression and assimilation.

For this paper, I have chosen four excerpts from the piece that will allow us to examine in more detail some of the procedures Ferneyhough has used and to reflect on

¹ Lecture given at the conference "Brian Ferneyhough: A Symposium," London, 2011.

² Remark in the sketches of "*Carceri d'Invenzione III*." The sketches can be found in the Paul Sacher Foundation, Basel, Switzerland.

their musical results. These four excerpts are drawn respectively from the beginning of the 10-minute piece, shortly after the first third of the piece, shortly after the halfway point and finally at the very end of the piece.

Excerpt 1

The piece begins with an extended solo for clarinet that lasts for eighteen bars (see Example 2). From measure 12 on, this solo is repeatedly interrupted by what I have called "trigger-impulses." Here each trigger-impulse consists of a single percussion impulse in combination with a brass chord; after each of these triggers the clarinet introduces a new gesture. Let us have a closer look at the very beginning of the piece.

Already after five bars an alteration of the basic tempo takes place from eighth = 52 to eighth = 65, highlighted in green. After three measures it returns to eighth = 52. Such short-term tempo alterations appear throughout the piece as part of the network of tempo and metric relations.

In Example 4, the close relationship between tempo and meter is clearly apparent. Measures 5 to 7 appear with 6/8, 3/8, and 7/8 meters in the faster tempo of eighth = 65. Another way of representing the same sounding result would have been to keep these three bars at the tempo of eighth = 52 and to use quintuplet eights as follows: 6/10, 3/10, and 7/10.

The representation of this pattern by means of tempo change rather than by metric alteration has, however, two decided advantages. First, it is not dependent on the small number of speed proportions that can be represented by metric signatures. For example, a 5:4 speed proportion in relationship to a 6/8 meter results in a 6/10 meter, whereas a 7:8 or more complex speed proportion cannot easily be represented with a metric signature. Second, Ferneyhough can change the basic tempo "manually" by small increments and slightly change the proportional relationships of the secondary tempos within a network of tempo relationships: for example, the basic tempo can be eighth = 51 instead of 52 later in the piece, with corresponding secondary tempos.

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Example 2: Excerpt 1, mm. 1-24³

³ Brian Ferneyhough, *Carceri d'Invenzione III*; all excerpts used with the kind permission of C. F. Peters Musikverlags, Frankfurt/Main, Leipzig, London, New York. Instrumentation: eight woodwinds, seven brass, three percussionists.

CARCERI D'INVENZIONE III
in D major/Händler

Brian Ferneyhough
(1986)

Bass Clarinet begins

Pulse-Cycle 1 begins

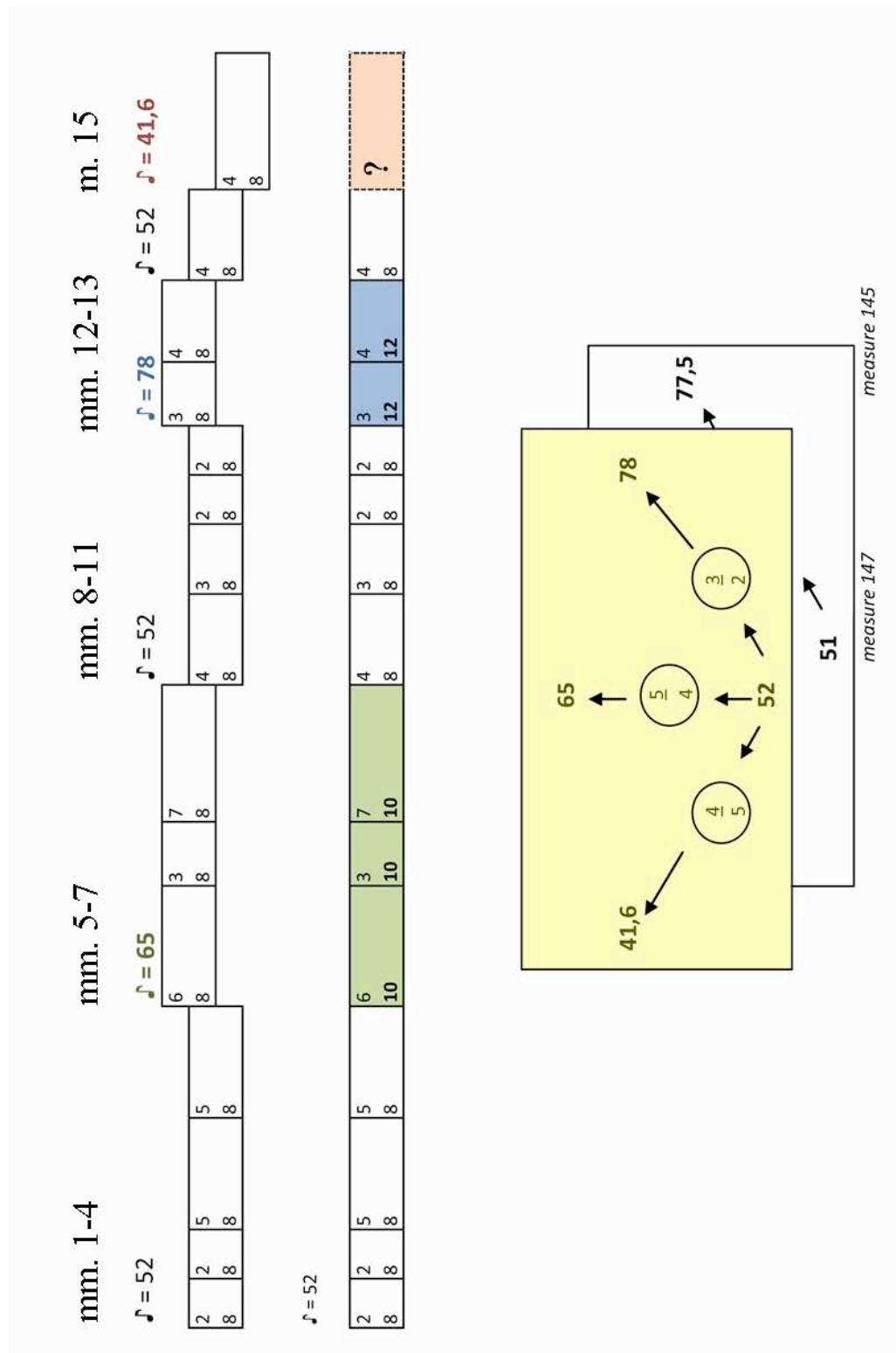
Pulse-Cycle 2 begins

Symm. pulse cycle

Symm. bar length

Symm. brass chord

Handwritten musical score for Clarinet 1, measures 1-12. The score is written on a single staff with a key signature of one sharp (F#) and a 3/8 time signature. It includes various musical notations such as notes, rests, dynamics (p, f, mf, ff, ppp, poco rall, ancora), and articulation marks. The tempo is marked with a quarter note equal to 52 beats per minute. The score is divided into measures 1 through 12, with some measures containing multiple staves of music. The notation is dense and includes many accidentals and dynamic markings.



Example 4: Aspect 1 of time organization: global perspective of the whole piece

Let us now take a closer look at the overall formal scheme (Example 5). *Carceri d'Invenzione III* consists of two larger sections that are connected with a small interlude. We see here the construction of both main sections, with the four excerpts mentioned above highlighted. Both sections consist of eight textural levels that enter one after the other and thus result in a thickening of the texture. The textural levels of the second section of the piece are longer and therefore the rate of entries of the levels is faster, with the result that the second section is clearly designed to be denser than the first.

The uppermost line in the first section of the piece represents the textural level of the clarinet solo, which has already been discussed. In measure 12, the second textural level begins with impulses triggered by percussion 2. In measure 18, the textural level represented by the bass clarinet enters, and in measure 24, a second set of trigger impulses begins.

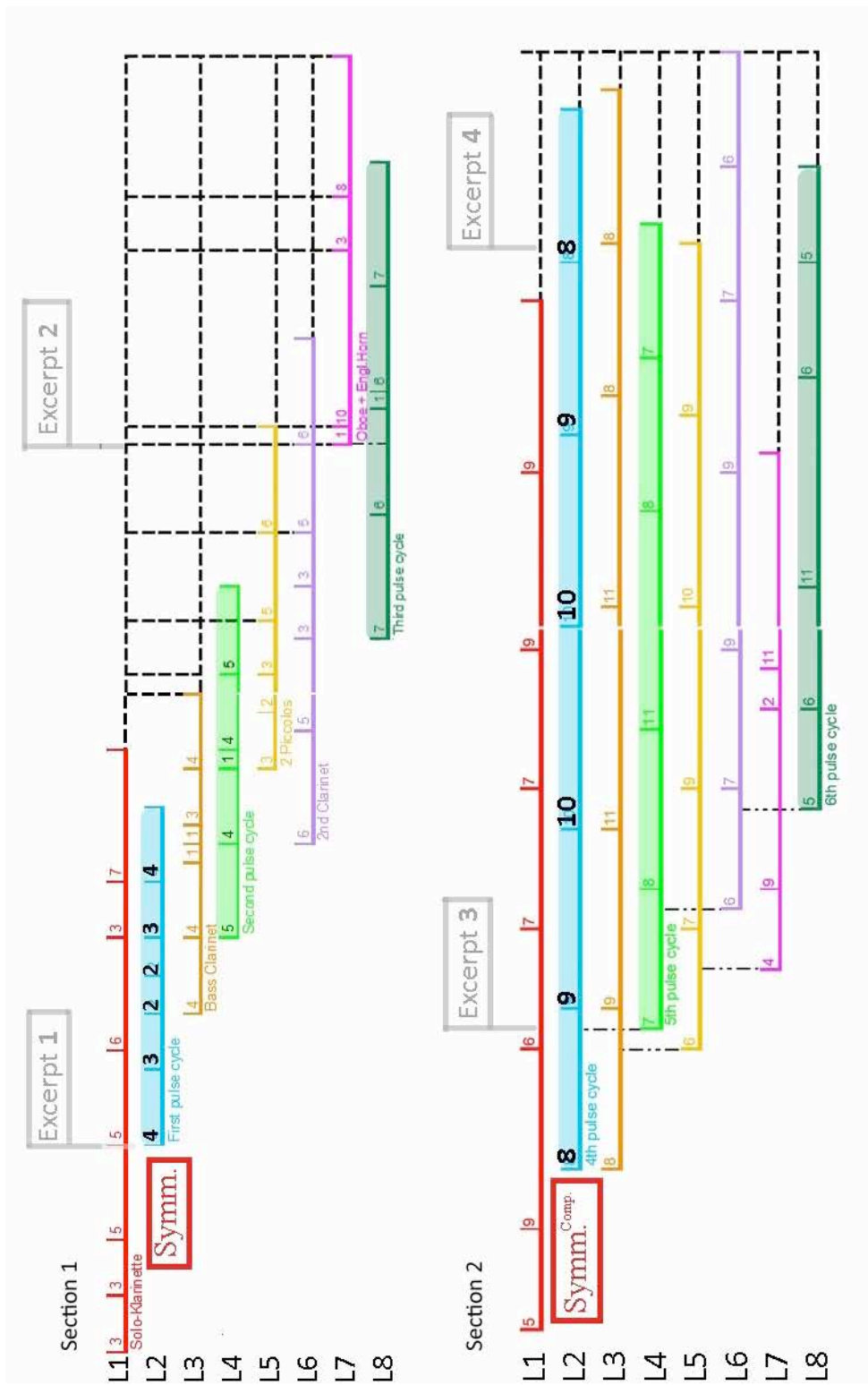
The impulses of Pulse Cycle 1 are easily recognizable within the score (see Example 2), as they are realized with accented brass chords. Seven bars later the bass clarinet enters, and in the last bar of this page, Pulse Cycle 2 begins with its first chord.

The chords in these pulse cycles are the eight basic chords that lie at the basis of the entire cycle of *Carceri d'Invenzione*. Let us consider one of these chords, the next-to-last chord on this page. Whenever this chord appears in one of my diagrams, it will be indicated with the red boxed "Symm." label.

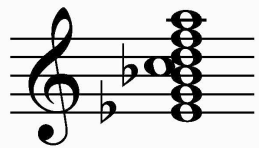
This chord is symmetrically constructed. The intervals are, from bottom to top, major third, minor third and major second, then another major second, another minor third and finally a major third. If one counts the half steps of these intervals a number series appears: 4-3-2-2-3-4. This series serves many functions, such as defining the lengths of measures 8 to 13: 4/8, 3/8, 2/8, etc. Out of this series Ferneyhough generates a number series that is the complement of the first series, using an index number of 12, as follows: 8-9-10-10-9-8.

On the formal scheme (see Example 5) one can recognize the Symm. series in the first half of the piece in the original version and in the second half in the clearly longer complement of this series. The other seven series Ferneyhough has generated from the basic chords of the cycle also appear in both original form and the complement of the original form. The disposition of these number series serves to generate a great deal of the densification process throughout the entire piece.

But what concrete functions do these numbers have for the structuring of the piece? They do not function as time-point intervals between the various trigger impulses; this would be too obvious. Let us examine Pulse Cycle 1 more closely. We will find a completely automated system here and discover its purpose.



Example 5: Form scheme



3+ = 4 semitones
 3- = 3 semitones
 2+ = 2 semitones
 2+ = 2 semitones
 3- = 3 semitones
 3+ = 4 semitones

Symm.

Symm. 4 - 3 - 2 - 2 - 3 - 4

Symm.^{Comp.} 8 - 9 - 10 - 10 - 9 - 8

Example 6: Symm. chord and measure-group series

Top-Down Procedure

Pulse Cycle 1 is partitioned into 4+3+2+2+3+4 measures, corresponding to the numbers of Symm. chord (see Example 7). The first group thus consists of measures 12-15. These consist of a 3/8 bar and three 4/8 bars, resulting in a length of fifteen eighths.

So *fifteen* is the definition for the number of impulses of the last bar in the group. The number of eighths in this last bar, i.e., four, is subtracted from fifteen, giving eleven, which is the number of impulses in the previous measure. Eleven minus four is seven, the number of impulses in the second bar, and seven minus four is three, the number of impulses in the first bar.

Through this procedure, the measures within a group will be progressively denser with activity, which is easily perceptible in the following groups of bars. Viewed in linear succession, this results in a sort of wave motion of density: in each case, there are few impulses at the beginning of a group of bars and many at the end of the group.

The somewhat even resultant rhythm of this process is, however, not self-evident when one looks at the score. Instead, only certain impulses are chosen and adopted as trigger impulses—in fact, only eight impulses in all of Pulse Cycle 1, marked here in red. The first five impulses we saw already in the first selection from the score; the brass chords occur precisely in these positions.

Why, then, was the rhythm of the pulse cycle so carefully planned, when only certain impulses appear in the composition? The answer lies in the *position* of these impulses: they do not necessarily appear at the beginning of a bar, but rather may occur in a precise position within a bar-spanning tuplet: for example, in measure 20 on the seventh of eight sixteenths (see Example 8).

Pulse Cycle 1

4 3 8

4 8

7:8

7 Impulses

4 8

11:8

4 8

11 Impulses

4 8

3:2

5:4

5:4

15

3 + 4 + 4 + 4 = 15

3 1 8

1 8

3 8

1 + 1 + 3 = 5

2 4 8

4 8

4 + 4 = 8

2 1 8

1 8

1 + 1 = 2

3 3 8

4 8

7:4

5 8

6:5

6:5

3 + 4 + 5 = 12

4 8

1 8

4 8

3:4

3 8

3:2

3 8

7:5

5 8

7:5

4 + 1 + 4 + 5 = 14

measure 20

Example 7: Aspect 2 of time organization: automatic process/top-down organization

20

Clar. 1

Bass Clar.

Hns. 1,2

Tpts. 1,2

Tbns. 1,2

Tuba

Perc. 2

Perc. 3

21

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Example 8: Excerpt 1, detail: measures 20-23

One can recognize this significant trigger impulse without difficulty both in the score and by ear. The effect on the remaining texture of Clarinet 1 and Bass Clarinet is that on the one hand, a new meter is defined ($\frac{3}{8} + \frac{1}{8}$ instead of $\frac{4}{8}$), and on the other hand, the polyphonic rhythmic shape of these two instrumental parts is suddenly cut off and replaced by an interlocked rhythmic and melodic shape. We will return to this shape later.

For now, we can say: At Excerpt 1 (see Example 2) we can recognize how the number series 4-3-2-2-3-4 (from the Symm. chord) already determines three elements of the texture: 1) it generates the measure lengths (measures 8-13), 2) it serves to organize the grouping of measures (measures 12-33) via the automatic process for trigger impulses within Pulse Cycle 1 shown before, and 3) it organizes the intervals of the brass chord that appears in the fifth aurally perceptible impulse of the piece.

Excerpt 2

Let us look now at a second excerpt of the score, from measure 60 on (see Example 5). In terms of duration, about a third of the piece has elapsed and two of the three initial pulse cycles have already reached their end. Other woodwinds appear here: two piccolos, a second clarinet, and two oboes. Toward the beginning of this excerpt we see the conclusions of the impulse-layers of the solo clarinet and bass clarinet. This does not mean that the instruments cease playing, but rather that they have surrendered their independence in favor of an integration into the other processual layers.

This new, coarse-grained homophonic structure in the woodwinds can be seen in the upper part of the score (see Example 9). At the bottom remain the triggering impulses from Pulse Cycle 3, played by Percussion 1. The trigger-impulses have broadened: their form is no longer a single accent, but rather each exists as a group of individual, smaller impulses. Furthermore, the single chords in the brass voices have become permuted surface-structures, very similar in overall form to the gestures in the woodwinds. The textural contrast between the brass and woodwind voices has thus been significantly weakened. The best example of this weakening and assimilation can be found in measures 65-66.

Measure 65 contains one of those broadened trigger impulses (see Example 10). It is defined by a linear and recursive expansion process. The basis for its construction is the group of three eighths at the beginning of the measure. The group of notes is repeated after an eighth rest, with one additional eighth note. The group is further repeated two more times, each time with an additional note added, thus producing an additional group of five, and subsequently six, eighth notes.

I have already mentioned such a recursive method at the beginning of this discussion, with regard to its effects on the tempo-development of the piece, acting as a sort of a global calibrator. The example here can be described as just such a calibrator at the smallest level, but exercising a no less meaningful influence on the evolution of the piece.

Example 9: Excerpt 2, measures 60-67

The musical score is for a full orchestra and includes parts for Piccolo 1 & 2, Oboe 1 & 2, Clarinet 1 & 2, Bass Clarinet, Horn 1 & 2, Trumpet 1 & 2, Trombone 1 & 2, Tuba, and Percussion 1. The score is divided into two systems. The first system covers measures 60-67, and the second system covers measures 68-75. The score includes various musical notations such as notes, rests, dynamics (p, f, mf, ff), and articulation marks. A red box highlights a specific section of the score, and a red bar is present at the bottom of the page.

Example 9: Excerpt 2, measures 60-67

Metrical Network

The figure shown in Example 10 is comprised of 21 individual impulses. To fit within the space of an 8/8 measure, the 21 impulses are divided into three groups of sixteenth-note values, which are further compressed by a 7:5 proportion, thus filling a space of fifteen sixteenths. To complete the measure, an additional sixteenth rest is added at the end of the figure. This figure is then further mirrored in the brass parts, but now with lessening degrees of compression: in Horn 1 the 16th-notes are reduced by only a 5:4 proportion; in Trombone 2 even less, by a 6:5 proportion; in Trombone 1 the figure appears in ordinary sixteenth-note values; and lastly in Horn 2 it appears—almost in slow motion—in eighth note triplets.

The relationship to the tempo organization becomes clear within the space of this single 8/8 measure: an elegant gesture comes into simultaneous relationship with itself, not to speak of the relationships present in the global tempo distribution. This is another independent dimension in the perspective of temporal organization.

The woodwinds are also involved with this procedure, as they have assimilated the original scaffold of eight eighth notes (see Example 9). This becomes clear when one sees that the proportional relationships are bounded by eight note intervals: they begin and end only at these points.

This interesting process of measures 65-66 is suddenly interrupted at the beginning of measure 67 by the next trigger impulse. Now, Oboe 1 and 2 present a no less interesting gesture, which should be familiar by now. We will come back to this moment shortly, but let us first examine briefly the remainder of the piece.

Excerpt 3

At the beginning of the second main part of the piece, the organization of the textural layers (shown in the formal scheme, Example 5) begins with the complementary, longer number series and a denser sequence of entries of the textural layers.

Excerpt 3 (Example 11) shows the situation after about 20 bars of the second section of the piece: all of the instruments are playing simultaneously, divided, however, into two mixed ensembles. Two simultaneous pulse cycles are driving the two ensemble textures (the lower percussion line presents the trigger impulses of our Symm. chord). The exact positions of the trigger impulses are determined through a similarly automated process as shown before. The main difference between the two sections is—as can be seen here in the score—that this latter process results in significantly more trigger impulses.

m. 65

Flz. 6:4 (1) 5:4 (1) 5:4 (1) 3 5:4 (1)

Hn. 1 *pp* poco *sempre sim.* *molto*

Hn. 2 *pp* poco *sempre sim.* *molto*

Tbn. 1 *pp* poco *sempre sim.* *molto*

Tbn. 2 *pp* poco *sempre sim.* *molto*

Perc. 1 *pp* *sempre sim.* *poco simile* *pp*

Idea:

3 4 5 6

Perc. 1 7:5 7:5 7:5 7:5

Horn 1 5:4 5:4 5:4 5:4 3:2

Tbn. 2 6:5 6:5 6:5

Tbn. 1

Horn 2 3:2 3:2 3:2 3:2 3:2

Example 10: Aspect 3 of time organization: local perspective within small space

Example 11: Excerpt 3, measures 109-115

The image displays a musical score for a symphony, specifically measures 109-115. The score is organized into two systems, I and II. System I includes staves for Fl 1, Fl 2, Ob 1, Ob 2, Hn 1, Hn 2, Tpt 1, Tpt 2, and Perc 2. System II includes staves for Clar 1, Clar 2, Bass Clar, Bsn, Tbn 1, Tbn 2, Tuba, and Perc 3. The score features various musical notations including notes, rests, and dynamic markings. A red box labeled 'Symm.' is located at the bottom right of the score.

Excerpt 4

By the end of the piece (see Example 12) the percussion impulses penetrate the surface, while the instruments gradually stop playing. A network of three simultaneous impulse levels remains, by which the alto flute as remaining solo instrument continues to be driven. This is the ideal transition state to the following work in the complete *Carceri* cycle, *Mnemosyne*, for bass flute solo and pre-recorded tape.⁴

As one can see from the rhythm sketch of the beginning of *Mnemosyne*, the texture is driven by six simultaneous levels of time organization. A small rhythmic cell with the proportions 2-3-1 is the main basis for the construction process of the piece. What follows is not an automatically determined top-down process as it appears in *Carceri d'Invenzione III*. Rather, employing a sort of mathematical topology, individual impulses are built up from the proportions present in their immediate environment. This new locally-generated organizational procedure is already suggested in *Carceri d'Invenzione III*.

Locally-Generated Procedure

I have already mentioned the so-to-speak "charming" oboe texture in measure 67 (see Example 13). Both oboes are playing the same rhythm, which in itself bears noting. The strict contrary motion at each rhythmic impulse underlines the homophony—the unity—of the gesture. Let us now take a moment to examine the rhythm of this phrase in isolation. It consists of two groups, each comprising four notes. The durational proportions relative to one another are 2-2-2-3 in the first group (counting the thirty-second-note triplets within the brackets), and those in the second group a far less-regular 4-1-1-6 (counting the sixty-fourth-note triplets, the smallest note value of this group).

Demonstrably similar in terms of the fixed rhythm and the contrary motion is the unified texture of the solo clarinet and bass clarinet in measures 21-22. Again it consists of four impulses, but this time with durations of 1-1-1-3 and 5-1-1-8. The oboe texture in measure 67 does not use these same proportions, but rather a distortion—regarding placement and number of equidistant impulses—of the clarinet gesture from measures 21-22. One begins to suspect that this may potentially contain the seeds of a new approach to generating material.

In the context of *Carceri d'Invenzione III*, the relationship between these two excerpts can be seen as a bracketing construction that projects a musical and temporal relationship across a span of many other independent materials.⁵

⁴ For an analysis of the complete cycle *Carceri d'Invenzione*, see Cordula Paetzold, *Carceri d'Invenzione von Brian Ferneyhough. Analyse der Kompositionstechnik* (Hofheim: Wolke Verlag, 2010).

⁵ In contrast to this example, consisting of four elements, the process in *Mnemosyne* is built up on the basis of groups of three elements. Further details can be found in my article, "... die meisterliche Entfaltung von Schichtenaufbau und Perspektive ...". "Organisationsstrukturen in *Carceri d'Invenzione*," in *Musik-Konzepte 140: Brian Ferneyhough*, Ulrich Tadday, ed. (Munich: edition text + kritik, 2008).

Example 12: Excerpt 4, measures 150-164 (*Carceri III* à *Mnemosyne*)

The musical score for measures 150-164 is presented in three systems. The instruments involved are Percussion 1, Percussion 2, Percussion 3, and Bass Flute. The score is divided into two main sections: 'Carceri III ends' (measures 150-154) and 'Mnemosyne begins' (measures 155-164). The 'Carceri III ends' section features a complex rhythmic pattern with various note values and rests. The 'Mnemosyne begins' section introduces a new rhythmic motif, marked by a red box and the text 'Mnemosyne begins'. The score includes various musical notations such as notes, rests, and dynamic markings. The percussion parts are marked with 'Perc. 1', 'Perc. 2', and 'Perc. 3'. The Bass Flute part is marked with 'Bass Flute'. The score is divided into three systems, with measures 150-154 in the first system, measures 155-159 in the second system, and measures 160-164 in the third system. The 'Carceri III ends' section is highlighted with a green box, and the 'Mnemosyne begins' section is highlighted with a red box. The score includes various musical notations such as notes, rests, and dynamic markings. The percussion parts are marked with 'Perc. 1', 'Perc. 2', and 'Perc. 3'. The Bass Flute part is marked with 'Bass Flute'. The score is divided into three systems, with measures 150-154 in the first system, measures 155-159 in the second system, and measures 160-164 in the third system.

measures 21-22

clar

bass-
clar

1 1 1 3 5 1 1 8

measure 67

ob 1

ob 2

2 2 2 3 4 1 1 6

Example 13: Aspect 4 of time organization: bracket/locally-generated

Conclusion

Through a close examination of four excerpts from the piece, I have attempted to demonstrate the basic process of thickening of impulses and interpenetration of musical textures over the course of *Carceri d'Invenzione III* (see Example 1). It is clear that this is in no sense a simple linear process, but rather the result of many individual proportional relationships, or rather the result of many processes across several levels of tempo, meter, and rhythm.

Although it is difficult to accurately describe the entire complex of interlocking processes, the tension field they create can be experienced as one listens to the work: I believe that this network of perspectives creates a sense of an extra dimension in the music. In visual art, it is possible to create this sort of multi-layer perspective, especially in the hands of a gifted artist such as the eighteenth-century Italian graphic artist and architect, Giovanni Battista Piranesi.

The title "*Carceri d'Invenzione*" comes from the series of etchings of the same name. The pictures are fascinating owing, among other things, to their ability to create perspectival effects of many different kinds. For example, a stairway begins in the very foreground right at the feet of the observer, inviting the viewer in a specific direction into the image. This path crosses arches and galleries and splits along the way, disappearing into the background and out of sight, although it seems to continue *ad infinitum*.

Piranesi creates a sense of perspective in which the same detail relates simultaneously to its environment and to that of the observer. Ideally, this occurs in all

possible perspectives, from very close and large to infinitesimally small and infinitely distant, as one can see clearly in the the picture.

Ferneyhough says, within the program notes to the first performance of the complete *Carceri* cycle in Donaueschingen, in the year 1986:

The *Carceri d'Invenzione* (...) impressed me, in first instance, by reason of their obvious intensity, richness and expressive power. After much subsequent reflection it struck me that it was the masterly deployment of layering and perspective which gave rise to this impression of extraordinary immediacy and almost physical impact. At one and the same time the observer is drawn ineluctably down towards the dark center while forcibly thrust away along centrifugal rays of absolutely non-naturalistic, mutually conflicting lines of force.⁶

⁶ James Boros and Richard Toop, eds., *Brian Ferneyhough: Collected Writings* (Amsterdam: Harwood Academic Publishers, 1996), p.131.



Example 14: Giovanni Battista Piranesi (1720-78): Untitled etching (called "The Drawbridge"), plate VII (of 16) from the series *The Imaginary Prisons* (*Le Carceri d'Invenzione*), Rome, 1761 edition. Source: "Giovanni Battista Piranesi," Wikipedia [web page] (http://de.wikipedia.org/wiki/Giovanni_Battista_Piranesi), accessed June 23, 2011.