CREATING MUSICAL MOMENTUM: TEXTURAL AND TIMBRAL SCULPTING WITH
INTUITIVE COMPOSITIONAL SYSTEMS AND FORMAL DESIGN

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This dissertation explores the analysis and creation of compositions from the standpoint of texture and momentum. It is composed of four chapters. The first chapter presents a number of concepts as tools for analysis, including textural typography and transformation, perception of time and psychological engagement of an audience, and respiration as a metaphor for musical momentum. The second and third chapters apply these tools to Gerard Grisey’s *Periodes* and *Partiels*, and Brian Ferneyhough’s *Lemma-Icon-Epigram*, respectively. The fourth explores specific methodologies used in composing my dissertation piece, *Phase*, including the application of number systems ranging from local to formal levels.
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PART I

CRITICAL ANALYSIS
Chapter 1
Tools for Analysis

Introduction – Historical Overview

When pitch is no longer the primary factor, other musical dimensions can be used to organize and create clear relationships between musical materials. Through clear differentiation of timbral and textural roles, systematic transformations of material, and control of musical density, periodicity, and momentum, composers can move beyond traditional approaches to create a visceral and engaging experience – which can be satisfying for both composer and audience.

Throughout the evolution of Western music over the centuries, composers have developed a variety of organizational frameworks for musical materials. In the fourteenth century, Machaut employed isorhythms in his motets; later composers such as Ockeghem explored the use of canon extensively during the Renaissance. The use of imitation and various contrapuntal techniques has been explored throughout history, including many methods of motivic development such as retrograde, inversion, augmentation, etc. During the eighteenth and nineteenth centuries, composers expanded previously used forms, most notably the sonata-allegro plan, which provided a way to present and ultimately combine two contrasting ideas through a dialectic framework. Beethoven brought this a step further by adding an extended coda at the end of many of his pieces, which would sometimes introduce new material as the result of synthesizing previously introduced and developed materials. The twentieth century has seen a revisiting of earlier methodologies, such as the employment of canon and, particularly in serial music, the use of motivic manipulations such as retrograde and
inversion. Examples include Anton Webern's *Symphony Opus 21*, *Structures* by Pierre Boulez, *Quatuor pour la fin du temps* by Olivier Messiaen and the many pieces for player piano by Conlon Nancarrow.

The twentieth century has also seen radical developments in exploration of musical dimensions such as rhythm and timbre, and in the organization of these and other elements. The radical extension of harmonic practice by such composers as Schoenberg, Webern and Boulez opened new ways to express ideas and to differentiate materials.

Timbre became a realm of greater importance, especially at the turn of the century: *klangfarbenmelodie* was a concept introduced by Schoenberg and later developed by such composers as Helmut Lachenmann in works such as *Pressions* for cello and *Mouvement* for chamber orchestra, which emphasized timbre over pitch. With the aid of computers, new processes and sounds became available, including the analysis of sound spectra and performance of complexities beyond human capabilities. Spectralists explored a new continuum as they sought to codify ways of thinking about pitch in its connection to timbre. A focus on musical sounds and behaviors as processes led toward forms that are more concerned with process of transformation than with clear definition of musical materials and identities.

Changing approaches to musical material and form yield new results, posing additional and different (often unanswered) musical and phenomenological questions.¹ Two schools emerging in the second half of the twentieth century – Spectralism and Complexity – apply different approaches to the processing of compositional material and the development of formal models. Spectralism deals not with the individual events

as much as with the resulting composite sonic experience. Examples of compositions derived as an expression of naturally occurring sonic phenomena include Grisey's Partiels and Modulations. “Complexity” may apply algorithmic processes to generate and develop materials. Recursive operations continually renew and recycle old materials, sometimes producing innovative results as in the case of Brian Ferneyhough's Lemma-Icon-Epigram.2

Within this essay, momentum will be used to describe innate characteristics of musical energy. As an overarching theme, a number of musical textures will first be categorized followed by ways of transforming them, and a subsequent exploration of organizing these concepts on a formal level. An analysis of Periodes, Partiels and Lemma-Icon-Epigram using these concepts will be followed by an investigation into the construction and completion of my dissertation piece, Phase.

Sound

Throughout the exploration of new forms of musical expression in the twentieth century, new ways of both listening to and composing music emerged.

Sound vs. Note

Kramer's claim about Debussy may illuminate the beginning of a new way of thinking about sound for its own sake. In reference to hearing a Javanese gamelan orchestra, perhaps at the world's fair,

[Debussy] understood that the strange sounds he was hearing were unfolding in a different time world. He heard sonorities that were allowed to be themselves, that did not exist primarily in functional relationships to other sounds, that were not participants in an upbeat-

2 Toop, “Brian Ferneyhough's Lemma-Icon-Epigram,” 52.
In a preponderance of music prior to the twentieth century, musical organization derives from the atomic particles at the “note” level. Though thirty years later than Debussy, and perhaps as a development of this way of thinking, Spectralism prioritizes the resulting sonic composite over its construction at the level of individual notes. Grisey describes the evolution of a sound as follows:

To take account of the relativity of perception: if the music is the becoming of the sound, rather than the sonoric object proper, the metabolism will have to be controlled – what I call its “degree of transformation” – in other words its voyage in time and its adventure.⁴

In many cases, the individual pitches matter less than the overarching trajectory of the gesture. In the case of stochastic composition, which informs many of the choices and methodologies in the creation of *Phase*,⁵ the desired effect results from a statistical approach to the creation of musical elements and their development, examples of which will be explored later in *Phase*.

Consonance vs. Dissonance

In Spectralism, new ways of thinking about old dialectical models emerged. Grisey did not think of consonance in the same way as common practice composers, though he did not entirely abandon the equal-tempered pitch world. Figure 1.1 illustrates Hindemith’s categorization of the consonance $\leftrightarrow$ dissonance continuum within the realm of equal temperament.

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⁴ Grisey, *Periodes*, performance notes.
⁵ The music of Iannis Xenakis provides a good representation of stochastic music. Much of his music is governed by the application of algorithms and statistics.
Spectralists view this scheme as a subset of a continuum between harmonicity and inharmonicity: pure spectral consonance followed by an increasing harmonic dissonance leads to pure white noise. Within this model, two or more instruments playing the same note create dissonance merely by their differing timbres. Through analysis, the spectral profile of a flute most resembles a sine wave, while a clarinet bears a greater semblance to a square wave. The two instruments do not blend as purely as do flute and bowed vibraphone, the latter of which also bears semblance to a sine wave. If struck, the attack differentiates the vibraphone from the flute immediately, while bowing gives more control over the length of the sustain envelope. Thus, certain instruments may blend better because they share similar attack and sustain characteristics.


Electronic music has given us terminology for describing the different phases of a sound’s evolution over time: the ADSR envelope model, consisting of attack, decay, sustain, and release phases.

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This can be applied to various elements of a sound, such as timbre, spectral extent, spectral harmonicity, vibrato, and so forth. Depending on the sound and how the sound is generated, each phase can have varying lengths, often highly controllable by the player, as in when a key is released or how a player applies bow pressure and speed, or varies breath. The attack phase of a sound’s envelope can be slow, as in the case of gently introducing a sustaining clarinet from niente. It can also be immediate, as in the case of a piano attack. In the case of piano and percussion, notes generally begin to decay soon after struck though in fact, usually some elements of their spectra will “blossom” after the initial attack; the envelopes of real-world sounds are neither singular nor unified between sonic dimensions. Length of the sustain varies per instrument and in the case of the piano is not controllable by the player, whereas strings, brass and woodwind players can modulate and control both the attack, sustain, and decay depending upon the players intent. Pitched instruments produce a periodic waveform, making a piano distinguishable from an oboe, for example. Sustain exists as the continuation of the instrument's waveform. This process results in what is described in electroacoustic music as ADSR: attack, sustain, decay, release.

Though initially used with regard to synthesized sounds, ADSR modeling can also be used as a compositional tool by acoustic composers in the application of musical gestures, phrases, sound masses, and the “fusion” of the attack by one instrument to the sustain of another. As an application of ADSR modeling to acoustic analysis, the following example illustrates how Edgard Varèse fuses drum and cymbal attacks with a number of brass instruments to control the sustain and decay of a chord.
Notice how the clarinet and trumpet attacks in the first two measures are coupled with a cymbal. Also, the horn decay in m.16 is followed by a dramatic crescendo, and the release is marked by a combination of bass drum, cymbal and tam-tam.

Another example of Varèse’s work illustrates the transformation of timbre as the gesture evolves.
By beginning with the tenor trombone and overlapping the attacks of the bass trombone, French horn, and lion's roar, before returning to the bass trombone at the end, Varèse crafts the envelope of the gesture, simultaneously adding textural support.
in the percussion. This would be an example of “strange sounds unfolding in a different
time world.”

**States of Sound**

Composers have searched for new ways to identify and categorize various
characteristics of sound in the service of new aesthetics, including computer music.
Dennis Smalley attack-effluvium continuum illustrates a number of states to which
parallels in the physical world can be made. He defines the extremes as particle vs.
solid; the former he calls an attack “impulse” and the latter the “effluvial” state. Figure
1.2 shows Smalley’s continuum between the two extremes, including intermediate
states, where perceivable periodicity and individual notes no longer prevail; the sound
exists as an unstable, “granulated” state.

*Figure 1.4, The Attack-effluvium continuum.*

An attack impulse can be any single point of sound, or a single waveform.
Examples include short bursts of noise, like the striking of a woodblock, or a hammer on
a nail. A “pure” attack impulse does not have an identifiable “sustain,” but exists merely
as a point in time.

Iteration could best be described as a repetitive cycle below the threshold at

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7 Kramer, *The Time of Music*, 44.
9 Ibid, 72.
which humans perceive an identifiable pitch. On the Bösendorfer Imperial grand, the lowest note C (16.35Hz) is barely identifiable. At higher frequencies, the “effluvial” state is no longer perceptible as a series of single events, as is the case of the “iterative” state. Instead, the sound congeals into a fluidly constant, possibly identifiable pitch—or in the case of a cymbal crash, a sustaining flow of noise.

However, the iterative state may contain variation within it, such as the change in the frequency of repetitive attack impulses by either accelerating or decelerating. There also exists a state between these two states: “granulation,” not recognizably iterative nor fluidly constant, exists as an erratic cross between the two. Within the “granulated” state it is possible to move to either extreme: just before the congealing of an effluvial state, or to the point just before the sound becomes noticeably iterative. Though written initially in reference to computer music, Smalley’s concepts may be universally applied.

**Periodicity**

Though not restricted to the innate nature of a sound as previously described by Smalley, another word for iteration is periodicity. Within any pitched sonority there exists a natural periodicity, expressed through the repeating waveform, which makes it unique.

Periodicity can exist on local, rhythmic, and formal levels. On a local level, it may be an exploration of evolving texture and timbral phenomena, including “beating.” On a rhythmic level it may be perceived as motor rhythm, metric regularity, or metric and tempo variance. On a formal level, it may be perceived in the rising and falling of energy from phrase to phrase, section to section, and movement to movement. Depending on

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10 Two simultaneously occurring sine waves with frequencies of 440Hz and 441Hz result in phase cancellation, experienced as the phenomenon of ”beating” at the rate of 1Hz. If the two frequencies are 440Hz and 490 Hz, respectively, the result produces a perceivable “difference tone” of 50 Hz.
how it is used, periodicity, or the lack thereof, can create engagement on the part of the listener.

Periodicity as a Compositional Element

We do not consider periodicity as either basic material nor as the unit of rhythmic structure, but the most simple, most probable phenomenon; it is tempting to see it as an ideal point of reference for the perception of time, as is a sinusoidal sound for the perception of pitches, but not at all the a priori foundation of a hierarchical system. We would as well have the same attitude to consonance.11

From this statement, we can conclude that Grisey's subsequent classifications of materials in the following table are meant to apply not only to rhythms, but to harmonic (tonal and non-tonal) and timbral materials as well.

*Table 1.1, Classification of intervals and of timbre.*12

<table>
<thead>
<tr>
<th>Classification</th>
<th>Predictability</th>
<th>Ordering</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Periodic</td>
<td>Maximum predictability</td>
<td>ORDER</td>
</tr>
<tr>
<td>b) Continuous – dynamic</td>
<td>Average predictability</td>
<td></td>
</tr>
<tr>
<td>1) Continuous acceleration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Continuous deceleration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Discontinuous – dynamic</td>
<td>Slight predictability</td>
<td>DISORDER</td>
</tr>
<tr>
<td>1) Statistical acceleration or deceleration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Acceleration or deceleration by stages or elision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Statistical</td>
<td>Zero predictability</td>
<td></td>
</tr>
<tr>
<td>1) Complete re-division</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Unpredictability of divisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Maximum discontinuity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Smooth – rhythmic silence</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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12 Ibid, 244. In the original table the full title was: “Classification of intervals (by their degree of dissonance) and of timbres (by the extent to which they are non-harmonic).”
Static and Dynamic Periodicity

Repetition, continuous acceleration or deceleration provide predictability and inherently set up expectations in the listener. The following example demonstrates the application of this concept to compositional materials.

*Figure 1.5, Continuous and static periodicity, Grisey, “Periodes, p.15.”*

The first nine beats of the page demonstrate the gradual, yet relatively continuous deceleration of a texture. If broken up into three-beat cells, the flute, clarinet, violin, and viola each exhibit a continuous decrease in density by reducing the number of attacks in each three-beat cell. This dynamic periodicity is followed by an example of static periodicity, wherein the materials repeat themselves.

Changes in periodicity will be easily recognizable in the case of continuous acceleration or deceleration. In the case of statistical acceleration, predictability will decrease as the pattern becomes more irregular, but the overall trajectory remains

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perceptible nonetheless.

*Figure 1.5, Statistical acceleration.*\(^\text{14}\)

Discontinuous change is not as reliably predictable as its degree of change is thwarted through interruption or modulations in the amount of change.

*Figure 1.6, Acceleration by elision, (discontinuous).*\(^\text{15}\)

In both cases, the overall phenomenological effect is that of rising tension. In the latter, momentum is gathered through increasing acceleration and thwarted expectations as result of a, c, and e being disrupted by the “interruptions” b and d. The length of each section a, c, and e become progressively shorter, and the rate of acceleration continues to be heightened in each subsequent segment.

Grisey goes on to conclude that:

> All sounds can be given a duration...dynamic curves, changes in timbre, sound quality and vibrato, or, more generally, the actual form of a sequence or sound, constitute as much material as one can rhythmically

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\(^{14}\) Grisey, “Tempus ex Machina: A composer's reflections on musical time,”, 253.

\(^{15}\) Ibid, 252.
Dynamic periodicity (i.e., deceleration and acceleration) can refer to frequency, tempo, additive or subtractive rhythms, gradual compression (or decompression) of time signatures, and gradual changes in as many parameters as one can imagine and manipulate, including density and temporal transformations of texture. As intervals, rhythmic profiles, textures, and timbres change, the descriptions of predictability can be applied to how they change. As predictability and expectations affect our perception and emotions, awareness of the effects of predictability, as well as the setting up and thwarting of expectations in these dimensions, becomes essential in crafting a composition.

Respiration (Macro-Periodicity)

“Respiration” will be used to describe how momentum and materials are organized compositionally. Grisey describes natural occurrences of periodicity, what he refers to as “soft periodicity,” as follows:

“...Our heartbeat, our breathing, the rhythm of our walk and doubtless many other unknown rhythms (our nerve impulse, for example) are never as rigorously periodic as a clock; they vary around a time constant...”

Respiration is a complex example of periodicity comprised of up to four phases: inhalation, retention, exhalation, and suspension. Due to its cyclical nature, each stage possesses its own characteristic energy, momentum and implicative set of expectations. An inhalation requires storing energy, represented by a particular dynamic curve—like climbing up a hill, which can ultimately go only so high. As the peak of the inhalation is reached and momentum subsides, it transforms into the next stage of

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16 Grisey, “Tempus ex Machina: A composer’s reflections on musical time,” 244.
17 Grisey, *Periodes*, performance notes.
respiration. Retention exemplifies stasis with high potential energy, as the breath is stored. Even as the breath is retained, tension builds as the expectation of (and need to) release increases. Release of the breath represents a transformation from potential to kinetic energy, while generating momentum as the breath builds, peaks, and subsides. Suspension, the last stage of respiration, embodies stasis with low potential energy. Following an exhalation, a longer suspension may build tension through the expectation of a subsequent inhalation.

Combining the two aforementioned categorizations begins to approach how these materials can be used with compositional intent. The following table compares the various states of momentum, as described by Grisey and Smalley.

Table 1.2, Integration of Smalley’s textural categorization and Grisey’s periodic table.

<table>
<thead>
<tr>
<th>Grisey</th>
<th>Smalley</th>
<th>Momentum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodic</td>
<td>Static (holds potential energy)</td>
<td>Static (holds potential energy)</td>
</tr>
<tr>
<td>Continuous – dynamic</td>
<td>Iterative with change in rate</td>
<td>Yes</td>
</tr>
<tr>
<td>Discontinuous – dynamic</td>
<td>Quasi-iterative/granular</td>
<td>Yes</td>
</tr>
<tr>
<td>Smooth</td>
<td>Effluvial</td>
<td>Static</td>
</tr>
</tbody>
</table>

With this in mind, musical materials can be logically applied to generate momentum as needed within a respirational model. In this paper, the aforementioned terminology will be used to analyze musical materials in *Periodes, Partiels, Lemma-Icon-Epigram*, and *Phase*.

Textural Transformation: Magnification

Let us imagine ourselves . . . contemplating the water at the edge of the river, then progressively, mentally reduced to the size of the molecules of water until we ourselves become molecules; we would certainly be surrounded by an unheard of landscape, but would we still feel the force
which sweeps these molecules of water out to sea?\textsuperscript{18}

As an example of dynamic periodicity, Grisey describes a metaphor of changing natural states: the phenomena of “magnification” as applied to water. While looking at water and magnifying it to an atomic level, perception passes through different levels as the states become clearer: first a homogenous substance, then a differentiation into particles – molecules, atoms, subatomic particles – and finally, quarks. In \textit{Partiels} and \textit{Tempus ex Machina}, Grisey expresses these states musically, as well as gradual transformations between them. At times, Grisey combines discernible layers of more than one state.

\textit{Figure 1.7, Textural acceleration, Tempus ex Machina, p. 11.}

Above, Grisey creates a statistical acceleration of a blurred state including elements of iteration and granulation. The clear overall trajectory creates an expectation of

\textsuperscript{18} Grisey, “\textit{Tempus ex Machina}: A composer’s reflections on musical time,” 268.
continued compression.

By extension, one may “stretch” an attack impulse enough to “see” (hear) the surface of a point by extreme magnification. There are two perspectives to this approach, the abstract and the physical. From an abstract perspective, a point exists with no area, regardless of the amount of magnification. From a physical perspective, though minute at a certain distance (tempo), the object would increase in size (duration) as the tempo decreases, as if one were approaching a planet from afar. Sonically, a point has some perceptible duration, otherwise it wouldn't exist; to stretch an attack impulse would reveal its innate duration. Grisey magnifies the sound through deceleration in the following example.

*Figure 1.8, Magnification, Tempus ex Machina, p. 14.*

The *sforzandi* mark the attack of each gesture, which continue to increase in length and decrease in density.
States of Time

One may first simply ask, what is time? How many kinds of time are there? Though certain varieties of time may be regarded as precise, perception of time is variable and unique to the individual. Thus, further differentiation of perceived and measured time needs to be made. Ferneyhough addresses this issue regarding the listening experience:

When we listen intensively to a piece of music there are moments when our consciousness detaches itself from the immediate flow of events and comes to stand apart, measuring, scanning, aware of itself operating in a 'speculative time-space' of dimensions different from those appropriate to the musical discourse in and of itself. We become aware of the passing of time as something closely approaching a physical, objectivized presence.19

Kramer refers to "ordinary time [as] absolute time, especially as agreed on by social convention."20 There is also "chronometric time, [the] articulated time set up within a musical measure and larger units (meter)."21 And finally, "psychological time – Stravinsky's term for subjective time, in which durations may be distorted from their absolute-time norm."22

The first two are mathematically identifiable; the third implies that time may be perceived as a pliable current, uniquely experienced by each individual. Ultimately, composers have the opportunity to harness and manipulate two phenomenological extremes including the area in between “time flies when you're having fun” and “time stands still.” The first instance requires no explanation, though perhaps mystical in

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19 Ferneyhough, Collected Writings, 43.
21 Ibid, 452.
22 Ibid, 454.
creation. When first speaking of timelessness (“time stands still”), silence may come to mind — experienced either as boredom (“when will this ever end?”) or a state of surrender to the never-ending (vertical time) moment.

In the linear mode, time is directional, a duration carrying us from the past into the future; the present is always fleeting away behind us. In the nonlinear mode, however, the present exists, and is all that exists.23

Kramer speaks of “vertical time” as “the temporal continuum of the unchanging, in which there are no separate events and in which everything seems part of an eternal present.”24

Without a reference point, how can time be measured? Periodicity provides stability and predictability, thus providing the detached listening mind a way to experience time via changes in tempo. “Time” in music is often measured through periodicity controlled through tempo. But what about music without overt periodicity? John Cage’s 4’33” was impactful in this regard, in that it framed the silent container traditionally filled by music.

Temporal Expansion and Contraction

As previously discussed regarding periodicity, the perception of time can be divided into three categories: “micro” reflects our experience of time moment to moment; “middle” may be per phrase or period; “macro” can be applied to experiencing sections and the overall form of a piece. Regarding the micro level:

Let us imagine a sound event, A, followed by another event, B. . . If the sound B is entirely predictable, time seems to move at a certain speed. By contrast, if the sound B is radically different, and virtually unpredictable, time unfolds at a different speed.25
The most obvious example of predictability would be a metronome, or the second hand of a clock. In both cases, we have a good chance of accurately merging perceived with chronometric time. Grisey speaks to the experience of timelessness regarding music:

A series of extremely predictable sound events gives us ample allowance for perception. The slightest event acquires an importance. Here, time has expanded . . . The acuity of auditory perception is inversely proportional to that of temporal perception.26

Examples of minimalism exemplify the success of music drawing in a listener by the conscious use of predictability. Enjoyment is derived from experiencing an environment created for focused listening. Small changes are made obvious and can be minutely manipulated by composer and perceived as listener. The opposite effect can be achieved as well:

There must exist holes in time, analogous to what aeroplane passengers call "air pockets". Chronometric time is never obliterated, but our perception of it can overshadow the linear aspect for a more or less brief instant. Thus, for example, an unexpected acoustic jolt causes us to skate over a portion of time. Sounds perceived during the ensuing moment of readjustment — a moment which is necessary for us to regain a relative equilibrium — no longer have anything like the same emotional or temporal value. This jolt which disturbs the linear unfolding of time and which leaves a violent impression in our memories, makes us less likely to grasp the shape of the musical discourse. Time has contracted."27

Cohesion, Contrast, and Saturation28

Another example of predictability will demonstrate a number of relevant phenomenological concepts from a compositional perspective. Imagine a metronome or clock: One might become desensitized by the experience of listening; expectations may

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26 Grisey, Tempus ex Machina, 258-259.
27 Ibid, 258-259.
28 As discussed at length in lessons with Richard DeRosa.
become fulfilled enough so that prolonged immersion (*saturation*) in the experience of *cohesion* creates a potential “need” or “want” for another dynamic to be developed – i.e., *contrast*. If the imaginary metronome began to make every other “click” slightly different, a listener might at first be shocked and/or fascinated. Perhaps the alternating timbre could be developed in such a way that the semiotics of the “metronome piece” could engage attention for a while, reengaging and avoiding *saturation* by carefully (and artfully) crafting the *contrasting* material with *cohesion* in mind. An excellent example is *Come Vengono* by Salvatore Sciarrino, where “tongue attacks” dominate:

*Figure 1.9, Sciarrino, Come Vengono, opening.*

![Figure 1.9, Sciarrino, Come Vengono, opening.](image)

Extreme, prolonged cohesion with well-placed accents and dynamic swells thwart expectations of continuation just long enough for contrast to reengage attention, playing right at the edge of the saturation point.

**Structural Gap**

Imagine watching the second hand of a clock, when all of a sudden it stops. Most likely as an observer, either alarm or fascination would ensue; in either case, one's perception of time will be affected. In the moment, one might experience a “pocket in time,” requiring a moment to “readjust.” Regardless, the unpredictable event changes our perception of time and events. The stopping of the clock demonstrates a concept
Leonard Meyer introduced as the structural gap, wherein an expectation is not fulfilled for the listener. Meyer posits that emotion experienced by a listener is induced as a result of these “structural gaps,” as well as by subsequently “closing the gaps.” An example in tonal music includes the deceptive cadence where the expectation of the tonic, I is thwarted. An upcoming significant cadence to I may be experienced as closing the gap. If a pattern goes uninterrupted, we may be unaware of it; when a pattern is interrupted, we may be more aware of its interruption than of the pattern itself.30

Within the respirational model, momentum and tension can affect our perception of time. Tension can make moments seem to last longer or shorter than they actually do. A static moment of retention so charged with potential energy can make seconds feel much longer. Insofar as musical situations can evoke visceral reactions, the perception of time is at the mercy of the composer.

Form

Accepting that individuals’ experiences are unique, can a composer manipulate the listening experience of an audience member? Grisey states:

One of the most arduous tasks for the composer will be to determine up to what point complex structuring affects perception in a non-negative way. On either side of such a point are two poles of boredom due to a lack or saturation of information, but this threshold is not any less dependent upon the complete subjectivity and responsibility of the composer.31

Trajectory and Momentum

Momentum describes “force” associated with trajectory. Traditionally in the

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31 Grisey, Tempus ex Machina, 245.
physical world, moving objects continuing on a path are referred to as having “trajectory.” Smalley refers to various kinds of “trajectories” within the sonic space. First, trajectory can refer literally to a sonic object moving across the aural landscape. As a corollary, stasis refers to a stationary sonic object. In physics, the formula for an object’s momentum equals speed x mass. With regard to music, especially in acoustic music where sound objects are not spatialized with the use of technology, can the musical material still have momentum? In addressing this question, one of the purposes of this paper is to explore the innate energetic qualities imbued in musical material, and how arrangement on a formal level can create, guide, and thwart such momentum.

Thus, momentum, trajectory, states of sound, energy, and the fulfillment or subversion of expectation are all considered in the creation of a form, on the micro, middle and macro dimensions.

Creating Momentum and Temporal Immersion

How does music create momentum? According to the New Oxford Dictionary, momentum is defined as “the impetus and driving force gained by the development of a process or course of events.”

In physics, the “course of events” or “process” may be naturally occurring or intentionally induced physical or chemical reactions. For this essay, Kramer expands the definition to include numerous descriptions of the ways an audience experiences time. In music, the course of events may be related back to the earlier definition of cohesion. Kramer speaks of this another way, stating that linearity is, “[the] principle of composition and of listening under which events are understood as outgrowths or

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32 The Oxford Dictionary Online
consequences of earlier events."\textsuperscript{33}

Establishing the semiotics of an unfamiliar musical work helps an audience experience it on anything other than the “sensuous” plane.\textsuperscript{34} However, I am not convinced of Kramer’s assertion that non-musicians listen to music completely holistically. In the case of Western music, listeners to contemporary pop music (in which a final cadence has often been eliminated completely by means of the “fade out”) may be familiar with the V – I paradigm, whether or not they understand the concept. I would posit that a certain amount of cultural programming has instilled the necessary information to take in the “folk music” of our time. Certainly, music education helps a listener to improve their analytical approach to listening, the part that hears details and relationships.\textsuperscript{35} However, in the case of unfamiliar aesthetic approaches, the piece itself is the education. The music needs to educate its audience as to its own internal relationships. Some “goals” may not be so difficult to teach, as in the case of a compressing texture. Perhaps in the event of “magnification,” the understanding that something is happening may be all that is necessary – resulting in a visceral experience of the process.

Thus, the composer is responsible through clarity, orchestration, and form to sonically illustrate important internal musical relationships, significant events, and their potential consequents. To the extent that these relationships can be perceivable by a listener as a result of providing adequate sonic markings, subsequent psychological manipulations of expectations can be reinforced and eventually thwarted – providing what Meyer states as the cause for emotion.

\textsuperscript{33} Kramer, \textit{The Time of Music}, 453.
\textsuperscript{34} Copland, \textit{What to Listen for in Music}, 9-19.
\textsuperscript{35} Kramer, \textit{The Time of Music}, 453.
Affect or emotion-felt is aroused when expectation . . . activated by the musical stimulus situation, is temporarily inhibited or permanently blocked.36

Kramer refers to goal-directed time as a “temporal continuum in which events progress toward predictable goals.” When exerting oneself climbing a mountain, time may seem to expand or compress as one both anticipates and arrives at the top. Achieving the goal, the climber may experience a sense of joy and timelessness. If however, one reaches instead a plateau at which point another incline must be ascended before reaching the top, one’s expectations have been thwarted, resulting in a different emotional state. Perhaps one might simply enjoy the process (climb) itself, though the expectation of reaching the peak may provide even more satisfaction.

The experience of musical form obviously demonstrates similar characteristics. What if, instead of reaching the expected peak, musical climax, or end of a plateau, a section of cohesive saturation is prolonged for an undetermined amount of time – long enough that the expectations of reaching the top subsides? Musically, enough time would have to elapse in order to erase prior memories, in which case one experiences temporal immersion. The use of temporal proportions to induce such states will be discussed later in this paper.

“Monkey Wrench”

Meyer refers to a number of elements necessary for a pleasant emotional experience as being (emoticons added):

. . . first arousing apprehension, then dispelling it. . . 😜37

37 Emoticons are used to semiotically represent emotional states.
Musically, we must first arouse apprehension through expectation (or thwarted expectation). In either case, the expectations must first be established. In the case of a structural gap, apprehension is resolved as the gap is closed. In a different paradigm, however, the gap is never closed: A || B || A/B → synthesis/transformation → C.

With the creation of longer works, form becomes increasingly important. By opening a new gap in the midst of overall cohesion, there exists opportunity for creating engaging, unexpected, and “believable” contrast. Ideally, the contrast comes as a welcome, and very unexpected surprise. Placement is of utmost importance: perhaps at the peak of a climax, at the point of saturation, or even when the audience may have been “lulled” into a sense of contentment. Not just a contrasting section – but also the essence of the piece: the phenomenological twist of opening this special gap serves multiple purposes. First, it must be extremely memorable, and second it must be satisfying to the point that the opening of the gap makes closing it inconsequential. This special formal device needs a name – for the purposes of this essay it will hence be referred to as a “monkey wrench.”

Making drastic contrast “believable” requires providing a connected context wherein it may exist. In Waver, the monkey wrench occurs in the middle: bowed vibes producing “beating” by pitch bending the same note against itself.

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39 David Bard-Schwarz uses ! and ? as means of adding emotional emphasis to musical analyses.
40 Coined in lessons with Christopher Moore.
Up to this point, all six players had played simultaneously and amounted to great volume and density. What makes it work in this case is the stark change in texture: stark, quiet, sustained, pitch monophony. The piece started with sustained noise, and then introduced particulates of pitch. Formally, the sustained pitch of the vibes comes as the next logical structural development. Contextually, the entire piece’s structure demonstrates wavering, including the way the instruments spatialize from one player to the next making the sound “waver” across the stage. In these ways, the piece foreshadows the “wrench.” Thereafter, the new texture is not abandoned, but incorporated – closing the gap.

In the case of Limud, the piece ends with all the players whispering the text,

*Figure 1.11, End of Limud. mm. 222-226.*
which opens a phenomenological, developmental door, providing a glimpse of new possibilities that are never fully explored, thus leaving the gap open. Both of the previous examples provide stark dynamic shifts in contrast to what preceded them. Thus wrenches come in all shapes and sizes, depending upon the tastes and tendencies of the composer deciding to use them.

An excellent example of this concept from popular culture is the 1984 blockbuster film, *Ghostbusters*. The movie climaxes with the absurd introduction of a one hundred-foot marshmallow man destroying New York City. What makes this scene effective is the way the movie provides opportunities for the suspension of disbelief throughout, such that when the ultimate wrench occurs, we buy into the premise.

Meyer explains that “pleasure” results from a belief in some degree of control over a mildly fear-provoking experience. A monkey wrench fulfills the need for belief in control over an unresolved, potentially “dangerous” musical situation. *Periodes* contains an example of a musically successful monkey wrench, when in the middle the work, the violist “tunes” the instrument:

*Figure 1.12, “Monkey wrench” Periodes, p.32*

While this event is theatrically evocative, it makes perfect musical sense as a soloist providing periodicity through “beating” in the context of the work. A monkey
wrench can heighten the sensuous experience in unexpected, yet — in retrospect —
seemingly inevitable ways. In the best monkey wrenches, there is a re-contextualization
of previous material in a new way.

The end of Partiels offers another kind of wrench, one where apprehension is
induced, and the impending expectation is not realized.

Figure 1.13, End of Partiels

The notes read:

Raise the arms, excessively restrained, mysteriously and formally. With muscular
and psychological tension hold them ready for an impending fff attack.41

Though not essential, theatrics can be effective in producing visceral dramatics,
and thus creating a successful monkey wrench. The overall importance of the concept
is such that it bears a name and serves a special phenomenological function and, if not
named, may not come into play as viscerally both in analysis and in the phase of pre-
composition, which may make a difference.

41 Grisey, Partiels, 63.
Chapter 2
Analysis of Gerard Grisey's *Periodes* and *Partiels*

*Respiration: Macro-periodicity*

As a way to organize the form of *Periodes*, Grisey refers to a “three-part cycle” in his program notes regarding periodicity and the concept of “respiration.” According to Grisey, *Periodes* explores the compression and expansion of periodicity. In so doing, the music expresses the perceptions of various respiratory “states.”

*Figure 2.1, Respiration in Periodes.*

Each rest area...exercises an authentic force of attraction and repulsion on the development of the sound. Each cell contains microphonic elements which...become altered...up to maximum tension and complexity. This first stage corresponds to *inhalation*. A different direction follows...we gradually enter into the sphere of attraction to the next cell; to return gradually to calmness and simplicity. This second stage corresponds to *exhalation*.

Grisey has re-contextualized the notion of periodicity to include a non-tonal harmonic procedure. In this case, periodicity includes a harmonic oscillation of increasing and

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42 According to Grisey, *Periodes* is titled in reference to the respiration cycles. “How does the evolution off textural/timbral modulation develop through the course of the respirating cycles in *Periodes*?” is a topic for further study.

43 Grisey, *Periodes*, Program notes.

44 Ibid, program notes.
decreasing complexity. Grisey creates pillars of harmonic stasis and the intermediate state of harmonic complexity as sonorities transform between these two states. Within *Periodes*, there are four such cycles.\textsuperscript{45}

Grisey also uses process of respiration to create momentum. Within the periodic cycles, Grisey respects the innate energetic attributes of each respirative phase while varying the timbral and textural characteristics. In this case, the respirative periodicity and the timbral variation of materials within each phase (exhalation, rest, and inhalation) create a visceral experience of the cycle, one that is not boring or predictable, and with enough variation so as to continue to engage the audience.

*Semiotics of Sound*

The beginning of *Periodes* demonstrates how Grisey introduces the musical language of the piece and how changes of state and timbre occur. Grisey establishes the aesthetic and idiom of this piece by beginning with blocks of stasis. Though synchronized and contrapuntally static within each chord, subtle internal activity exists. For example, following the first attack, the contrabass begins *alto sul tasto* moving towards *ordinario* in the second chord, whereupon the contrabass continues to modulate between *alto sul tasto* and *ordinario*. Additionally, both the violin and the viola slightly bend (microtonally) their respective highest notes over the course of each chord before re-attacking the next chord. Thus, each sound block moves with an internal waver, the result of the beating created through microtonality. This waver serves as the seed (from which more will grow) or the “first words” of a language, which Grisey will continue to “teach” to the listener as the work progresses.

\textsuperscript{45} For more see Feron, “The Emergence of Spectra in the Gerard Grisey's Compositional Process,” *Contemporary Music Review.*

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Once the pattern has been established, Grisey builds upon the previous material. In this case, after numerous iterations, he adds clarinet, then flute. On page five, the bending pitches are staggered, as a means of extending and pushing the material farther. He then teaches a “new word,” the color trill in the viola at rehearsal two. On page six, Grisey introduces the parameter of dynamic swell, which establishes a sort of temporal amplitude motive. The swells continue, staggering throughout the ensemble just as the bends were earlier, and these staggered attacks themselves become an orchestrational motive. The trombone exaggerates the swell, and as the moment of expected saturation is reached right before rehearsal three, the new element appears, in the form of chaotic string noise in the viola.
Timbral Morphology

At this point, Grisey has introduced core materials and a basic developmental strategy. The waver, initially a microtonal bend, has individuated and become a color trill, then a flutter-tongue and further morphed into the introduction of the chaotic string noises.

Figure 2.4 Transformation of flute articulation, Periodes, p.11.
Each modification represents the morphological trajectory in progress, wherein a state of being turns into a heightened version of itself, as in the case of a pitch bend turning first into a color trill, and later into a flutter-tongue. A direct modulation would be to move the flute flutter-tongue to a viola tremolo. However, the chaotic string noise is a sort of “timbral modulation” – not exactly a trill or a flutter-tongue, or even a tremolo (the string equivalent of a flute flutter-tongue). More so, it is both a modulation and an integration of new elements, chaos and noise.

Grisey continually and logically builds on choice aspects of the sonic composite. The piece teaches the listener how to understand its musical language. Logic functions as an important element, allowing a listener to make connections either consciously or intuitively. The development of the material proceeds coherently, moving from a familiar element to a similar version of itself in an unfamiliar and unexpected re-contextualization.

In the same way as a sonata merges multiple ideas in the development, Grisey continues to resynthesize and integrate previously presented materials. In the present essay, re-contextualization refers to taking an established process and applying it to a different source, thus yielding new material.

*Figure 2.5, Re-contextualization.*

In effect, it may be viewed as another version of the “monkey wrench” model. The chaotic string noise of the viola marks the temporal saturation point, where the material phenomenologically emerges out of the previous stasis to achieve a sort of
composite identity comprised of the previously introduced elements such as trill, flutter tongue, bends, and dynamic swell. After establishing itself as a composite entity, the entity has become aware of its need to develop further, essentially pushing its own material farther. The use of the ensemble dynamic swell introduces an idea of a segregated event, and a sort of composite entity has emerged.

*Figure 2.6, Dynamic swells as a composite sonic entity, Periodes, p.6.*

All elements are integrated into a single pulsating composite entity, which are in contrast to the opening static chords. On the static end of the continuum are sustained tones, and on the active extreme, flutter tongue and tremolo.

*States of Sound (Transformation of the Attack-Effluvial Continuum)*

Although Grisey may have never intended for this parallel to be made, textural categorization can be applied to *Periodes*, pages 10-11. After a few attack impulses, a noticeable silence, and four seconds of sustained pitch representing the effluvial state,
the music begins an iterative phase.

*Figure 2.7, States and transformation, Periodes, p. 10.*

Notice the fusion of an attack “envelope,” where there exists a brief crescendo from *pp* to *fp* at the beginning of the first sustained pitch. This momentary fusion connects the unified composite amplitude swells with the individuated attack impulses before the preceding silence. In this way, Grisey has taken the ensemble from a number of individual particles and brought them together to form a unified composite. Once unified, it again begins to iterate at an increasing rate until the individual iterations are no longer perceptible, as the players switch to tremolo.

The glissandi, at this point moving “outwards” in contrary motion, become rapid enough to transform into tremolo. Flute and trombone join with their analogous flutter-
By nature of the consistent pitch content inherent in the tremolo, the unified tremolo can be heard as effluvial, though by another perspective it would yield a blended state: effluvial with an iterative layer. The granular state exists between the iterative and the unified tremolo, not clearly one nor the other. The granular state is created through staggering the attacks between the instruments, thus avoiding simultaneities: increasing the density and thwarting the perception of individual events aids in creating the perception of blur. Following the homogenous tremolo composite, the sound begins to diffuse to its individual components again, thus returning to an iterative state. Alternating between states in this way the music breathes, representing what Grisey refers to as
“respirating.”

**Textural Magnification**

At the point where the current materials’ trajectory reaches its climax and saturation point, the composite texture transforms and re-contextualizes the glissando gesture. Previously, the glissandi were generally used in contrary motion “inward,” with a few notable exceptions where they began to move “outwards.” In those instances, the predominant hierarchical event was not the direction of the glissandi, but the quickening periodicity towards the climax. On page 12, all glissandi now ascend in staggered attacks throughout the ensemble, as the density gradually becomes sparser. Composed of a tapestry of multiple threads, each moving at independent rates, the composite gradually relaxes and provides a denouement for the previous climax.

Details become clearer through magnification, as a transformation between states occurs. While crossing an arbitrary “state threshold,” long, pitch bends transform into shorter, fingered gestures.

*Figure 2.9, Magnification, Periodes, p. 12.*
Beginning with the flute and followed by cello, contrabass, clarinet, viola, and violin, Grisey introduces the more articulated texture. By staggering the entrances, he ensures a gradual transformation between these two states. The differing number of notes, durations, and subdivisions in each gesture prevent noticeable simultaneities between the layered ascending waves. The revealing of details can be seen more clearly as the “surface” of each of the notes, perceivable earlier only as sustained bends.

*Figure 2.10, Magnification (continued), Periodes, p. 13.*

Continuing through the attack-effluvial spectrum, the blurring once again produces a dynamically transforming, granulated state—one that starts dense and closer to the threshold of the effluvial state, though not crossing over. Figure 2.11 shows the target texture, that of a somewhat sparser representation of the previous example.
Not only has the time between attacks been stretched, but also the intervals between pitches; this, what were previously scalar passages have had notes removed to become arpeggios. This transformation began at a quasi-iterative/granular state and progressed through a gradual decrease of rhythmic and harmonic content. Arriving at a texture wherein the instruments fuse into a repeating homogenous effluvial composite, Grisey marks the reiteration with “quasi-pizzicati” in the flute. In this case, periodicity occurs on a middle-ground level—applying to a segment of material—rather than to micro-level elements of a texture. The resulting effect is that of the materials repeating like a broken record.

*State “Shift”*

Modulation, which in tonal music refers to a change from one key to another, will be used here in reference to a change in texture. Granted, the term modulation poses problems, as it has a history of notably harmonic and pitch related connotations and usages; in this essay, however, the terms modulation and transformation apply to states
and categories of sound. For the purpose of this discussion, the term transformation is used to refer to a gradual metamorphosis from one state to another or, within a granulated state, a progressive and systematic movement from one side of the continuum to another. An example would be a primarily iterative texture transforming gradually to predominantly effluvial state. In contrast, the term “state shift” will be applied to an abrupt change of state.

*Transformation through Reiteration*

The previously described iterative material (Figure 2.11) reaches an even more elongated state near the end of the movement. At this point, various states blend and mix, existing in an “in-between” transitory state. Depending on perspective, a slow repetition of sustained attacks could be considered as an effluvial composite, or as a slow iterative state. The material serves as what could be described as a pivot state, convincingly arguable as one or the other. If the material speeds up, it reveals an iterative nature. If slowed down further, the material would distinguish itself as definitively effluvial. The rate of change as well as the curve of the rate of acceleration contributes to the momentum in the change of state.

More than augmentation, magnification refers to the aesthetic qualities of sound rather than duration and placement in time. For the purposes of this paper, reiteration will be applied to a segment of material that is repeated, like a broken record, as in the case of the opening gesture of Partiels. In terms of transformation, if magnification is a way of “stretching the surface” of compositional materials, reiterational transformation changes the nature of the repeated material at an atomic level. *Periodes* prepares through reiterational transformation the beginning of Partiels by magnifying the material
In the previous example, the addition of an aggressive amplitude envelope (beginning with the trombone) differentiates individual effluvial elements from within a gradually decelerating iterative texture. In this passage, the material transforms slowly back from iteration into attacks. Additionally, the loud attack of the trombone followed by loud iterations of string attacks foreshadows the distinctive opening of Partiels.

On the following page of the score (page 42), the effluvial nature of the previously elongated iterative material asserts itself further with the addition of multiple loud attacks in the accompanimental, staggered attacks of the strings. This material does not have an identifiable periodicity, that being a necessary quality of iteration; thus I hear this as an elongated and stretched state of granulation.
Transformation from one state to another continues on page 45, where the trombone declamation remains. Alongside this, multiple iterations of brief overpressure in the contrabass complement its decay, which, along with the trombone, continues to develop into the opening of Partiels. The following figure shows the development of the iterative/effluvial composite.

Figure 2.14, Iteration amidst an effluvial composite, Periodes, p. 45.

Notice how the contrabass continues layering iterative pizzicati over sustained
and gradually increasing overpressure, followed by two sffz bowed attacks, before returning to the layered iteration amidst an effluvial composite. Formally, iterative attack impulses of the bass transform from points of attack into sustained sounds. In so doing, they extend and cross over into re-articulations of the effluvial state as a primary voice, which functions as a means of perfectly transforming into the beginning gesture of Partiels.

The first page of Partiels replicates the same material on the final page of Periodes.

Figure 2.15, Periodicity, Periodes, p. 46.

The previous overpressure iterations of the contrabass transform into three sustained fff attacks in quick succession, accompanied by the loud trombone statement. Grisey
follows the trombone and iterative contrabass composite with an emerging spectrum orchestrated with strings and winds. The combination of both the trombone/contrabass statement and the emerging string/winds answer result in a larger form of iteration; in this way Grisey reframes periodicity within a larger context.

The iterative/effluvial composite at the beginning of the page modulates to a re-contextualized version at the end. The contrabass pizzicato/overpressure iteration changes to sustained attacks along with another sustained trombone declamation, exactly the same as what follows in Partiels. Grisey's transformation seamlessly connects the two movements.

Formally, Periodes and Partiels share similar compositional materials, albeit arriving at them in different ways. Partiels uses the materials presented in Periodes for further transformation within and between categories. Over the course of the movement, Partiels moves from the effluvial state through iterative material, granulation of pitch material, and at the end, granulated noise.

The piece begins with three attacks, followed by the orchestration of the spectral analysis of a trombone note. The sustaining strings, flute, and clarinet emerge from under the receding trombone/contrabass gesture of the opening.

46 Partiels is based on the spectrum of a computer analyzed trombone note. Fineberg, Joshua. Sculpting Sound.
47 The repetitive cell mechanism returns again and again in Partiels, yet another re-contextualization of periodicity.
48 This essay describes textural and categorical modulations and transformation, leaving pitch content virtually untouched.
49 Fineberg, Sculpting Sound, 56-58.
The entire cell repeats, representing effluvial iteration. The first fourteen pages continue to explore large statements of this material, each segment adding more “noise” as partials are registrally displaced from their original position in the pure spectrum and noise elements are added.50

On page 15, Grisey introduces iteration, first in the percussion. He delegates it to three instruments, starting slowly on the bass drum, then slightly faster as staccato points are added in the bass clarinet, and then on the tambourine.

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Grisey continues to explore iterative material, first by adding tuba and pizzicato in the bass (referring to the end of *Periodes*). Initially, all instruments create distinguishable points, either by their innate nature as in the case of bass drum or tambourine, or by the playing method, such as staccato or pizzicato. A gradual transformation from iteration to effluvial ensues, beginning with bass introducing measured sixteenth note tremolos on page 18.

*Figure 2.18, Measured tremolo, contrabass, Partiels, p.18.*

The nature of tremolo on string instruments requires a caveat for categorization based upon playing technique. Iteration by this definition would include any musical
materials of a periodic nature, such as tremolo, flutter-tongue and vibrato. Grisey continues to add measured tremolo, first in the bass then later in the cello and viola, pushing the state of iteration further by modulating to the unmeasured tremolo in the violin.\(^{51}\) By introducing unmeasured *tremolo impercible* in the vibraphone on page 24, an instrument whose spectrum is closer to a pure sine wave than that of the more complex violin, the result may be perceived as having more fully crossed over into the effluvial state.

*Figure 2.19, Un-measured tremolo in violin and vibraphone, Partiels, p. 24.*

Through orchestration, Grisey develops the iterative materials through changes in speed and timbre of the repeating element, as well as by the size of the grain via

\(^{51}\) In the case of additive synthesis, one sine wave is added to another. At some point, the two waves interact such that a difference tone is created. A difference tone is created as the result of the difference of the two original waves. For example, adding a 50 Hz wave to a 55 Hz wave would create a difference of 5 Hz, well below an audible tone threshold; however the listener would experience “beats” at the rate of 5 per second. Beating occurs commonly when two similar instruments play the same note slightly out of tune, or in the case of tuning a guitar, beating goes away when the strings fall “in tune” with one another. In another additive example, adding a 75 Hz wave to a 125 Hz wave would create a “difference” tone of 50 Hz, in which case the listener would hear three pitches: 125 Hz, 75 Hz, and 50 Hz because all three are above the threshold of frequency effluviality. There exists a point where the rate of beating crosses over the threshold of iteration to effluviality.
“magnification.” Throughout the previous exploration of iteration, there has also been a gradual transition from iterative percussive sounds to effluvial pitch, blended with an iterative layer, thus setting up the next section to be more pitch based.

The following section first proceeds from a relatively static, moderately sparse texture, through deceleration and crescendo to slow, repeated, pitch effluviality, then later to a state of accelerating and compressing repetitions building to a saturation point of iterative material. First, layers of iterative material blend to create a static fabric, which Grisey develops through the use of dynamic envelopes to create momentum. Slowing the periodicity and decreasing density in conjunction with the decrescendo reduces the momentum of the phrase.52

Figure 2.20, Repeated pitch effluviality, Partiels, p.31.

Again, note how synchronicities are avoided, favoring layered, repeated patterns of similar, though revolving pitch structures. Thus in Partiels, Grisey continues to reuse materials previously presented in Periodes, furthering developing them. Another

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52 Denis Smalley describes multiple categories of trajectory and momentum in his article, The Language of Electroacoustic Music.
example of this approach includes the articulated glissandi material from pages 12-13 of *Periodes*, though revisited this time in reverse. The ascending gestures of the previous statement are now presented inverted in every way: sparse, “slow,” descending, and increasing in speed, density, and range over time.

*Figure 2.21, Compression of glissandi, woodwinds, Partiels, p.39.*

In the preceding section, Grisey gradually develops iteration through changes in timbre and continues to do so here by transforming textural elements into motives capable of being exploited and manipulated. The use of spectral runs, prevalent in both *Periodes* and *Partiels*, is used motivically in *Partiels*, not only as a state but as a self-contained gesture as well.

*Figure 2.22, Decompression of string glissandi, Partiels, p. 39.*
As a result of the staggered canonic nature of the material, the texture progresses from dense to sparse as the voices finish their statements. The composite exists in a quasi-granular state comprised of short iterative granules.

The magnification process earlier applied to an attack impulse reveals musical “surface area” in the form of time-based effluviality. The same process of magnification applies here, revealing the “water molecules” audibly moving around, to borrow Grisey's metaphor.53

*Figure 2.23, Decompression and elongation into granules, woodwinds, Partiels, p.40.*

Pitch iteration continues to develop as a category, changing from dense to sparse. Considering the short, descending run to be a “grain,” the following example illustrates the development of that motive, where grain size becomes augmented or diminished. A macro-granular state is created as the material within the grains ascends or descends. The texture is erratic with no identifiable periodicity.

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Partiels ends with crinkling cellophane and paper. Here, Grisey explores one of two possible unexplored categories: noise granulation and a state approaching effluvial noise (static white noise).

Figure 2.24, Noise granulation, Partiels, p. 60.
In order to create a cohesive work, one of the first things I do as a composer is look at possible combinations of texture and dynamics. Within a given texture, there are two overarching categories, each with its own subcategories: the first category is one of predictable periodicity of a recognizably iterative state which has the potential for various rates of iteration, including a quasi-iterated/granulated state; the second category, stasis, can be subdivides into chaotic stasis with unpredictability, and effluvial stasis that is smooth and without interruption. Within the chaos also exists opportunities to incorporate various densities. Each of these categories can be manipulated within its own continuum of density or rate as applicable, within four possible combined states: sparse and soft, dense and soft, sparse and loud, dense and loud. Formal decisions will create a perceived shape of the resulting piece consistent with desired phenomenological effects. Further analysis will explore methodologies regarding formal design as a result of designated categorical possibilities.
Chapter 3
Brian Ferneyhough's *Lemma-Icon-Epigram*

*Lemma-Icon-Epigram* has been the subject of much analysis regarding pitch processes. The purpose of this essay is to create a categorical analysis that will explore the various musical materials both from an energetic and a textural perspective. After identifying the categories, describing their characteristics with respect to momentum, and exploring their developmental origins, it will be shown how *Lemma-Icon-Epigram* “respirates” between each category within the context of cohesion and contrast. Throughout, concepts of momentum on a macro-formal level will be discussed.

*Categorization of Textures*

Once pitch has been deprioritized as the primary hierarchical element, composing for the piano can become difficult. Traditional keyboard playing limits timbral possibilities and tends to restrict one to pitch, rhythm, and resonance. Meanwhile, crescendi can be achieved only through gesture and repeated attacks. Ferneyhough's *Lemma-Icon-Epigram* will serve as an example of a piano piece limited to playing only on the keys that nevertheless lends itself to an analysis in terms of texture and momentum. Without the need to examine pitch structures closely, we may see that *Lemma-Icon-Epigram* accomplishes many differentiations of material through texture and register. Even though the work uses mostly traditional playing techniques, it demonstrates clear examples of a number of categories of sound, and later develops and combines these to create memorable moments resulting in an effective form.

Four main textural categories in *Lemma-Icon-Epigram* are: single notes/block

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54 Toop, “Brian Ferneyhough’s *Lemma-Icon-Epigram*,” 52-100.
chords, trills/tremolo, runs/glissandi, and “spattering.” A few clear examples of these
categories are given below, followed by descriptions of their origins from the beginning
of the piece. How these elements are used to create memorable moments and
connections within and throughout the form will be explored, as well as how they
contribute to the overarching concept of momentum.

Though there are rare examples of isolated single notes, more often these are
found in the context of a given musical moment. The following illustrates two categories
of single note gestures: secco and sustained.

*Figure 3.1, Lemma-Icon-Epigram, m. 24*

The left hand marks the end of the first extended period with a loud sustained
sonority, while the right hand echoes the attack of the left hand, creating a brief
experience of temporal stasis in contrast to the high level of activity in the previously
extended material. The notes at the beginning of the example are farther apart both
temporally and intervallically. One may perceive the first attacks as individual elements
rather than members of a larger gesture. Near the end of the measure, the notes are
closer together and “cohere,” resulting in a composite gesture.
Single note are extended by either adding elements horizontally or vertically. The following examples demonstrate both techniques: the first example illustrates staccato chords followed by brief moments of silence; the second shows multiple instances of simultaneities within close proximity to one another.

Figure 3.2, Block chords, Lemma-Icon-Epigram, mm. 38-39.

Measure 39 demonstrates multiple sonorities in quick succession. The contrary motion results in expanding intervals between the hands. There is crossover between categories: one could argue the third gesture of measure 39 consists of two fragmented runs in simultaneous contrary motion. More examples of hybrid gestures show up throughout the piece, especially in the Icon and Epigram sections.

Per the respiration analogy, the seemingly prominent space between the staccato attacks in measure 38 may be interpreted as an interruption to create silence and “breath.” Though brief in the previous example, more prolonged instances of silence occur throughout the piece. Both silence and sustained sound play an important role in the form of Lemma-Icon-Epigram, and serve as examples of “stasis,” or the suspension of momentum. The following figure provides an example of stasis manifested by a held sonority.
This moment marks the first exaggerated and sustained stasis in the piece—the onset of the *Icon* section—and is later explored in context with greater detail.

Accelerating single notes congeal into perceivable gestures of trills/tremolo, or runs/glissandi. Trills/tremolo are generally static regarding pitch trajectory, as opposed to runs/glissandi, which have a clear ascending, or descending trajectory. However, the tessitura of intervals in a tremolo can be modulated in such a way to create expectations and an experience of either expanding or contracting pitch trajectory in a dynamically changing way.

Without the pitch repetition of trills/tremolo, “spattering” gestures generally consist of disjunct intervals having a relatively wide tessitura, although the tessitura may vary. It has no discernible pitch trajectory, and in its purest state has no rhythmic trajectory either, creating a sense of temporal “stasis.”

*Figure 3.3, Sustained sonority, Lemma-Icon-Epigram, m.89.*

*Figure 3.4, “Spattering” in Lemma-Icon-Epigram, m. 35.*
Though the above example is relatively dense texturally, later examples will show how it such a gesture can be transformed into simpler textures. In fact, the first example of “single notes” could be considered a “slow spattering.” As in the previous category, notes must occur close enough together to create a categorical congruency, otherwise they fall into the “single note” category. Far more often, “spatterings” appear as above. However, single notes and spattering gestures may be considered extreme points on a continuum, and that some events may be interpreted as being between these two extremes.

Regarding momentum, the following table describes the innate energetic characteristics of the various categories of material:

*Table 3.1, Table of Textural Characteristics, Lemma-Icon-Epigram*

<table>
<thead>
<tr>
<th>Gesture/Category</th>
<th>Momentum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single notes</td>
<td>Low (stasis)</td>
</tr>
<tr>
<td>Runs/Glissandi</td>
<td>High (perceivable pitch trajectory)</td>
</tr>
<tr>
<td>Tremolo/trill</td>
<td>Varied. It depends on the kind of change in pitches, pitch trajectory,</td>
</tr>
<tr>
<td></td>
<td>and also perceivable rhythmic trajectory. It is possible to create stasis</td>
</tr>
<tr>
<td></td>
<td>with trill/tremolo, without a clear trajectory, thus without expectation</td>
</tr>
<tr>
<td></td>
<td>of momentum</td>
</tr>
<tr>
<td>Spattering</td>
<td>Stasis (Momentum could be generated through perceivable and predictable</td>
</tr>
<tr>
<td></td>
<td>change in density thus resulting in a clear trajectory. A perceivable</td>
</tr>
<tr>
<td></td>
<td>change in tessitura over time can also create a clear trajectory.</td>
</tr>
</tbody>
</table>
Beginnings and Development of Categories

The above categories will be applied in the following analysis of Ferneyhough's work.\textsuperscript{55} The piece begins with a legato spattering gesture as seen below.\textsuperscript{56}

*Figure 3.5, Opening gesture, Lemma-Icon-Epigram, m. 1.*

The use of register immediately creates a distinctive counterpoint between the smoothly flowing upper voice and the conspicuous single notes outlining a lower voice an octave below. Articulation contrasts (staccato/secco vs. legato) play an important role in the development of material. Ferneyhough also uses both sustain and sostenuto pedals extensively to create a background resonance over which a secco foreground can be placed. Activation, the way sonorities are articulated, plays a large role in the development and differentiation of categories.

The second system introduces pitch simultaneities and trilling, the latter of which may be considered another form of note “activation.” Both trilling and pitch repetition provide a way of creating a dynamic envelope where single attacks do not. When the tessitura changes, as in measure eight (Figure 32), the texture can be extended and developed, potentially indefinitely. The secco/staccato category is developed further in

\textsuperscript{55} Also refer to Richard Toop’s analysis regarding formal concerns and cycles of time signature development. Toop, 63.

\textsuperscript{56} This analysis will not concern itself with pitch content and specific rhythmic figures. For more information in this realm, please refer to the analysis done by Richard Toop in conjunction with Brian Ferneyhough’s sketches. Toop, 57-59.
The use of staccato articulations creates a *secco* repeated note gesture, what I will be calling a pivot texture between single notes and the trill/tremolo category. From a phenomenological point of view, the second system provides a contrast to the first: whereas the first system consists of three texturally similar, cohesive phrases, with short breaths in between, the second system contains five contrasting gestures and is far more disjunct. In order to avoid saturation due to excessive contrast, a shift in texture thwarts expectations by further developing the opening gesture, the intervalllic expansion creating a “spattering” effect.

*Figure 3.7, “Spattering,”* Lemma-Icon-Epigram, *m.5.*
This passage parallels the familiar legato wash heard in the beginning. Though rhythmically similar, the pitches are widely distributed throughout several registers. The second half of the measure differentiates an upper voice by use of dynamic accents and a wider gap between the upper and lower voices. The first gesture of the measure resembles a transitional state between the materials in measure three, and the cohesive tremolo/trill of measure eight.

Figure 3.8, Disjunct Material, Lemma-Icon-Epigram, mm. 6-8.

In measure seven, the *secco* texture introduced in measure three is extended, resulting in a slow “spattering” with some repeated pitches—a hybrid between single notes, a protracted spattering, and an embryonic tremolo state.

*Respiration in* Lemma-Icon-Epigram

Within this development, the materials follow a “semiotic” logic as the piece unfolds in an orderly fashion: one textural state leads to another in turn.

Figure 3.9, Proportions of opening textures, Lemma-Icon-Epigram, mm. 1 – 11.
In mm. 2-4, the seeds for both the trill and secco gestures are planted. Though these are contrasting elements, each plays a role in the subsequent development. Measures 2-4 are lumped together as a cohesive unit because of the overarching disjunct nature of the materials within, and the way the materials switch from one state to the next in rapid succession. Labeling measures 2-4 as “disjunct” identifies the internal relationship of the materials’ elemental surface texture. In contrast, the two surrounding materials of spattering and “proto-trill/tremolo” have been labeled “conjunct” due to the smoother resulting texture. The groups that follow alternate between conjunct and disjunct materials, resulting in a categorical periodicity.

After the five marcato attacks in measure ten, the material proceeds without pause until measure 24. In contrast to the opening passage, where the alternating textures are relatively transparent and overt, Ferneyhough continues in measures 12-23 with a varied textural counterpoint, at times using multiple layers simultaneously. Overall, the material becomes denser as a result of the layering and blurring of categories. Use of space constitutes the main difference between the opening passage and mm. 12-23.

*Figure 3.10, Layering of Categories, Lemma-Icon-Epigram, mm. 14-15.*
Notice the absence of spattering in the example above. Of the four categories previously described, cohesion is achieved through the use of the first three while the fourth is reserved for contrast.

Whereas the “disjunct” materials consistently convey a disruption (or suspension) of momentum, the “conjunct” materials demonstrate a perceivable dynamic trajectory. The alternation of materials may be metaphorically compared to the “respiration” concept presented by Grisey. Viewed from this perspective, the “breathing” represented in the opening would appear to be accelerating, building momentum, and increasing tension by creating an expectation of either further acceleration (eventually reaching a “critical mass”) or a saturation point. At m. 11, the peak is reached and the material continues to flow without a break until m. 24. The following figure shows contrast/cohesiveness on a larger structural level.
A recursive respiratory analysis can be applied to mm. 1-11 as a respiratory cycling within itself, gradually storing energy – as an inhalation. Measure 11 has been included in the first group because of the homogenous texture of the material. Measures 11-23 represent one macro exhalation, ending with a “suspension” – a single static secco measure in 24, marked for memory as a result of its contrast with the previous material. The music “catches its breath” for a moment before continuing to exert itself in the next respiratory cycle.  

The number of sixteenth notes between first two sections (62:51) reflects a sort of “tilted symmetry” between the two sections. Perceptually, tilted symmetry subverts the experience of predictability.
Chords may be regarded as a suspension of time, the low energy state of respiration. However, the loud, low register sustained chords are especially visceral, marking for memory both the register and the “texture” as a potential contextual reference point. In hindsight, knowing that they play a predominant role in the *Icon* section, one could trace their overall development in the *Lemma* section as preparatory.

Characterizing the other side of the continuum (retention), spattering holds the high potential energy state of respiration. As a means of transitioning between the two contrasting states of stasis, the two active textures (runs and tremolos) provide the inhalation and exhalation, respectively. Differences in color in Figure 3.14 have been used to illustrate this change in energy within the “active” category – blue representing lower energy and red representing higher energy. Upon reaching temporal suspension in measure 48, the material continues to oscillate between states of activity, with multiple respites of stasis. The following diagram illustrates these relationships, as well as tessitura and dynamics with an increase in the latter indicated by the darker color.

*Figure 3.14, Momentum with dynamics and tessitura, mm. 42-48.*

Even though the dynamic marking in m. 48 is *ppppp*, the material in context retains a high state of potential energy due to the contour and activity of all that has preceded it. The previous diagram illustrates especially well the textural cohesiveness...
of this particular passage. As the material progresses, secco moments of stasis provide respite for the exertions of the runs.

Figure 3.15, Categorical respiration (continued), mm. 48-59.

One may consider both secco moments as periods of high potential energy, reinforced by the use of register and dynamics. Overall, the material continues to build momentum and energy with longer stretches between moments of stasis. This effect, coupled with the use of dynamics and tessitura as illustrated in the above figure, creates a greater contrast when stasis is finally reached in measure 59.

Measures 60-89 continue the process, generally increasing momentum and tension through respirating materials and integrating a new textural element, glissandi. By providing just enough contrast within the extended cohesion, the material creates opportunities to reengage attention – thus, the saturation point is avoided.

Figure 3.16, Integrating contrast, Lemma-Icon-Epigram, mm. 60-64.
Figure 3.16, Integrating contrast, Lemma-Icon-Epigram, mm. 60-64 (cont.)

By interspersing brief moments of single notes, the material invokes an internal respiratory quality, maintaining overall cohesiveness while providing a perceivable internal contrast.

Figure 3.17, Micro-respiration, mm. 65-67.

At this point, a state of temporal immersion has been achieved through extended continuous activity – making the subsequent final arrival in measure 89 all the more striking. Postponing the peak, Ferneyhough first explores the glissandi marked with single note “breaths.”

Measure 68 provides a transitional texture, a state between single notes and
runs, while in m. 69, Ferneyhough weaves in a tremolo layered under an ascending run. *Figure 3.18, Transitional State, Lemma-Icon-Epigram, m.68.*

Following m. 70, Ferneyhough continues to explore a final exertion before the arrival point in m. 88. An analysis of m. 84 shows how these categories are layered and blurred.

*Figure 3.19, Blurred categories Lemma-Icon-Epigram, m.84.*

The low register **fff** chord continues to resonate while runs and tremolo continue above, followed by an upward quasi-spattering run at the end of the measure. In this way, the material continues to find moments to “catch its breath” before the final exhalation into the breakdown in mm. 88-89.
Demonstrating extreme dramatic contrast, the “edge” between measures 88-89 is unmistakable. Coupled with the loudest moment thus far, it marks the end of the *Lemma* section and the beginning of *Epigram* with an energetic release thus far unparalleled in the work. This sets up another paradigm: that of space versus activity in a more clearly defined relationship, allowing for single notes to be more closely examined. If I were to name a “wrench” in the piece, it would be the transition between *Lemma* and *Icon*.

Imagine again the water model as previously introduced by Grisey. The effect of the following measure’s texture relates to that of previous examples of spattering, though slowed down.
Figure 3.21, “Lost,” slow secco spattering, Icon, m.99.

Compositionally, this presents an opportunity to look at the “musical clay” and explore all of its possibilities: what would this look (sound) like if it were compressed to its extreme? What if it were slowed down to create detached points? How are these points articulated? In this instance, Ferneyhough attaches new material to these points, allowing it to gradually overtake the old material.

Figure 3.22, Beginning of textural transformation: Lemma-Icon-Epigram, mm 108-109.

Glissandi are introduced as echoes of the chords, as the material enters a new
phase, and activity begins to build again. Though space and sustained chords still play a predominant role in the interactions between glissandi/runs, the “streams” become more prominent. Transforming from stasis, the influx of glissandi provide the necessary energy to create momentum as the music inhales before “holding its breath.”

By increasing the length of the grace note passages, the quasi-glissandi/spattering gestures gradually take over the secco material, as in measure 116. *Figure 3.23, Glissandi as the primary category, Lemma-Icon-Epigram, m.116.*

![Figure 3.23, Glissandi as the primary category, Lemma-Icon-Epigram, m.116.](image)

With interruptions of the 1stasis punctuated by chords, the “sputtering” glissandi continue, creating an increasingly disjunct texture. As the differentiation between stasis and activity becomes more distinct, these categories are blurred as textures are layered and fragmented within the edges of the cells. The overall surface effect is the result of a blurring of internal textures.
Within the activity of m. 121, the right hand plays an arching gesture of chords while the left hand presents downward runs. The overall effect of m. 123 is an expanding and contracting spattering gesture. It may be construed that at this point, the musical material is having trouble holding its breath, or even “hyperventilating.” Short bursts of activity are interrupted by ever increasing space between them.

Measure 132 marks the penultimate cell of this cycle, punctuated by a loud low cluster
Throughout each “hyperventilating” cell, categories have been blurred and overlapped. The disjunct nature of this phase ends with a period of prolonged activity similar to the previously segregated material. After extending the intensified texture for the next three measures (mm. 133-135), Ferneyhough provides a much-needed release with the return of a prolonged section of secco texture beginning in m. 137.

Figure 3.27, Return of the secco texture, m. 135.
Marking the beginning of the next period of suspension, m. 135 begins the penultimate macro-respiratory cycle of the piece. The material begins secco and somewhat sparse, cohesive, and with a clear trajectory, then continues to increase in activity, overall dynamics, and density until it ends with an accented middle register chord. The following figure shows cycles of respiration from the beginning of the Icon section through m. 157.

*Figure 3.28, Respiration of the Icon section, and beginning of Epigram.*

As in the beginning, respiration between disjunct and conjunct materials provides contrast and cohesiveness, providing time to “reset” our attention in the gaps. Similar to the first cycle, these oscillations build cohesion through the association of related materials. Active materials such as glissandi and runs continue, with chords marking the end of m. 135 and the return of the secco texture, in contrast to the highly differentiated alternations between dense activity (granulation?) and space (effluvial silence). Additionally, the return of the secco texture makes a cohesive connection to mm. 90-105, reengaging memory of prior materials to reinforce the semiotic context of the piece. The alternations of space and spattering throughout the second cycle build a sense of expectation through a dynamic intensification, even though the space between each outburst increases each time, akin to the expectation of reaching the final plateau.
Figure 3.29, Distinction between materials, Epigram mm. 157-162.

Whereas the material in *Icon* generally involved a blurred or layered integration of elements, *Epigram* tends to be more clearly differentiated, with notable exceptions of blending.

Figure 3.30, Blending of categories, mm.163.
The final measures exhibit clear evidence of contrasting methodologies. On one hand, the blending of categories is followed by clear alternation of categories.

The following figure shows the final respiratory cycle.

**Figure 3.32, Categorized final respiratory cycle, mm.160-177, Lemma-Icon-Epigram.**

Bringing all of the elements back together before the final measures, *Epigram* continues with an increasingly compressed alternation of all categories in the final
measures. Beginning with the suspension of breath of the previous chords of m.157, the active spattering and tremolo material (mm.159-166) marked by interruptive, as the material embarks upon its last tentative inhalation, rising to suspension represented by the tremolo material in mm. 167-169, itself “sputtering” as if running out of breath. The final exhalation beginning with the spattering of m.170, continuing with resonant sustained sonorities holding the space between the last gasps, as the material “expires.”
Chapter 4

Analysis of *Phase: Agony Transmuted*

*Form and Conception*

*Laborintus II* by Berio was influential to the form of *Phase*, in particular the way the composer combines multiple elements within the work. Berio successfully integrates such disparate elements as a narrator, eight “actors,” electronics, and jazz by first subtly hinting at these elements, then bringing them to the foreground once the existing material has been established and adequately explored to the point of saturation. The resulting composite continues to be explored until the next point of saturation is reached, at which point a new twist is revealed.

I intended to follow a similar course with *Phase*, with fixed media serving as the primary monkey wrench in the work. Conceived as three continuous movements preceded by a prologue, *Phase* is divided into five “Arias” separated by four “Interludes.” *Figure 4.1, Phase form.*

Throughout the work, *Phase* integrates and explores the various elements of pitch, noise, video images, and movement. Abstractly programmatic, the piece exhibits multiple dramatic arcs including two moments of extreme contrast: the first of these is the third interlude with the extended electronics; the second is at the end of interlude...
four, with an exaggerated drop in dynamics and activity, coupled with a change of light highlighting the dancers.

As an extension of the music, intermedia would include Butoh dance and digital background video art. Like the acoustics and the fixed media, both the dance and the video are highly abstract. Throughout the work, Butoh dancers move slowly, creating evocative human sculptures. At times reaching towards the sky, at other times turning inward, and at other times individuated, shapes and “movement qualities” evoke energetic metaphors. Slowly transforming pieces of background video art are projected behind the ensemble. Live quasi-randomly morphing electronics use Max/MSP/Jitter to process both pre-generated video clips and a live camera feed of the dancers, creating an algorithmically controlled piece of self-generating video background art. Both the dancers and the video art are more active during certain segments of the piece, most notably the interludes.

The purpose of the prologue is to create an “accessible” experience for the audience by setting up a context for unfamiliar, dissonant, and disjunct materials and events to happen in a “safe” psychological environment. It introduces the main characters: the piano and the electronics in an “overture” which gives glimpses of materials and aesthetic highlights to come. Accompanied by video and dance as a means of immersing the audience in an engaging, though potentially unfamiliar aesthetic, the intention is that the experience will create a positive response in the audience. The semiotic elements in the work may not as of yet be understood by the audience at this point, nor is it intended for the audience to grasp the numerous systems and mechanisms that have generated the material. Hopefully, the aesthetic
tone of the work at the outset proves to be inviting to the audience, creating a taste for the unknown, and providing a context for the musical “challenges” that are yet to be revealed in the work.

After the introduction of the piano and the electronics, the ensemble enters at the end of the first aria. Respirating multiple times, the first movement “catches its breath” during the first two acoustic interludes (I1 and I2) where the focus returns to the piano. The second movement breaks the pattern with the electronic centerpiece, I3 after the third development of A material in A3. As my vision was to extend the piece further with the final movement, another phenomenological twist was needed in order to maintain momentum and audience engagement. Having mastered the prior musical challenges of being overwhelmed by both the electronics and acoustic instruments, the audience experiences the last movement, which re-contextualizes all the previous materials in a visceral, energetic climax. As the accompanying ensemble respirates between string quartet and wind/brass/percussion quartet, the piano transmutes and wields the bulk of the energy, as the piece comes to a close by finally integrating all the elements through various expressions of periodicity and respiration between various states of noise, pitch, phasing and beating.

*Number Systems: Aria 1 and Interlude 1*

Macro (Form)

Used extensively throughout *Phase*, number systems generate and control the behavior of musical materials, ranging from choice of dynamics, transformation of timbres and durations on a micro level, to the lengths of sections on a formal level.

Preliminary conception of the form included assigning proportional lengths of the
sections to one another. A combination of Lucas and Fibonacci numbers were combined to create a master list: 1, 2, 3, 4, 5, 7, 8, 11, 13, 18; these numbers were rearranged, resulting in the following generative sequence: 7, 1, 11, 4 || 7, 3, 2, 8 || 18, 5, 13. In order to translate this number sequence into durations, a multiplier of 20 was initially determined to yield the optimum durations for the work, resulting in the following durational units (in beats at MM=60; double-bars represent breaks between movements): 140, 20, 220, 80 || 140, 60, 40, 160 || 360, 100, 260. In considering number placement, attention was given to relative differences between adjacent sections; for example, at the end of the second movement moving into the third (40, 160, 360), the latter section is significantly longer than the first creating an experience of temporal immersion by resetting the experience of the former. The ratios were applied to the number of beats rather than duration in seconds – an important approach to creating the malleable “musical clay” that can be stretched and squeezed in whatever needs or wants that may arise.

An important aside needs be made at this point. Defaulting to MM = 60 results in a 1:1 relationship between chronometric time (in seconds) and number of beats. An awareness of temporal perception thresholds was considered in choosing where to place the longest sections, which would be the most “immersive.” Because tempo is completely malleable, time values could be stretched or compressed to whatever phenomenological needs might develop as the composition progressed. Results are achieved through pushing systematic composition as far as it can go on its own, then applying mindful “tweaks” to the system and intuitive sculpting of the material to meet the needs (wants) of the given situation. Often, a well-designed system creates
opportunities for the music work as a result of the limitations imposed by the system itself. Thus, revising and allowing for different multipliers per section resulted in the following proportions:

Table 4.1, Proportions of formal section lengths, Phase.

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>I1</th>
<th>A2</th>
<th>I2</th>
<th>A3.1</th>
<th>A3.2</th>
<th>I3.1</th>
<th>I3.2</th>
<th>A4</th>
<th>I4</th>
<th>A5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7</td>
<td>1</td>
<td>11</td>
<td>4</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>8</td>
<td>18</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>X20</td>
<td></td>
<td></td>
<td></td>
<td>X30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>20</td>
<td>220</td>
<td>80</td>
<td>210</td>
<td>90</td>
<td>240</td>
<td>!?!</td>
<td>55</td>
<td>143</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A multiplier of 30 was applied to derive the number of beats per section in the second movement, and a multiplier of 11 was applied to the third movement. These factors were determined by applying the number sequences through trial and error in order to arrive at the most satisfying composition results.

Micro (Durations)

Intending to create the experience of increasing momentum as the result of an accumulation of attacks, the “heartbeat Grundgestalt” was arrived at from a top-down approach: macro → middle → micro. Initially, the number of beats for each period was determined by dissecting the length of section A1 into four segments (A1.1, A1.2, A1.3, A1.4), using an altered Lucas series and multiplying by ten, yielding (in beats): 40, 20, 10, 70.

Figure 4.2, “Heartbeat Grundgestalt” (in three periods).

A1.1: 18, 11, 7, 4, 2, 3, 5, 8, 13 | 11, 7, 4, 2, 3, 5, 8, 5, 3, 2, 2

123 onsets = 3 eighths/beat for 41 beats

A1.2: 8, 5, 3, 2, 1, 2, 3, 5, 8, 5, 3, 2, 1, 2, 3, 5, 3, 2, 1, 2, 3, 5, 8, 1, 2, 3, 5, 1, 2, 3, 1

100 onsets = 5 quintuplets/beat for 20 beats

A1.3: 1, 2, 3, 1, 1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 2, 1, 2, 2, 1, 2, 1, 2, 2, 1, 2, 2

50 onsets = 5 quintuplets/beat for 10 beats

Guided by a phenomenological desire to express an intensifying state of
respiration, the first segment (A1.1) moves between decreasing Lucas series and ascending Fibonacci series numbers, compressing both the length and number of attacks for each subsequent cycle. Though originally intended to fit into 40 beats, an extra beat was added in order for the section to end with an intensification of the onsets, culminating on the first beat of the next section. The slowest thread subdivided each beat by triplet eighths, yielding 120 onsets @ 40 beats x 3 (subdivisional unit). After numerous attempts to squeeze a satisfactory stream of respirational cycles into 120 onsets, I decided to break the pattern and add the beat, thus allowing intuition to temper the systematic approach.

*Figure 4.3, Unit durations and respirational phases, “heartbeat Grundgestalt a.”*

```
18, 11, 7, 4, 2, 3, 5, 8, 13, 11, 7, 4, 2, 3, 5, 8, 5, 3, 2, 2
inhale | exhale | inhale | exhale | inhale
```

Each cycle represents a compression and expansion of the number of units between each onset. Once crystallized, the “Grundgestalt a” sequence was distributed across three strands of different subdivided values: triplet eighths, sixteenths, and quintuplet sixteenths. The entry of each canonic thread was delayed such that the arrival point of all three would occur on the first beat of section A1.2.

*Figure 4.4, Canonized “Heartbeat Grundgestalt a.”*

The second segment (A1.2) was designed to reflect a state of respiration and
subtly introduce a “heartbeat” motif, expressed in durational units “1, 2” (or notationally as \[\text{\footnotesize \text{\textsuperscript{\textcircled{\textbullet}}} \text{\textsuperscript{\textbullet}}}\]). Appearing first in A1.2, this motif repeats in A1.3 with one or more added beats. This time the original beat schematic was adhered to with A1.2 and A1.3 equaling twenty and thirty beats, respectively, with the master subdivisional unit as five. Mathematically, the quintuplet thread fits exactly:

*Figure 4.5, Unit durations and respirational phases, “heartbeat Grundgestalt b.”*

<table>
<thead>
<tr>
<th>A1.2: 100 onsets @ 5/20 beats</th>
<th>A1.3: 50 onsets @ 5/10 beats</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 5 3 2</td>
<td>1 2 3 5 8 5 3 2</td>
</tr>
<tr>
<td>inhale</td>
<td>exh.</td>
</tr>
</tbody>
</table>

The onset of A1.2 represents the center of canonic activity. As the point of convergence for the canonic material of “Grundgestalt a,” it also as serves as the point of divergence for “Grundgestalt b.” Though in canon, there are “sculpted” anomalies. At the beginning of A1.2, the triplet thread has been erased to create space and allow the material to build up again with the goal of climaxing at the beginning of A1.3.

*Figure 4.6, “Heartbeat Grundgestalt b,” A1.2 – A1.3.*

Though followed throughout A1.2, at A1.3 the triplet thread aborts what would be its prescribed path at beat two of m. 16 (*), resuming the system presented by the quintuplet thread at the beginning of m. 15. Breaking the system again at m. 17 of the
sixteenth thread (**), attacks are chosen to express a compressed cyclical periodicity with emphasis on beats with simultaneities. Later occurrences of the “heartbeat Grundgestalt” allow the canons to complete as well retrograde, stretching the “clay” further. In the score, the Grundgestalt reveals itself first in the prologue as the flickering video heartbeats, returning later in A2.1-A2.2 by providing a structural framework for acoustic counterpoint: the triplet thread for the cello/bass, sixteenths for trombone/bass clarinet, and quintuplet sixteenths for the flute.

Figure 4.7, “Heartbeat Grundgestalt,” orchestrated, mm. 65-67.

Within this framework, instruments vary articulations by using sustained, particulate, or “active” materials (“active” in this context refers to flutter-tongue, tremolo, or jeté). This same framework later provides onsets through which pitch material would be woven to create the re-contextualized “musical clay” of Aria 4.
Middle (Phrasing) and Timbral Categorization

With a duration of seventy beats, the entrance of the ensemble at A.1.4 illustrates the use of number systems applied on a “middle ground” level: integrating numbers from both Lucas and Fibonacci series yields the sequence 5, 8, 13, 4, 7, 11; multiplying the last three elements by a factor of two provided the beat framework for A1.4.

Section A1.4 employs rotating blocks of sound as a means of introducing the basic differentiated qualities of timbre to be explored in detail throughout the piece: noise and pitch. When first conceiving Phase, the following gradient was considered:

*Figure 4.8, Timbral categorization.*

![Timbral Categorization Diagram]

The X-axis represents duration whereas the Y-axis represents degree of decay. This chart illustrates the possibilities, roles, and relationships between instruments that have emerged in the creation of this work. The snare drum represents the closest thing to an unpitched particle with string pizzicato, a pitched particle, situated on the other side of the Y-axis, A1.4 uses primarily sustained materials, bridging both sides of the pitch-noise continuum. When combined with the previous number series set at a middle ground level, a loose structural framework emerged:
Table 4.2, Application of number systems to timbral categories, A1.4.

<table>
<thead>
<tr>
<th>String category</th>
<th>Distortion</th>
<th>Undertones</th>
<th>Harmonics</th>
<th>(gap)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle 1</td>
<td>5</td>
<td>8</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>Cycle 2</td>
<td>8</td>
<td>14</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

Representing a slow periodicity, the entry of the ensemble was intended to be explosive and overwhelming, orchestrated in two respirational cycles. The fortissimo onset of the distortion was, in each case, followed by an expansion and denouement.

Pitch and Rhythmic Microperiodicity

In Phase, there are two basic categories of material:

1. “Heartbeat Grundgestalt”
2. “Broken clock”

The “broken clock” creates a lopsided periodicity on the local level through repeated pitch and rhythmic material. It appears in the piano first in the prologue in mm. 6-7, then again in Interlude 1 at the end of A1.4. Two taleas of differing lengths, one for pitch and the other for durations, combine to create the notational “clay” of the raw “broken clock.”

Figure 4.9, Raw “broken clock” material.

Formally, the interludes provide a respite, allowing both the audience and the ensemble a moment to rest, regroup, and “reset.” Musically and phenomenologically throughout Phase, orchestral space and moments of sustained, non-textured effluvial sound occur within gaps and fermata, providing contrast to prolonged sections of active material. The main local compositional challenge of I1 was to transform the piano from a
“scintillating and shimmery” effect into a “broken clock” texture, representing a transition from “ease and grace” into “struggle and challenge” – the descent from mania into depression.

Applying more systems further sculpted the musical clay. Using a “fixed” spectrum assured that the color would be maintained, while octave displacement was used to vary the material, increasing the amount of registral displacement over time. The distance between the displaced notes was managed by “scrubbing” through the Fibonacci sequence: 2, 3, 5, 3, 2, 3, 5, 8, 5, 3, 5, 8, 13, etc.

*Figure 4.10, Octave displacement managed through Fibonacci, Phase, I1, mm. 49-51.*

Applying systems to govern phrase lengths, tessitura through octave displacement, and the density from beat to beat were a way to sculpt the characteristics of each “state,” as defined in Table 4.3.

*Table 4.3, Piano materials categorization, I1.*

<table>
<thead>
<tr>
<th>“Shimmery spurts”</th>
<th>“Broken clock”</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Quasi-spattering)</td>
<td>Wider, disjunct intervals</td>
</tr>
<tr>
<td>Quicker, denser</td>
<td>Slower</td>
</tr>
<tr>
<td><em>legato</em></td>
<td><em>marcato</em></td>
</tr>
<tr>
<td>“fluid”</td>
<td>“clumpy”</td>
</tr>
</tbody>
</table>

To avoid “clumpiness,” the cluster was split into two dyads when applied in the “shimmery” phrases, and octave displacements were used in the final measure to
augment the distance between the upper and lower dyads.

Table 4.4, Distribution of phrasing and materials, I1.

<table>
<thead>
<tr>
<th>Material</th>
<th>Spurt</th>
<th>Denouement</th>
<th>Gap</th>
<th>Spurt</th>
<th>Clock</th>
<th>Spurt</th>
<th>Clock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds</td>
<td>14''</td>
<td>4''</td>
<td>1.25''</td>
<td>4''</td>
<td>2.75''</td>
<td>2.5''</td>
<td>4.5''</td>
</tr>
<tr>
<td>Beats</td>
<td>11 b</td>
<td>6 b</td>
<td>2 b</td>
<td>6 b</td>
<td>4 b</td>
<td>3 b</td>
<td>5 b</td>
</tr>
<tr>
<td>Tempo</td>
<td>3b @ (\frac{4}{4}) = 60</td>
<td>\textit{ritardando}</td>
<td>Fermata(\frac{4}{4}) = 90</td>
<td>\textit{rit.}</td>
<td>\textit{rit.} (\rightarrow) (\frac{4}{4}) = 60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The “clay” was sculpted through the phrases as defined by the material characteristics, and octave distribution continued as appropriate yielding the following:

Figure 4.11, Phrasing in piano, Phase, I1.

The second phrase of “spurt” material gradually transforms into the “broken clock.” Revealing the raw material more overtly in measure 56 at a rapid tempo, magnification occurs as the tempo slows and octave displacement increases further in mm. 57-58.

Setting up a rhythmic periodicity at the end of the interlude provides an
opportunity to re-contextualize the clock through orchestrational changes. The ensemble returns in Aria 2 transferring the texture of the “broken clock” to a violin/viola/flute composite. Simultaneously, materials from the particle side of the sustain-particle timbral continuum are emphasized through the Heartbeat Grundgestalt triplet stream by the cello and bass.

Figure 4.12, Orchestration of the “broken clock” and “heartbeat Grundgestalt,” A2.1.

The preceding example demonstrates how categorization was applied to timbre, types of material, and orchestrational roles. Once timbres were chosen, relationships between the different timbres were defined and developed through the following sections. For example, in the transition from A2.2 to A2.3, the piano plays a leading role whereas the percussion provides counterpoint (and commentary), filling the gaps
between the phrases. Three primary groups exist.

Table 4.5, Groupings of foreground materials, A2.3.

<table>
<thead>
<tr>
<th>PRIMARY (sustained pitch)</th>
<th>“Glue” (“noisy” pitch)</th>
<th>SECONDARY (noise particulates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piano</td>
<td>Flute overblow</td>
<td>Percussion (battuto)</td>
</tr>
<tr>
<td>“Active” flute</td>
<td>Clarinet overblow</td>
<td>Trombone (breath attacks)</td>
</tr>
<tr>
<td>Membrane friction attack</td>
<td>Trombone bends</td>
<td>Bass clarinet (key clicks + slap tongue)</td>
</tr>
</tbody>
</table>

As a side note of phenomenological interest, the timbres used as “glue” (serving as an “in-between” state while primary and secondary voices exchange positions for the foreground of A2), were earlier introduced in the distortion category of A1.4. An important part of creating cohesion relies on referencing previous materials and developing them further. The use of the overblown wind instruments in this case subverts its role into the background, while its presence establishes a context for when it becomes foreground material in the climax of A2.2.

Textural Transformations: Aria 2

After the build-up at the end of A2.2, I wanted to create a state of “energetic suspension,” while continuing the momentum and shifting texture. What was required was a drop in dynamics and overall orchestral “mass,” but with continued density and activity, similar to the “spattering” texture discussed previously. A system of categorizing and transforming both timbral and activation materials was applied in sections A2.3 and A2.4, resulting in a gradual progression from high activity to sustained sounds. String materials of A2.3 were categorized in an order reflecting the effects of activation and timbre, creating a “string wall” that would initially overwhelm the piano before subsiding.

Categories of activation in the strings include tremolo, jeté, and ordinario.
Organizing the onsets by the following algorithm, a gradual transformation of sound was produced. In order to push the extremes perceptibly farther, the middle tremolo would become “chaotic” in the case of adjacent occurrences, including the opening one.

*Table 4.6, String activation and bow pressure talea.*

<table>
<thead>
<tr>
<th>Activation (T = tremolo, J = jeté, O = ordinario)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
</tr>
<tr>
<td>D</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bow pressure (D = distorted pitch resulting from overpressure, N = normal pressure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
</tr>
</tbody>
</table>

By combining two number series of different lengths, a variety of combinations are possible. The following figure shows how all these number series were integrated in the violin.

*Figure 4.13, String transformations, violin, A2.3*

Due to the fact that jeté bowing is ineffective with increased pressure, a change in bow position was necessary to create a transformative timbral “filter” to metaphorically simulate the change in bow pressure.

Aided by the entrance of distorted string sounds in the fixed media at m. 65, the goal of **A2.3** was initially to overwhelm the piano, then allow the piano to emerge from the string wall by giving it a registral “boost” at the end. Similarly, the initial goal in **A2.4** would be to submerge the piano as in **A2.3**, but in this instance it remains submerged.
Instruments were given clear roles with corresponding timbral characteristics to define distinct orchestrational textures. Entrances were shaped to produce a perceivable change in the registral profile of the sound mass.

*Figure 4.14, Entrances for strings, A2.3 and A2.4*

For **A2.3**, the violin was given the longest stream (a), and bass the shortest (d). In **A2.4** the strands were inverted with bass taking the longest and the violin the shortest. Quicker respective entrances ensured a more aggressive onset of the wall in the latter section, as well as a slower and more gradual decay. Number systems were again used in crafting the durations for each of the threads.

*Figure 4.15, Duration sequence, “string wall,” A2.3.*

Streams a, b, and c were generated by adding to stream d. Dividing the values of d by 2 (resulting in the sequence 1, 2, 1, 2, 3, 5, 1, 1, 1, 2, 1, 2, 3, 1, 1, 1, 2, 1, 2, 3, 1, 1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 3, 1, 2, 1, 2, 1, 1, 2, 4), suggests that the result may be considered a variation of the *Grundgestalt* sequence. This “Grundgestalt variation”—discovered upon analysis after the fact—would later be used as one of two rhythmic frameworks in **A4**, to be discussed in the section on “re-contextualization.”

For phrasing purposes, a variation of the Lucas series was used to determine the
length of gaps, which later perforated the string wall texture; these Lucas numbers were chosen in order to prevent alignment of the gaps in the first of the two walls. Entrances were also staggered as illustrated in Figure 4.15 above.

Figure 4.16, Entrances and (gaps), A2.3.

VLN:  11 (2) 7 (3) 11 (3) 4 (2) 4 (1) 3 (1) 7  
VLA:  (7) 11 (4) 7 (2) 11 (3) 7 (1) 4  
CL:  (7) (4) 11 (3) 7 (2) 4 (1) 3 (2) 4 (1) 7  
CB: (7) (4) (3) 11 (3) 7 (1) 4 (2) 7(1) 4

The numbers in parenthesis represent the number of silent beats, including those of the staggered entrances; thus, the viola entrance was delayed seven beats, the cello eleven, and the bass fourteen. Color coding is used in the following figure to show the individual strands for each of the sections, reflecting the numeric figure used.

Figure 4.17, Phrasing for string “wall(s),”A2.3 – A2.4.

Intentional artifacts emerge as a result of the gap system in the case of A2.3 and A2.4. First, phrasing was designed for sound to remain relatively continuous throughout A2.3 with only a few instances where the density drops below three instruments. Because of quicker entrances in A2.4, the gaps in the individual phrases fortuitously aligned, producing interesting edges and a “stuttering bass” at the end. Though the same taleas are used in both A2.3 and A2.4, the changing alignment of entrances creates two completely different effects: A2.3 “shimmers” and tends to transform more gradually, whereas A2.4 “hicups” in a manner that was intentionally avoided in the
previous section. Aligning at the end of A2.3, the canonic nature of the material creates perceivable waves:

*Figure 4.18, Canonic artifacts in strings, A2.3, mm.83-85.*

*Figure 4.19, String gaps, A2.4, mm.96-98.*
As in the first interlude, the second interlude provides a contrasting instrumental texture, consisting of piano, flute, bass clarinet, and percussion.

*Figure 4.20, Interlude 2, mm. 111-113.*

The piano material refers back to the prologue, with the wind and percussion instruments echoing the piano gestures. The timbral choices are eclectic, borrowed from the preceding material, while glimpses of the electronics provide commentary during the gaps between the piano phrases and foreshadow later development and foregrounding. Instrumentation here introduces the second of two “quartets” used in the piece. The significance of the instrumentation becomes more apparent later in Aria 4, when the composite material oscillates between the wind/trombone/percussion quartet of I2 and string quartet in a “macro-respiratory” fashion.
Respiration: Aria 3 and Interlude 3

In contrast to the relatively homogenous “walls” of A2.3 and A2.4, section A3.1 both extends existing categories and clarifies others in the context of a respirational model. The other purpose of Aria 3 is to provide a build to the main monkey wrench of the piece, I3.

Figure 4.21, Respiration in A3.1.

Respiration -- -- -- -- -- -- -- -- -- -- | Exhale / Inhale | Retain

Like the simple three-celled model of A1.4, the beginning of Aria 3 uses the phases of respiration as a “container” wherein multiple textural categories are integrated in a macro-periodic model. Flute, bass clarinet, and bass trombone provide the first stage of inhalation involving “air” sounds, with some accompanying textures provided by key clicks.

Figure 4.22, Inhalation, A3.1.1.
As used in A3.1, the “inhalation” section brings back familiar materials, providing cohesion with earlier moments of the piece. Foreshadowing materials from A4, subsequent retentions and exhalations introduce familiar timbres (harmonics and *col legno battuto*) processed in new ways, the construction of which shall be discussed in depth momentarily.

*Figure 4.23, Retention, A3.1.*

*Figure 4.24, Exhalation A3.1.*
With a return to familiar materials, the subsequent suspension in A3.1 re-contextualizes them with a different state of momentum. Originally presented in A2.2, the double-trilled glissandi were presented in an alternately expanding and contracting contrary motion, creating trajectories akin to inhaling or exhaling. Here, they are layered in a quasi-random arrangement so as to create an experience of temporal immersion and stasis.

*Figure 4.25, Suspension A3.1.*

A3.2 respirates as well with expanding periodic cycles, incorporating all prior acoustic elements much in the same way that Ferneyhough created cohesion through prolonged exposure to related materials. The phenomenological “other” is the progressively overwhelming electronics, to which the acoustic forces eventually succumb in Interlude 3.1. Through expanding periodic cycles, Interlude 3.2 reintroduces the acoustic elements. As I3.2 transforms, Aria 4 gradually enters as a background
layer, transforming into Interlude 4 and integrating all the elements—acoustic, electronic, visual, and dance—in a massive sensory overload.

Re-contextualization: Aria 4

Figure 4.26, Re-contextualization through process.

A || B || ("material A" re-contextualized through “process B” → C)

During the course of composing Phase, an opportunity arose to write a piece for a new music festival: this new work, Glimpse (for 2 electric pianos and found percussion) became source material in a multitude of ways. Glimpse provided the source material for numerous quotations in the prologue as well as material for the electronics in Aria 4.

Figure 4.27, Source material from Glimpse.

Pitch material for A4 was derived by “scrubbing” segments of Glimpse, highlighted in Figure 4.28 below. Beginning in m. 30 of Glimpse, the following figure shows how beats 1-3 were categorized and used as source material for Phase:

Figure 4.28, Categorization of Glimpse material, A4.
Only “active,” foreground material was used: the chords in the right hand of m.30 and the left hand of m.32 were deliberately left out. The process of “scrubbing” is derived from recording studio editing techniques, and in the present work refers to:

1. Repeating segments (as in a broken record);
2. Unfolding materials moving forward, then backwards;
3. “Recursive scrubbing” of materials generated by either 1 or 2 above.

The goal was then to create viable raw material that could be used as is, or redistributed through further processing. The three distinguishable cells were then “scrubbed” via methods 1 and 2 above, resulting in the following:

*Figure 4.29, Raw “scrubbed” piano material A4.*

The order of “scrubbing” was designed with the phenomenology of Grisey, Meyer, and DeRosa in mind. Engaging the attention of the listener was considered a high priority, achieved by creating and fulfilling structural gaps, as well as generating
cohesion (through repetition) and contrast.

*Figure 4.30, Arrangement of the cells by number (scrubbed Glimpse, m.30).*

1 1 2 | 1 2 | 1 2 2 | 1 2 2 | ½ of 2 | ½ of 2 | 1 2 3 | ½ of 3 | 2 3 | ½ of 3 | 2 3 | ½ of 3 | 4

Creating expectations and predicting reactions to their subsequent thwarting generated the following micro-phenomenological analysis. Emoticons are used in addition to punctuation marks introduced by theorists David Bard-Schwarz and David Lewin.58

*Figure 4.31, Glimpse scrub fragments with phenomenological commentary.*

The process was continued throughout the three measures of source material. Repetition was used to approach the fine line between comfortable familiarity and potential boredom, avoiding prolonged repetition, which may induce the perception of vertical time as intended by minimalist composers such as Reich, Feldman, and Glass.

As a fixed pitch spectrum, the material would be used in two ways. First, it would be woven through the heartbeat *Grundgestalt* of A1. The “heartbeat” canons of the first aria, initially presented in the video imagery and later by flute, bass clarinet/trombone, and strings respectively, become the rhythmic framework. The “scrubbed” pitch material is woven through the rhythmic framework, differentiated into three streams—strings,

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58 David Bard-Schwarz, lectures, 2013.
piano, and winds/bass trombone—reflecting the onset of the triplet eighth, sixteenth, and quintuplet sixteenth threads, respectively. The results of this process provided the “clay” for composition and orchestration.

Figure 4.32, First three measures of “scrubbed” Glimpse piano part, annotated.

Figure 4.33, “Scrubbed” Glimpse material woven through “heartbeat Grundgestalt,” A4.
Re-contextualization at the beginning of **A4** demonstrates how process A ("heartbeats") was applied to material B ("scrubbed" piano). Further sculpting was required at this point: for example, notes allocated to the string quartet were limited to sounding pitches available to open strings and harmonics. This material was further sculpted through "subtraction": timbral paths were carved out such that the piano remained as a "tissue" between two alternating subgroups (string quartet and winds/brass/percussion/electronics).

Later, the electronics would be separated as its own group. These materials would be alternated with the “broken-clock” material, referenced in the beginning by the prologue, and by the electronics at the end of **I3**. At this point, the “clock” material becomes both secondary material and part of the process., the rhythm provided by the Grundgestalt variation of the string wall and durations through which the *Glimpse* tissue can be overlapped.

**Periodicity as a Function of Re-contextualization**

Re-contextualization as a “function” can be thought of as $f(x)$ whereas process $f$ is applied to material $(x)$. In the context of exchanging materials and processes, at least four possible permutations exist between any two musical materials: $a(a)$, $b(b)$, $a(b)$ or $b(a)$.

**Table 4.7, Phase form as a function diagram.**

<table>
<thead>
<tr>
<th></th>
<th>A1.1-3</th>
<th>A1.2</th>
<th>A2.1</th>
<th>A2.2</th>
<th>A3.1</th>
<th>A3.2</th>
<th>A4</th>
<th>A5</th>
<th>A6</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>c(c)</td>
<td>d</td>
<td>b(c)</td>
<td>e</td>
<td>b'</td>
<td>b''</td>
<td>f</td>
<td>c'</td>
</tr>
<tr>
<td>b</td>
<td>c(c)</td>
<td>d</td>
<td>b(c)</td>
<td>e</td>
<td>b'</td>
<td>b''</td>
<td>c(a)</td>
<td>b'</td>
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<td>c</td>
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<td>b'</td>
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<td>c(a)</td>
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<td>d</td>
<td>b(c)</td>
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<td>b''</td>
<td>c(a)</td>
<td>b'</td>
<td>c(a)</td>
<td>b'</td>
<td>c(a)</td>
</tr>
</tbody>
</table>

As a process, $b$ was used as a rhythmic framework in **A1**, and later **A4**, wherein scrubbed *Glimpse* materials were woven through it. As a material, (c) represents...
sustained timbral materials, whereas process c represents a slow cycling periodicity, as a “container” for material as in the beginning of A1.4, A3.1, and later in A5. C’ of I3.2 functions as a rapid cycling of materials. Re-contextualization as a formal de-coupling of material and process was used as a means of merging contrast and cohesion by creating new musical clay that contained elements from both its sources. In this way an audience could find familiar elements in an unfamiliar substance. As a compositional tool, re-contextualization can be applied recursively, as it is in I4, to integrate multiple previously “unrelated” elements.

Conclusion

As a means to close the piece, the phenomenological twist at the end was to be a “pleasant” surprise. As I4 climaxes, alternating blocks of electronics and acoustics, immersive fixed media create a “wobbling” effect in the room through a manipulation of beating, phase-cancellation, and spatialization, bringing attention to the moment when everything stops except a spotlight on the Butoh dancers, and providing an opportunity to experience Kramer’s vertical time with a willing and enthusiastic embrace of “timelessness.”

Both Grisey and Ferneyhough provide excellent examples of how the mindful use of clear categories and a sense of how energy can be used to provide a visceral and engaging experience for an audience. Also, an awareness of the innate phenomenological potentials of materials on both a structural and energetic level can provide guidance and new directions as the innate nature of compositional elements guide the process of re-contextualization.
Categorical respiration (continued), *Lemma-Icon-Epigram*, mm. 48-59.
Categorized final respiratory cycle, *Lemma-Icon-Epigram*, mm.160-177.
Phase form with "macro-phenomenological" annotation
Bibliography


Scores


PART II

PHASE: AGONY TRANSMUTED
Phase: Transmuted Agony
for chamber ensemble and intermedia

Brad Robin (2016)
GENERAL INDICATIONS:

- Change between indicate states.
- : Sporadic dynamics within specified range.
- : Perform gesture within specified duration.
- : Bend to indicated note. Do not re-articulate destination pitch.
- : Frenzied "chaotic" tremolo.
- : Double trill, alternate between normal and harmonic finger pressure.
- : “Friction attack” tremolo.
- : Swirl object upon indicated surface.
- : Mute with palm of hand while striking surface.
- : Use credit card at a perpendicular angle and scrape parallel to coils. Make metallic “scraping” sound.

STRINGS:

- Scordatura remains throughout piece. Notation reflects fingered pitches.
- : Complete distortion, imperceptible pitch
- : Increased pressure, produce partially distorted pitch
- : Normal pressure
- : Chaos pressure, erratically vary bow pressure between indicated states.

FLUTE:

- : air sound
- : pitch/air blend
- : full pitch
- : lip pizzicato
- : normal
- : tongue ram

BASS CLARINET:

Overtones are to be performed to relative indicated level.

TROMBONE:

- : Attack with mute open, immediately close.

PIANO:

- : Tremolo scrape with poker chip.

PERCUSSION:

- TAM-TAM: Prepare triangle beater with fishing line or string such that beater can be dangled from top of tam-tam.
- Objects include: thin, plastic grocery bags, set of keys, pan, small and large pot.
- F.A.: Activate friction attack with superball mallet.
- : "Friction attack" tremolo
Swirling, blurry images coalescing into hearts.

Exhale. Inhale.

Silently depress.

Gradually release pedal.
Continue Butoh "sculpture - reaching with hands out, backs to one another in torment.

Bow slow, produce undertone.

Take plunger

Insert harmon mute stem out.

Insert harp mute stem out.

Cresc. poco a poco

Bow slow, produce undertone.

Bm

Flute

Pno.

Vla.

B. Cl.

Cb.

El.

Dhrs.

m.s.p.

b#

mm

Sf

f

Insert harp mute stem out.

Insert harp mute stem out.

Cresc. poco a poco

Cresc. poco a poco

Insert harp mute stem out.

Insert harp mute stem out.
Match flute and clarinet dynamics.

Continue erratic tremolo scrape.

Depress silently.

Gradually release pedal.

Staccato.
"Breath"
A2.1 B. Cl.

Ovblw.
Pno.
Pno.
Pno.

Vla.

Vln.

Vc.

Cb.

Fl.

Cng.

K.D.

B.D.

Sn.

Pizz.

Snares on.

Brush with one hand on snare in circular motion.

Crinkle plastic bag continuously creating erratic noise.

*When in unison, match clarinet dynamic.

(sound)

(sound)

(sound)

(sound)
"Discovery"

[Staff notation and musical instructions are present, but the text is not legible.]
Produce random key clicks while making air sound, no pitch, alternate clamping all left hand fingers with right hand fingers.

Erectly pusher lips while blowing.

Erratically vary diaphragmatic breathing.

Crinkle bags.

Erratically vary diaphragmatic breathing.

Crinkle bags.

Erratically vary diaphragmatic breathing.

Erratically vary diaphragmatic breathing.
Fl. \( \text{q = 75} \)  
B. Cl.  
Bb.Tbn.  
Sn.  
Pno.  
Vln.  
Vla.  
Vc.  
Cb.  
Dncrs.  
Pno.  
Vid.

"Spectral object" phasing and beating, reflecting the harmonic content of the piano offset by microtones.
Attach sizzle chains to small and medium cymbals.
"Core"

Dncrs.

B. Cl.

Vc.

Bs.Tbn.

Phn.

Vln.

Vla.

Vc.

Cb.

Vld. 2

Bc.

El.

Dncs.
Pause at any time, aleatoric breaths. Continue holding notes if pause occurs within a phrase.

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A4 "Integration"