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SPECTRAL TIME: HOW GÉRARD GRISEY'S CONCEPT OF MUSICAL TIME IS STILL RELEVANT TODAY

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University Honors

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Purpose

This paper analyzes and compares the music of two composers, Gérard Grisey and Magnus Lindberg, focusing on how each treats the passage of time in his music. These composers were deliberately selected because Grisey helped launch the spectral music movement in the 1970s and 80s, while Lindberg is still alive and writing music today. Though Grisey is not as well-known of a composer as others during that time, this paper strives to show how his ideas concerning the passage of time in music influenced the music of his students and other composers, even those who do not claim to be “spectral” composers. Using the “skeleton,” “flesh,” and “skin” of time to identify the quantitative, qualitative, and subjective aspects of temporal matters within music, Grisey also introduced a continuum that labels different types of time from completely predictable and regular to completely random and discontinuous. These concepts transformed music by assigning more focus to the phenomenological nature of music and perception, and through analysis of a Lindberg piece composed in the last ten years, the reader will see the effects of Grisey’s teachings and approach on the music of one of today’s premier composers.

Part I: Background

In an interview with Tristan Murail, who helped launch the spectral movement with Grisey in the 70s, Ronald Bruce Smith sought to clarify how and why the movement started. Murail describes how the music scene of the late 70s was dominated by the music of serial composers and theorists, as well as the theories of Pierre Boulez. The Paris student uprising in 1968 provided a spark for a contrasting viewpoint: the art of destruction as a foil to the serialist

approach. Composers such as John Cage, Earle Brown, and Andre Boucourechliev challenged the ideas of music and deconstructed the long-held ideals of theorists and musicians of the time.¹

In this atmosphere arose the Ensemble L'Itineraire, comprised of Murail, Grisey, Hugues Dufourt, Michael Levinas, and Roger Tessier. According to Jonathan Cross, this group drew from the music of Debussy, Crumb, Ligeti, Messiaen, Scelsi, Stockhausen, and others for ideas of deeply exploring harmonies and sounds.² This new group of composers was not interested in writing highly structured music like Boulez, according to Murail, but also did not want to write completely intuitively such as Scelsi or Ligeti. L'Itineraire took a new approach. After reading books about acoustics and the behavior of sounds, Murail and Grisey began experimenting with sound spectra and other sound properties. Using synthesizers, ring modulators, and frequency modulators, the two began writing music to emulate these behaviors.³ This new music drew structure from the shape of the sound spectra themselves, while still allowing composers freedom to be intuitive with how to use spectra-derived collections of timbres and pitches.

While none of these composers were thinking about their music as a new genre, the term “spectral music” soon emerged as a new label to describe their efforts.⁴ According to Cross, this new term was coined by Hugues Dufourt in 1979, and as technology and computers continued to develop, the boundaries of “spectral music” stretched as composers could do more sophisticated

¹ Ronald Bruce Smith and Tristan Murail, “An Interview with Tristan Murail,” *Computer Music Journal* 24, no. 1 (Spring 2000): 11.

² Jonathan Cross, “Introduction: Spectral Thinking,” *Twentieth-Century Music* 15, No. 1 (2018): 3-9.

³ Smith and Murail, “An Interview with Tristan Murail,” 12.

⁴ Julian Anderson, “Spectral music,” *Grove Music Online*, *Oxford Music Online*, Oxford University Press, Accessed August 27, 2019, <https://doi-org.proxy.lib.uni.edu/10.1093/gmo/9781561592630.article.50982>

analyses of sounds.⁵ Indeed, Murail affirms that beginning to collaborate with the recently-founded IRCAM tremendously boosted his musical ideas and output. The institution informed his approach, while he pushed IRCAM to try new experiments in sound analysis in search of meaningful findings that could be used in composition.⁶

This new musical genre rubbed off on numerous composers, including Haas, Harvey, Hurel, Lindberg, Saariaho, and Tenney. Spectralism revolutionized how composers thought about two things: sound and the passage of time.⁷ Murail states, “For me, this fascination with transforming objects and creating hybrids was always there: it’s almost congenital. I think retrospectively that this idea, coupled with the importance I (and others) place on working with harmony in a way that completely controls it- giving strength to the formal construction- were the basic ideas of spectral music.”⁸ Similarly, Grisey posits, “Strengthened by an ecology of sounds, spectral music no longer integrates time as an external element imposed upon a sonic material considered as being ‘outside-time,’ but instead treats it as a constituent element of sound itself.”⁹ While much of the research today focuses on this first major point, there seems to be a dearth of research concerning the second idea. The way that spectral composers treated the passage of time was revolutionary then, and has shaped the way modern composers think about time. To observe this phenomenon, this paper will examine Grisey’s approach to time, in his compositions and his essays, and compare it to the way that Magnus Lindberg, one of Grisey’s students and one of the premiere composers of today, has approached time.

⁵ Cross, “Introduction: Spectral Thinking,” 6.

⁶ Smith and Murail, “An Interview with Tristan Murail,” 12-16.

⁷ Cross, “Introduction: Spectral Thinking,” 7.

⁸ Tristan Murail, “After-thoughts,” *Contemporary Music Review* 19, No. 3: 7.

⁹ Gérard Grisey, “Did You Say Spectral?” trans. by Joshua Fineberg, *Contemporary Music Review* 19, No. 3: 2.

Part II: Grisey's Ideas

Though Gerard Grisey was not the first to theorize about time in music, his emphasis on the *perceptibility* of time in music offered a unique approach that set the stage for the spectral wave to come. Grisey divides time up into three areas: the skeleton, the flesh, and the skin of time, which refer, respectively, to the structure and chronometric time in the piece, the way the piece moves between events, and the way a listener might interpret the temporality of a piece. These might be reinterpreted as simply measurable (skeleton) and experiential (flesh) time, while the skin is apparent within the other two levels already, as the measurable and experiential aspects of the music create the listener's experience of the music. Though Grisey himself denies the ability of a composer to act on the skin of time, the ways that he employs the continuum between continuity and discontinuity shapes the time in his music, in both measurable and experiential ways.

Context of Grisey's ideas

During the twentieth century, composers started to challenge the idea that all music had to move through time in the same way. They defied constant meters and rhythms contained by bar lines and took exception to the notion that all music had to have forward motion all the time. Debussy was the first to explore the idea of "static time," with his "blocks of harmonies" that didn't necessarily move into the next event in time.¹⁰ Others followed him, namely Messiaen, Boulez, Stockhausen, and Carter. These composers seemed to collectively conclude that musical time could be sorted into two classifications. The first was pulsated or measured time, such as

¹⁰ Edward Campbell, "Thinking Musical Time," In *Music after Deleuze* (London: Bloomsbury Academic, 2013), 112-114.

what was used in most common practice works, with clear divisions of the time into constant meters that determine stress and rhythmic activity. These twentieth century composers offered a new type of time, which they described as non-pulsated, unmeasured, or static time.¹¹ This type of time seemed to stand still and altered the perception of passing time in the ears of the listener. Subsequently, different parameters of music (rhythm, pitch, timbre, etc.) could be altered following either pulsated or non-pulsated time.

Grisey didn't necessarily disagree with this duality presented by his contemporaries, but more so insisted that their theorizing and postulating about these different types of times was pointless given how they used it in their music. For Grisey, it all came down to *perception* and the ability of the listener to hear the processes and transformations occurring in the music:

Who perceives the difference between time divided up periodically by a meter... and smooth time, without a pulse, if the rhythms which overlay it are there precisely to destroy all feeling of periodicity?... If, therefore, the pulse is not expressed, we will remember that only a few simple rhythms make the perception of a virtual pulse possible, whereas others disguise it for the sake of ambiguity and the mesmeric feeling of pure duration, without a reference point.¹²

The music scholar Edward Campbell further describes Grisey's philosophy, "For Grisey, the listener cannot perceive the difference between time which is divided up by a virtual (presumably shifting) pulsed and non-pulsed smooth time, when the rhythms in such pieces are often layered, thus removing all sense of periodicity anyway."¹³ Grisey argues that composers such as Boulez, Messiaen, and Stockhausen, came up with brilliant ideas concerning time, but the listener didn't have a chance to pick up on anything when listening to their music. Their attempts to utilize these ideas of switching between pulsed and non-pulsed time were covered up

¹¹ Ibid, 115-125.

¹² Gérard Grisey, "Tempus ex Machina: a composer's reflections on musical time," *Contemporary Music Review* 2, No. 1 (1987): 240, 242.

¹³ Campbell, *Music after Deleuze*, 126.

by convoluted rhythms which obscured any kind of meter or time feel. Grisey put strong language to this notion, calling Boulez's ideas of smooth (unmeasured) and striated (measured) time¹⁴ "the invention of a conductor bereft of any phenomenological awareness."¹⁵

Grisey approached rhythms, tempi, and transformations of all musical parameters in a different way, which will be described in more detail later. But, once again, for Grisey, the transformations were all structured in such a way that he could come close to shaping the listener's perception of time passage in his music in the way that he wanted it to be. His music was clear and coherent to the listener, not abstract and ambiguous such as the music of Boulez. While Boulez and others composed through process and structural control, Grisey wrote with more phenomenological awareness. Instead of fitting accelerations or decelerations into serialized structures, Grisey formed his structure around the perception of the listener. According to Campbell, the tempi used by Grisey are not structural such as tempi found in Boulez or Stockhausen, but rather emphasized the entire duration of a musical sequence (as opposed to a durational unit of measurement), and Grisey used the tempo to condense or elaborate on this sequence.¹⁶ This applied to each parameter in Grisey's music-- tempo, rhythms, timbre, pitch, and more. The transformations of each of these parameters over the course of a piece have clear curves, coherent and complimentary, always focused on ease of perception for the listener.¹⁷

Grisey's thoughts and opinions regarding musical time were shaped by Gilles Deleuze and other French philosophers of the 20th century.¹⁸ Exarchos suggests that Grisey's thinking

¹⁴ See Boulez's *On Music Today*

¹⁵ Grisey, "Tempus ex Machina," 240.

¹⁶ Campbell, *Music after Deleuze*, 126.

¹⁷ Pustijanac, "Time's Arrow in Spectral Music," *Nuove Musiche* 1 (2016), 152.

¹⁸ For greater detail on Deleuze's writings and thoughts, see Edward Campbell's *Music after Deleuze* or any of Deleuze's publications.

follows Deleuze's ideas when it comes to temporal experience.¹⁹ While both agree that human experience of time is affected by both quantitative and qualitative aspects of time, the qualitative aspects bear more weight.²⁰ Grisey mentions Deleuze in his article "Tempus ex Machina" when discussing his approach to process vs. object.²¹ Similarly, François Dosse asserts that Deleuze was "the only philosopher whose writings helped [Grisey] to think music."²² It is clear that Grisey was not theorizing about time in a vacuum, since he was surrounded by similar thinkers in philosophy and music, but it was the ways that Grisey pieced these ideas together that makes him worth examining. Having given some context as to Grisey's inspirations and what set him apart from other composers in the 20th century, let us move on to examine his thoughts and writings on temporal experience in music in greater detail.

Grisey's Approach to Musical Time

Instead of the duality of musical time suggested by Boulez and other contemporaries, Grisey offered a threefold approach. He likens each piece of music to a body, comparing the passage of time in each piece to the different parts that make up that body: the skeleton, the flesh, and the skin. Grisey defines each of these in his writings. He calls the skeleton of time "the temporal divisions that the composer uses to organize sounds."²³ Grisey goes on to describe the flesh of time as "the unacknowledged part of musical composition... Subtler and more nebulous than the preceding section [the skeleton of time], it is here a question of approaching the

¹⁹ Exarchos, "The Skin of Spectral Time in Grisey's *Le Noir de l'Étoile*," *Twentieth-Century Music* 15, No. 1 (2018), 41-42.

²⁰ See later in the paper for details on quantitative vs. qualitative time

²¹ Grisey, "Tempus ex Machina," 269.

²² Campbell, *Music after Deleuze*, 128.

²³ Grisey, "Tempus ex Machina," 239.

immediate perception of time in its relationships with the sound material.”²⁴ Lastly, he describes the skin to time as “a field where the composer notices more than he acts. The skin of time, a place of communication between musical time and the listener’s time, is not very open to his interference.”²⁵ More succinctly, we might describe these three classifications as the quantitative, qualitative, and subjective properties of musical time, respectively.²⁶ Grisey developed systems and approaches to address each area of time. His writings offer intuitive ways to measure time in post-tonal works and always center around his central goal: creating *perceivable* shapes in time based on the ways humans perceive events in time, instead of arbitrary theorizing and experiments based on mathematical structures.

The Skeleton of Time

Grisey bases his approach to the skeleton of time, which gives a piece structure and over which the composer has the most direct control, around a continuum he identifies between continuity and discontinuity. He offers various levels on this continuum to avoid the either-or relationship that results when analyzing music with a dualistic system. While no less arbitrary, Grisey’s system at least offers more labels which can come closer to adequately describing a passage of music than a dualistic system can. The table presented in example 1 shows the various levels of structure, but before describing each level of continuity, Grisey warns of the tendency to limit the meaning of musical duration to mean only a rhythmic value of a note:

Before going over the elements of the table point by point it should be made clear that all sounds can be given a duration. By duration, musicians have too often intended a limiting meaning, such as the rhythmic expression of an attack transient. Climaxes of dynamic curves, changes in timbre,

²⁴ Ibid, 257-258.

²⁵ Grisey, “Tempus ex Machina,” 272.

²⁶ Exarchos, “The Skin of Spectral Time,” 34.

sound quality and vibrato, or, more generally, the actual form of a sequence or sound, constitute as much material as one can rhythmically express.²⁷

a) Periodic	maximum predictability	ORDER
b) Continuous-dynamic	average predictability	↓
1) continuous acceleration		
2) continuous deceleration		
c) Discontinuous-dynamic	slight predictability	
1) acceleration or deceleration by stages or by elision		
2) statistical acceleration or deceleration		
d) Statistical	zero predictability	DISORDER
complete redivision		
unpredictability of durations		
maximum discontinuity		
e) Smooth		
rhythmic silence		

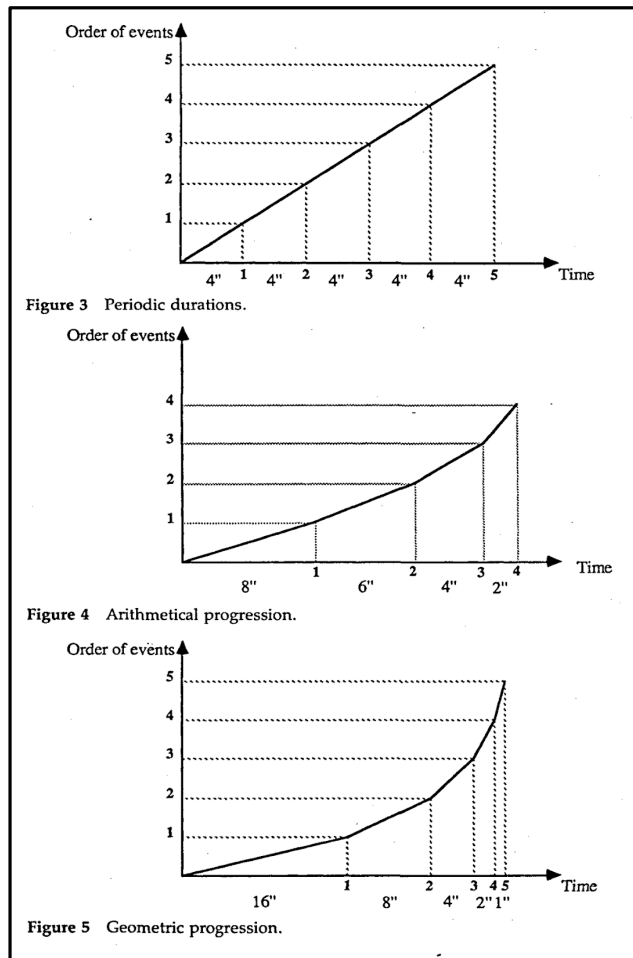
Example 1: The table presented on Page 244 of Grisey's *Tempus ex Machina*

This is an important clarification to make, as the levels in *example 1* guide not only the rhythmic language in Grisey's music, but nearly every element-- timbre, dynamics, vibrato, and more.

The first level of classification described by Grisey is "Periodic." As the descriptor suggests, at this level the musical parameters (rhythm, pitch, timbre, etc.) repeat continuously at regular time intervals: "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."²⁸ It is easy to hear the repetitive nature of periodic passages as a reference point for hearing the passage of time, but its purpose goes deeper than that. Without periodic music, none of the other levels on this continuum could exist. Periodicity temporarily suspends time and the pause in new information allows the listener to catch up to all the previous events and the sound events to come.

²⁷ Grisey, "Tempus ex Machina," 244.

²⁸ Grisey, "Tempus ex Machina," 245.



Example 2: Periodic vs. Continuous-Dynamic Graphs
(from Page 248 of Grisey's "Tempus ex Machina")

Grisey calls the next classification "Continuous-dynamic." This classification describes music that accelerates or decelerates at a constant rate. While periodic elements are important, in the realm of art music, it is of course essential that the musical parameters eventually escape the sameness of repetition. Grisey describes this level as logarithmic, a constant increase/decrease in the musical parameter. Example 2 shows a periodic graph for comparison, followed by two continuous-dynamic graphs (which in this example show constant acceleration). As Grisey explains, constant acceleration or deceleration can be achieved in two ways: adding or subtracting a

constant factor to or from a duration (seen in the "Arithmetical progression" in example 2, in which the constant factor is 2), or multiplying or dividing a duration by a constant factor (seen in the "Geometric progression" in example 2, in which the constant factor is once again 2). Grisey goes on to clarify some details in his approach to this constant acceleration or deceleration. Namely, he explains how larger differences must be made from note to note, timbre to timbre, etc. when dealing with deceleration, as opposed to acceleration.²⁹ Additionally, Grisey notes the psychological effects the composer must keep in mind when accelerating or decelerating. This

²⁹ Grisey, "Tempus ex Machina," 247.

again goes back to Grisey's focus on perception and ties in with the later sections on the flesh and skin of time: "Psychologically the acceleration of durations reinforces the progressive blurring or fading of sounds that takes place in our memory: the longest events memorized are also the earliest... The arrow of his own biological time and that of musical time, added together, cause a complete loss of memory."³⁰ Accelerating causes a loss of memory by Grisey's thinking, and longer events found before the acceleration are more likely to be remembered than shorter events after the acceleration. Deceleration has the opposite effect: "By contrast, the deceleration of durations contradicts the fading of sounds: the shortest events memorized are the earliest... With deceleration, the listener is pulled backwards, since the arrow of musical time had somehow turned in the opposite direction."³¹ In short, the listener will remember parameters differently depending on whether they take place in an acceleration or a deceleration.

The next classification Grisey offers also describes acceleration or deceleration, but no longer in a constant manner. This he calls "discontinuous-dynamic" time. This discontinuous change in speed adds interest to music, as it helps avoid stasis that comes not only with periodic events, but also with events that speed up or slow down at a constant rate and tend to become predictable. Grisey describes how this can be accomplished in a couple of ways, first by accelerating or decelerating by skipping sections of the above-mentioned logarithmic curves. This introduces the state/speed of the sound at a much faster or slower rate than what preceded it. Secondly, discontinuous-dynamic time is achieved by using statistical accelerations or decelerations, which cause the time either to speed up or slow down, but at random rates, thus creating a disorderly shape to the curve.

³⁰ Grisey, "Tempus ex Machina," 249.

³¹ Ibid

On the opposite end of the continuum from “Periodic” material lies “Statistical” time. This classification describes complete randomness of musical characteristics, derived from probabilities. Grisey describes this time as a “veritable white noise of durations.”³² The randomness and disorder introduced by this level can be necessary given the right musical moment. Too much, however, and the listener stops paying attention or can no longer follow the music.

Finally, Grisey acknowledges the rare moments in music when time ceases to exist, and the (non)-events cannot be divided temporally in any way. This he refers to as “smooth” time:³³ “To this picture we can add (non)-rhythm, seamlessness or lack of all temporal division... a rare case of the total absence of any event, single sound or rhythmic silence.”³⁴ While this is not as common as the other types of time presented, it is important to note its existence and acknowledge its validity in music. Examples of this classification might be fermatas or out-of-time cadenzas- not regular occurrences but not uncommon.

Like any great composer of the past or present, Grisey established a system within which he could compose. By mixing various types of times from periodic and completely predictable to statistical and unpredictable, Grisey provides structure and limitations for himself in his pieces. This allows each piece to maintain cohesion while allowing for creative freedom by the composer.

The Flesh and Skin of Time

³² Grisey, “Tempus ex Machina,” 256

³³ Grisey’s definition of smooth time should not be confused with Boulez’s concept of “smooth time.” Boulez’s definition will be discussed briefly later in this paper.

³⁴ Ibid

Now that we have discussed Grisey's approach to the skeleton of time, we turn to the more-difficult flesh and skin of time. Grisey's afore-mentioned structure can affect the psychology and experience of time. Grisey argues, like Deleuze before him, that perception of the passage of time can be altered to escape the homogenous passage of actual chronometric time in music: "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."³⁵ Though chronometric time may pass in a measurable way, the listener of that time passing may or may not perceive it accurately. Thus, the flesh of time could be said to impact perception more strongly than the skeleton of time. Next, Grisey explains how different types of sound events can either contract or expand time. Unexpected, sudden happenings in the music draw the attention of the listener to that moment, and they lose track of the overall shape of the piece and the passage of time, causing time to contract. Conversely, periodic events as described above cause the listener to notice any small change in the texture as a landmark in the piece. These constant repetitive events also cause the listener to lose track of time, but in this case time expands.³⁶ While perception might skew the chronometric time in such ways, Pustijanac still emphasizes the importance of the structure and how chronometric time remains vital in the perception of transformations. This remains true for all post-tonal composers, but particularly underscores Grisey's theorizing. While Grisey divides time up into 3 different levels, all are necessary for the experience of time in music:

Certainly, there is an essential factor without which any discourse about directionality in a post-tonal context appears impossible. This is the duration of the transformation, a parameter that is fundamental at the perceptual level for understanding and constructing, on the basis of the perceived degree of change, the conditions for the predictability of the direction of the process, whatever parameter this includes.³⁷

³⁵ Grisey, "Tempus ex Machina," 258-259

³⁶ Ibid

³⁷ Pustijanac, "Time's Arrow," 151.

The duration of each sound event, or each change in a sound event, must be perceivable for a post-tonal work to be understood well by the listener. Just as the sonata form, or rondo, for example, gave classical works coherence and helped the listener divide up sections of the piece and track the transitions, so the post-tonal composer must create a form for each work to aid in perception of motives, transformation, and development.

The flesh of time can be difficult to assess or analyze. This is due to the lack of control of the composer and the subjective nature of labeling different aspects of the music. This element of musical time relies on the difference between two musical events- the "... difference between a sound and its neighbor..." But at a certain point, this distance between two events becomes the property that identifies the music.³⁸ What makes the flesh of time difficult to assess is trying to find the point where this distance goes from being a relative comparison between two events to an event in and of itself. Obviously, this is a subjective study, and thus the composer can only guess as to how the listener might perceive the difference between two neighboring musical elements in their composition.³⁹

The skin of time, similarly, avoids direct composer control. According to Exarchos, the skin of time is a unique form of musical time that includes both chronometric time and time as it is experienced by the listener: "... both chronometric and experiential time are always given as a composite, and although they are different in many ways, they are also interdependent."⁴⁰ This once again goes back to the subjective nature of time and perception. In many ways, the skin of time can be difficult to divide from the flesh of time, as both depend heavily upon listener perception, but it is helpful to once again return to the way Exarchos divides these classifications

³⁸ Exarchos, "The Skin of Spectral Time," 35.

³⁹ Ibid

⁴⁰ Exarchos, "The Skin of Spectral Time," 39.

up: the flesh of time referring to time's *qualitative* qualities and the skin of time referring to the *subjective* qualities. While this still leaves something to be desired in the form of differentiating the two (and indeed, Grisey offers little in the way of explaining this difference in his writings), suffice it to say that the composer still maintains some control over the flesh of time, while having no control over the skin of time.

Another important point in considering the flesh and skin of time is addressed by both Grisey and Exarchos. That is, what constitutes a musical object, and what defines a process? We would traditionally tend to define an object as a single happening within a piece of music, while a process plays out over a longer period of time, and serves to develop and transition material through time. Alternatively, Grisey offers that sound objects are instrumental gestures, and processes derive from everyday gestures.⁴¹ With these definitions in mind, an obvious similarity is found in the approach to object and process by a composer. Grisey explains that the difference between an object and a process does not exist: "Since sound is transitory, let us go further and say: object and process are analogous. The sound object is only a process which has been contracted, the process nothing more than [a] dilated sound object."⁴² The only difference between an object and a process is the time that it takes for them to occur. Again, it comes down to perception. Grisey suggests that we could think about an object as a snapshot of a process. He goes on to say that a process brings out the shape an object has. An object goes by too quickly for the listener to perceive its internal shape, but since a process is expanded over time, perception is more achievable.⁴³ Pustijanac stresses the profundity of this idea, and identifies its repercussions in composers following Grisey:

⁴¹ Grisey, "Tempus ex Machina," 269.

⁴² Grisey, "Tempus ex Machina," 269.

⁴³ Ibid

The idea that a sound can not only be observed through the microscope but that one can [control] the extent of its enlargement in order to capture in more or less detail its internal life has important consequences for the compositional technique. The results are near to what is traditionally defined as gesture or figures. Although of spectral origins, from the perceptual point of view, such figures appear as objects rather than states of sound; the temporal scales are changed, and with this change also the modes of perception and the retention of the formal processes.⁴⁴

Grisey played a large part in shaping how composers today think of gestures in music. This has profoundly impacted not only acoustic composers, but electro-acoustic composers as well.

Everything concerning the flesh and skin of time revolves around memory. With Grisey's theoretical framework in place, he is free to stretch and compress as he sees fit. All of this, in the end, serves to alter how listeners perceive and remember the passage of time. Pustijanac argues that spectral composers, especially Grisey, developed a vocabulary and an ability to shape musical parameters and dimensions with the intention of exploiting the mechanisms of human perception and memory.⁴⁵

Moving to a Dualistic System

Having established Grisey's tripartite approach to time, let us once again simplify our thinking of time to a dualistic system, keeping in mind, however, the importance of perception in shaping all compositional practices. Exarchos identifies these two levels of time as *measurable* and *experiential*: "What I suggest is not the withdrawal of the skin level, but that this is already presumed, more or less explicitly, on the other two levels. Grisey himself already insisted on temporal perception in his analysis of the skeleton and the flesh."⁴⁶ These labels of measurable and experiential time correlate to what Messiaen called "progressive" and "static" time, or what Boulez called "smooth" or "striated" time.⁴⁷ Again, Grisey did not necessarily take issue with

⁴⁴ Pustijanac, "Time's Arrow," 158.

⁴⁵ Ibid, 155.

⁴⁶ Exarchos, "The Skin of Spectral Time," 38.

⁴⁷ Campbell, *Music after Deleuze*, 115, 118.

their labels, but more so how those composers carried them out. Outside of music, the philosopher Pierre Souvtchinsky identified synonymous terms of “psychological” and “ontological” or “real” time.⁴⁸

Clarifying Measurable versus Experiential Time

The first property distinguishing measurable time from experiential time is the homogeneous quality of measurable time. Exarchos cites the philosopher Henri Bergson as the originator of these descriptors. Bergson offered that “time can be thought of as a kind of homogeneous space, where distances can be measured as temporal intervals... This is a kind of spatialized time, to the extent that space is thought of as homogeneous, the dimension(s) in which things are extended.”⁴⁹ Because of this homogeneity, events in measurable time can be compared by their difference in degree. As Exarchos puts it, “I can say that this interval is that many times longer than another, or longer by that much; I can even say that this sound-event is that much later in time in relation to an earlier event, and so on.”⁵⁰ With measurable or homogeneous time, we pay no attention to qualities of the sound or time.

Experiential time, on the other hand, is heterogeneous, meaning it involves “different kinds of sound-events and different kinds of associated temporalities.”⁵¹ The heterogeneity is also due to the fact that experiential time is also a composite experience, always involving chronometric time. In experiential/heterogeneous time, sound events and other parameters are

⁴⁸ Ibid, 108.

⁴⁹ Exarchos, “The Skin of Spectral Time,” 39.

⁵⁰ Ibid

⁵¹ Ibid

compared and characterized by differences in kind, not simply by their degree (such as in measurable time).⁵²

Gilles Deleuze, who, as mentioned, had a large impact on Grisey and his musical thinking, used different terms to describe measurable time vs. experiential time. In his words, “space” describes the passing seconds within which a composer can shape his or her music. This could be compared to any other kind of creative art, such as sculpting or dance, in which the creative product takes up space in real life. Because music is a time-based art form, the passing seconds are the medium that music fills. Deleuze uses “duration” to describe experiential time.⁵³

Finally, we can distinguish experiential time by viewing the virtual tendencies of the sound compared to the way the music actually unfolds. Exarchos writes, “In Bergson’s theory of temporality, the past of duration exists *virtually* in the form of tendencies, and duration itself consists in the *actualization* of these tendencies.”⁵⁴ Exarchos goes on to explain that because duration either fulfills the expectations set out by the past music or goes against them, duration is both virtual *and* actual, a composite time experience.⁵⁵

Duration (pure time)	Space (homogeneous time)
interiority	exteriority
heterogeneity	simultaneity/juxtaposition
qualitative discrimination	quantitative differentiation
<i>difference in kind</i>	<i>difference in degree</i>
<i>continuous and virtual</i>	<i>discontinuous and actual</i>

Example 3: A table from Exarchos Page 41 classifying all of the above-mentioned terms regarding measurable and experiential time.

⁵² Ibid

⁵³ Ibid, 40.

⁵⁴ Exarchos, “The Skin of Spectral Time,” 41.

⁵⁵ Ibid

Changes in Grisey's Approach

As most composers do, Grisey altered his compositional approach as his career progressed. This included the way he thought about time. In his earlier works, such as *Partiels* or *Periodes*, Grisey used a simple linear approach, allowing a single process to unfold over time. Later in his career, though, he moved towards multi-layered temporal scales, allowing multiple “times” to unfold simultaneously. The early 1980s marked the end of the “spectral movement” in so far as it focused on the dissection of a sound’s structure and properties, allowing such properties to dictate how the piece unfolded and developed. As Pustijanac explains, Murail, Grisey, and the other spectral composers soon noticed the inability to reconcile the priority they placed on perception to the ideal of a single process unfolding over time. Any single process created a gradual change in the elements over the course of the piece, and was easy to predict. This often led to listeners being unable to perceive the changes over the course of the entire piece. In essence, these pieces gave listeners nothing to latch on to aurally, and offered tough listening if they were expected to comprehend the process occurring in real time. Grisey, instead, moved on to develop the idea of temporal scale change, exploring different states of time through new sound objects.⁵⁶ Grisey indicates his plans for the future in “Tempus ex Machina,” written in the middle of his career and before he fully explored multiple temporalities:

What continues to attract me is the possibility in the future of imagining *structures which are no longer fixed to a single type of perception*. Temporal structures themselves acquire a plasticity relative to the change in scale. *These scales of sound proximity*- for which one can always substitute a continuum- create a new dimension of sound: depth, or the degree of proximity.⁵⁷

As previously stated, Grisey turned from using a single process over an entire piece, to using multiple processes simultaneously. This developed over his career, and can especially be seen in

⁵⁶ Pustijanac, “Time’s Arrow,” 156-157.

⁵⁷ Grisey, “Tempus ex Machina,” 268.

his later works, such as *Vortex Temporum*. Additionally, it applies not only to large scale form, but also rhythms on a smaller scale. However, despite the many ways Grisey's approach changed, his focus remained constant: "Going from a system of timbro-temporal deforestation to a controlled spatio-harmonic dilation, Grisey's imprint never breaks the thread of his continuous preoccupation with temporal metamorphoses."⁵⁸ Through every phase of his compositional career, Grisey's concentration remained on perception and how musical temporality morphs over the course of the piece in real time.

Using Grisey's *L'Icône Paradoxe* (1994), Castanet gives an example of how these "multiple times" worked in Grisey's later works. The form of this piece includes two threads which evolve in contrary directions, described as "analogous to two diagonals whose intersection makes up the middle section." The proportions of those threads correspond to proportions found in the fresco that inspired the piece: 3-5-8-12.⁵⁹ Castanet also describes the four variations of time more specifically: "Time I is 'extremely compressed.' High pitched instruments of the large orchestra play a compressed version of the entire piece in 16 seconds..."; "Time II tries to be 'linguistic.' With the accompaniment of the small orchestra, the soprano and mezzo-soprano perform a slow evolution, starting from vowels and moving toward consonants..."; "Time III is somewhat related to the linguistic content of Time II, but dilated."; "Time IV is extremely dilated." The entire large orchestra presents a slow spectral punctuation...⁶⁰ Though each of these is a separate time event, all happen simultaneously and help to create a unique sound world with this piece. One more structural feature is described by Castanet regarding the piece's time:

⁵⁸ P.A. Castanet, "Gérard Grisey and the Foliation of Time," trans. by Joshua Fineberg, *Contemporary Music Review* 19, No. 3 (2000): 33.

⁵⁹ Casanet, "Gérard Grisey," 8

⁶⁰ Ibid, 38.

“When Time II and Time III cross at the intersection of the diagonals, a continuous and periodic rotation invades the entire available sonic space.”⁶¹ As seen from these descriptions, the piece is highly structured, and relies only on a couple of processes, but the time scale of each “Time” creates interest in the contrast between them and the way they interact. This is a common feature among Grisey’s later music, and proves that right up until his death, Grisey was focused on perceptibility in his music regarding the passage of time, even if his process in the mid- to late-90s differed from his process in the late 70s.

Part III: Illustration of Grisey’s theories in his composition

Having defined the skeleton, flesh, and skin of time, explored Grisey’s continuum between continuity and discontinuity, and emphasized how Grisey differed from his contemporaries, let us now turn to supporting evidence in the compositions of Grisey for further examination of his temporal ideas. For this evidence, we turn to *Partiels*, written in 1975 for 18 musicians, the third part of Grisey’s larger cycle- *Les Espaces Acoustiques*. This piece is based on a sonographic analysis of the low E on a trombone, heard at the beginning of the piece.⁶² Everything in the piece- the harmonies, gestures, and timing, are representations of the spectra formed from the attack, decay, sustain, and release of this note. Arrell notes how the ebb and flow of *Partiels* relates to sound waves themselves: “Large scale oscillations between harmonicity/ inharmonicity and periodicity/ aperiodicity draw a tension graph that mirrors the

⁶¹ Ibid

⁶² See Example A-1 in Appendix A

compressions and rarefactions of a sound wave.”⁶³ Furthermore, this realization of the trombone’s tone shapes not only pitch structure, but also time: “Time dilates and harmony slowly emerges from timbre as a macroscopic journey into the microscopic interior of the trombone spectrum begins.”⁶⁴

Partiels also serves as large metaphor for breathing- with inhalation, exhalation, and repose.⁶⁵ This complements the spectral analysis of the trombone tone in structuring the timing of the piece and provides structure to a through-composed piece. These three breathing phases also often align with the level Grisey is at on the afore-mentioned continuum. The inhalation relates to continuous dynamic or discontinuous dynamic time and acceleration. Exhalation also relates to dynamic time, either continuous or discontinuous, but as it relates to deceleration.⁶⁶ During the three sections of repose throughout the piece, time stands still for a short time, using a mixture of periodic time and statistical time. As mentioned in Part II, these two times on opposite ends of the continuum cause the listener to think of time in a new way. In one occasion the music becomes completely predictable and the listener might let down their guard, seemingly knowing exactly what is coming next. While statistical time comes from the complete opposite end of the continuum, it might have a similar end result: as the listener is overwhelmed by the disorder and unpredictability of completely statistical time, they might temporarily stop paying full attention to the music. The hope, of course, in both cases, is to avoid going on for so long that the listener

⁶³ Chris Arrell, “The Music of Sound: an Analysis of *Partiels* by Gérard Grisey,” In *Spectral World Musics: Proceedings of the Spectral Music Conference*, edited by Robert Reigle and Paul Whitehead, (Istanbul: Pan Yayıncılık, 2008), 320.

⁶⁴ Ibid, 321.

⁶⁵ Ibid, 320

⁶⁶ Ibid.

completely stops paying attention, but these “reposes” during the music might be thought of as “palette cleansers,” preparing the ears and the mind for the next inhalation and exhalation cycle.



Example 4: The double bass entrances from the beginning of *Partiels* to Rehearsal 12

Example A-1 in Appendix A shows a prime example of “periodic time.” The repeated low E in the trombone and bass set up expectations for the listener. The E is played three or four times, and after a brief

pause, the rest of the ensemble enters in from almost nothing, establishing the overtones of the low E, as mentioned above. This occurs for around a minute, before slightly changing the bass line and resulting upper voices.⁶⁷ Just after the section shown in example A-1, Grisey resorts to continuous-dynamic time, accelerating gradually by varying the rhythm of the double bass, so that by Rehearsal 12, the bass line is aperiodic, and time has sped up substantially. This phenomenon can be seen in example 4, which reveals the increasingly aperiodic bass line found starting at the beginning of *Partiels*.⁶⁸

Example A-2 in Appendix A shows Rehearsals 31 through 34 of *Partiels*. Found during a repose, this shows a huge deceleration to a sparse periodicity, as described above. Rapid descending lines in the entire ensemble slowly begin to repeat with less frequency, until Rehearsal 33, when Flute 1 and 2 repeat the same examples in a periodic fashion, fading out until the start of the new inhalation at Rehearsal 34, when the music once again begins to accelerate.

⁶⁷ Gérard Grisey, *Partiels*, conducted by Stefan Asbury, Asko Ensemble, recorded February 14-16, 2002, KAIROS Production, 0012422KAI, 2005, streaming audio, accessed March 25, 2020, Naxos Music Library.

⁶⁸ Arrell, “The World of Sound,” 324.

Example A-3 in Appendix A shows a “rupture” in the piece, the only section that escapes the classification as inhalation, exhalation, or repose. It is in stark contrast to the section directly preceding it, and provides a good example of how time can temporarily stand still as the listener momentarily zooms in on the present and ignores the bigger picture. As Grisey would say, time here has contracted.

Part IV: Tracking the Legacy of Grisey’s Theories in Lindberg

Though not considered a “spectral” composer, Magnus Lindberg did study briefly with Grisey, and Grisey’s influences on Lindberg’s sound world are apparent. It might seem today that the spectral revolution of the 70s is a thing of the past, but by analyzing Lindberg’s piece *Souvenir*, written in 2010, using some of the terminology discussed earlier in this paper, we can see that Grisey’s temporal theories as found in “Tempus ex Machina” and his other writings are still relevant in the music of the current day.

Souvenir, the third piece written during Lindberg’s tenure as composer-in-residence for the New York Philharmonic, was written for the “Contact!” series, the Philharmonic’s offsite new-music series, curated by Lindberg at the time. It is appropriately dedicated to the memory of Grisey, and was paired on the concert with *Quatre Chants Pour Franchir le Seuil*, the last work completed by Grisey before his death by stroke in 1998.⁶⁹ This paper will focus on the first of the three movements found in *Souvenir*, described by Lindberg as “a vortex, a fast and concise movement where events collide.”⁷⁰

⁶⁹ David Mermelstein, “Lindberg Makes his Mark on the N.Y. Philharmonic,” *Wall Street Journal* (Online), October 7, 2010.

⁷⁰ Kimmo Korhonen, liner notes to *LINDBERG, M.: Violin Concerto / Jubilees / Souvenir* (Kuusisto, Tapiola Sinfonietta, Lindberg), conducted by Magnus Lindberg, Tapiola Sinfonietta, Ondine Oy, ODE1175-2, 2013, streaming audio, accessed April 8, 2020, Naxos Music Library.

An Overview of Souvenir, Movement I

Spanning just under ten minutes, Movement I can be divided into five sections, each serving a different function.⁷¹ The table below shows how these sections are divided up.

Section	Section 1	Section 2	Section 3	Section 4	Section 5
Measure Nos.	M.1-27	M.28-67	M.68-115	M.116-184	M.185-208
Timecode	0:00-1:50	1:50-3:34	3:34-5:56	5:56-8:10	8:10-9:41
Duration	1:50	1:44	2:22	2:14	1:31
Purpose/Description	Introduction; pushes and pulls around a periodic pulse on which it is built	Transition; accelerates through use of metric modulations	Development; begins and ends with smooth time, constant acceleration and deceleration in the middle	Buildup and Climax; Big acceleration through use of metric modulations, interrupted by smooth time	Coda; smooth time, followed by deceleration and concluding with periodic pulse

Example 5: The divisions and descriptions of sections in *Souvenir* Movement I

Section 1 is an introduction, built around a periodic pulse heard at the beginning, pushing and pulling on the pulse while presenting important motivic material to be heard later in the piece. Section 2 represents a transition, an acceleration through use of metric modulations, though not yet devoid of the push-pull feeling heard in Section 1 (and, indeed, throughout the piece). Section 3 might be labeled a “Development” section, a spinning out of material which ties into the first two sections through its occasional return to motives. Bookended by passages of

⁷¹ Magnus Lindberg, *Souvenir*, conducted by Magnus Lindberg, Tapiola Sinfonietta, recorded February 15-16, 2013, Ondine Oy ODE1175-2, 2013, streaming audio, accessed April 8, 2020, Naxos Music

smooth time,⁷² this section constantly oscillates between acceleration and deceleration in the middle. The buildup and climax of Movement I is found in Section 4. An overall feeling of acceleration through metric modulations leads up to the climax and reaches the fastest tempos of the whole movement. These accelerations, however, are interrupted by more passages of smooth time. Section 5 adds a Coda to the first movement, beginning with a continuation of smooth time as a transition out of the climax. Heavy deceleration follows, and the movement concludes with a plodding periodic pulse reminiscent of the beginning. Though Sections 1 and 2 introduce the main motivic material for the piece, sections 3 and 4 might be said to be the “main body” of this movement. In *Souvenir*, Lindberg does not focus as much on the non-rhythmic/non-metric musical parameters as Grisey does in his music. Dynamic shapes are explored, but perhaps not as deeply as Grisey utilizes them. Timbre is not nearly as important as it was for the spectralist, who derived the timing and structure of the piece itself from the timbres of sounds.

Deeper Analysis of Souvenir, Movement I

The ideas presented in Part II of this paper can be applied in an analysis of Lindberg’s music. The skeleton, flesh, and skin of time, otherwise labeled as measurable and experiential time, can help lend some understanding and structure to a free flowing and elusive piece. In the following section, six excerpts from *Souvenir* Movement I will be discussed for their implications as it relates to the skeleton of time and the continuum between continuity and

⁷² This type of time might be better described as amorphous time, but to remain consistent with Grisey’s terminology presented in Part II, this analysis will utilize the term “smooth time” to refer to unpulsed, suspended time.

discontinuity presented in Part II of this paper. The excerpts from the score corresponding to each section may be found in Appendix B.

*Excerpt 1, Measures 1-10*⁷³

Measures 1 through 3 feature articulations on the downbeat of each measure from bassoon, bass drum (only measure 1), tam-tam (only measure 1), harp, viola, and cello. Piano, harp, and double bass pulse constant quarter notes, setting up the periodic pulse central to the rest of the introduction. Measure 4 shows continuous dynamic acceleration as expectations for more of the same pulse in piano, harp, and double bass are defied by the slightly faster quarter note triplets that emerge out of another articulation on the downbeat of the measure. Measures 5-10 then show more continuous dynamic acceleration as the piece begins to build around the continued periodic pulse. This pulse goes away beginning in measure 7 but will return later in Section 1. Multiple layers of time with the utilization of polyrhythms, especially in measure 7, also help to push the pulse.⁷⁴

*Excerpt 2, Measures 20-31*⁷⁵

Measures 20-21 constitutes the return of the periodic quarter-note pulse from the beginning, which first resumed in measure 18. This clarifies the time despite more free-flowing figures in the rest of the ensemble. The 7/8 bar in measure 22, coupled with the written *accelerando*, clearly shows the beginning of a continuous dynamic push into Section 2. Measure 25 continues this continuous dynamic acceleration, with an extraordinary example of a written-

⁷³ See Example B-1 in Appendix B

⁷⁴ This will be discussed in more detail later in the paper.

⁷⁵ See Example B-2 in Appendix B

out *accelerando*, used frequently by Lindberg in this piece. The violins and violas play sextuplets moving to septuplets moving to 32nd notes, gradually pushing the time ahead. This pushes into downbeat of measure 26, a discontinuous dynamic arrival marked by hits in the bass drum and tam-tam. The pulse suddenly pulls back with much-slower quarter notes in piano, harp, and double bass coupled with sustains in the strings and woodwinds. This deceleration turns to a more continuous dynamic nature in measure 27, as the quarter note pulse in the piano, harp, and double bass moves to half notes pulsing in the harp and cellos. This measure also features another common device used by Lindberg in this piece: while the first 3 beats of measure 27 pull back significantly, the last beat of the measure leads into the arrival of m. 28 with a sudden acceleration (here seen in violin I) accompanied by a crescendo into the downbeat. This lurching motion becomes even more discontinuous with the sudden return to 60 BPMs in measure 28, and a much slower pulsing than heard in the previous passage. The deceleration found in measures 26 and 27 was interrupted by the acceleration on beat 4 of measure 27, but here finds its arrival point. Measure 28 marks the last statement of the quarter/half periodic pulse for the opening section, and marks the start of section 2. Measures 29-31 serve as a transition- the pulse ceases to exist here, and the cello and double bass trade off with soloistic figures that play freely with the smooth time.

*Excerpt 3, Measures 43-58*⁷⁶

Measures 43-50 travel through a constant state of discontinuity. The abrupt shifts alternate both beat values and the number of beats per bar. It lasts for too brief of a period to

⁷⁶ See Example B-3 in Appendix B

group into two groups of four bars, and no one bar is like the next. Lindberg plays with groups of 3s, using sixteenth notes in measures 43 and 47 and sixteenth note triplets in measures 44 and 48. Further adding to the discontinuous dynamic feel of this passage are the 5/16 meters in measures 45 and 49, which pulse one group of 3 sixteenths immediately followed by a group of 3 triplets. Finally, groups of 4s are presented with 32nd notes in measures 46 and 50, adding yet another layer to the metrical discontinuousness. These serve to add a little bit of acceleration at the end of each 4-bar segment. When 12/16 is finally established in measure 51 it does so in a continuous dynamic way, with the sixteenth notes tying into the preceding section, but now in a more repetitive way, setting up a short span of periodicity, especially when compared to the discontinuities of the previous 8 measures. The periodicity is short lived, as groups of 4 are once again brought into textures which had previously been dominated by groups of 3. The slower groups of 4 prepare the arrival of measure 55 in a continuous dynamic way. Measure 55 sets up a new type of periodicity with a rhythmic motive in 8/16 time that will continue to appear throughout the rest of the piece. Following the threefold periodic pattern set up in measure 55, measure 58 signals a pause in periodicity, with a continuous dynamic acceleration led by quintuplet ascending runs in the woodwinds.

*Excerpt 4, Measures 68-76*⁷⁷

Measures 68-80 serves as a repose. Time here is smooth, with no pulse to give an indication or benchmark of how to measure the passing of time. Arpeggiated figures in the strings and piano continue the motion from the previous section in measure 68,⁷⁸ to the arrival on

⁷⁷ See Example B-4 in Appendix B

⁷⁸ This occurrence will be discussed more in-depth later.

the downbeat of measure 69, revealing oscillating figures in the percussion, piano and harp serving to cover up the pulse. These oscillations fade out with a free-flowing harp solo in measures 70 and 71, setting up a chorale-like passage in the high woodwinds, percussion, and strings beginning in measure 71. These instruments play in rhythmic unison, but with each note having a different rhythmic value it is impossible to feel a pulse. This smooth time continues until a sudden acceleration in measure 80 leads into the next section with a sense of discontinuity.

*Excerpt 5, Measures 164-184*⁷⁹

Measures 164-169 mark a continuous dynamic acceleration. Beginning with triplets in the piano and high strings, the main division of the beat becomes sixteenths from measures 165-169. This faster pulse is passed around the ensemble and the dynamics constantly fluctuate, all in a continuous fashion. Measures 170-172 show a discontinuous acceleration as the listener suddenly perceives a quicker pulse as the sixteenths that remain constant facilitate a faster tempo as, becoming the main subdivision in 6/16 time. The music pushes frantically into measure 173. Continuing the feeling of discontinuity, measure 173 reveals a sudden drop in the texture, both in tempo and dynamics. The flurry leading into this passage is left behind for understated triplets then sixteenths in percussion, piano, and harp. Harmonics sustained in the strings give a mysterious aura to the suddenly new tempo, and contribute to a sense of an almost smooth time. Articulations in the woodwinds provide a cumulative quarter note pulse in measures 174-176, but with their sustained tone and quiet dynamic, it is difficult to perceive. This mysterious texture suddenly accelerates in a continuous manner into measure 177, presenting a clear,

⁷⁹ See Example B-5 in Appendix B

periodic statement of the pulse with large, tutti chords on the downbeat of every measure answered by low hits in the cello, double bass, and bass drum. This provides an effective lead-in to the climax of the 1st movement at measure 180. Measures 180 and 181 mark the climax of the piece with two forte tutti chords. These chords are held with fermatas, contributing to the sense of temporarily suspended time. The chord in measure 181 is an echo of the chord in measure 180, and serves as a transition out of the climax, while maintaining the smooth time quality. Though the vibraphone and piano play constant sixteenths in measures 182-184, the decrescendo and sustain from the rest of the ensemble makes this sound like smooth time, a transition from the climax of the piece to the final section/coda.

*Excerpt 6, Measures 202-208*⁸⁰

Right when the piece seems as if it is about to arrive at a new, even bigger climax, the texture instead seems to lighten in measure 203, and the pulse pulls back in a continuous dynamic way as the recurring motive is heard in quarter-note triplets. In measures 204 and 205, just as this pulse arrives, the bassoon, low brass, and low strings play quarter-note triplets with a rallentando, slowing the pulse even more in a continuous dynamic manner and setting up the arrival at measure 205. Measure 205 sees a sudden, discontinuous drop in the tempo, and unison rhythms with a much slower pulse in the piano, harp, woodwinds, and strings. From measure 206 to the end, the bass drum recalls the periodic pulse from the beginning of the piece.

Statistical and Smooth Time

⁸⁰ See Example B-6 in Appendix B

Lindberg does not explore the concept of statistical time in *Souvenir* as much as he does the other classifications of time. Perhaps chance and randomness does factor its way into Lindberg's compositional process, but that is not discernable from his music. Smooth time, on the other hand, is used heavily in this piece. Lindberg uses it purposefully, and when a perceivable pulse does appear in the music, it creates a more noticeable periodic pulse when it follows this unpulsed, smooth time. One conceivable explanation for Lindberg's heavy use of smooth time is that Lindberg uses this technique toward the same ends that Grisey uses statistical time. Both "cleanse the palette" in the sense that they eliminate all sense of pulse to reveal a new, perhaps unrelated pulse after the passage is over.

Comments on the Skeleton of Time

These classifications of time show how Lindberg pays close attention to the ebbs and flows in the pacing of his music. He toys with the expectations of the listener, yanking them this way and that with rapidly-changing time. He does this mindfully, and though it is doubtful that he thinks of time in the same terms as have been presented above, it is apparent that he is thinking of the shaping of time in similar ways as Grisey. Additionally, Lindberg alters the memory of the listener using this acceleration and deceleration, which was always one of the main goals of Grisey and the spectralists of the 70s and 80s. There are psychological effects in addition to the structural implications. Just as Grisey discussed in "Tempus ex Machina," in *Souvenir* the "arrow of time" changes directions based on accelerations and decelerations, and the listener likely remembers events in the music differently depending on the context in the piece. Such concerns with the perceptibility in the music lead us into the flesh of time as it relates to *Souvenir*.

The Flesh of Time in Souvenir

As Grisey theorizes, unexpected events in music serve to contract time, as the listener suddenly loses track of the overall shape of the piece and focuses on the unexpected event that defied their expectations. This might be caused by any number of musical parameters, whether it be dynamic contrast, orchestration, rhythmic language, timbre, or tempo. Two examples in *Souvenir* show the latter: abrupt changes in tempo reflect such big changes in pulse that time does, indeed, contract. The first instance of this happens in measure 173.⁸¹ Rapid accelerations in the pulse occur from measures 164-172, as described above. The 6/16 and 9/16 meters in measures 170-172 lead the listener to expect an even faster passage with the arrival of measure 173. Instead, however, sudden drops in dynamic level, sustained notes in the strings, and a metric modulation take the music to a much slower and more subdued feeling. Time contracts as the listener suddenly struggles to hear definition to the pulse, or a continuation of what preceded it. A second case of contracted time occurs in measures 205 and 206.⁸² After a return of the recurring melodic motive in measure 203 and a subsequent descending quarter note triplet line in bassoon, low brass, cello, and double bass leading to octave Ds, a suddenly slower tempo and beautiful tutti chords appear in the woodwinds, piano, and harp, articulated by the triangle. This bewildering change of pulse, accompanied by a sweeter, thinner timbre than has been heard thus far in the movement, draws the listener's attention to that moment, away from the overall unfolding of the piece.

⁸¹ See Example B-5 in Appendix B

⁸² See Example B-6 in Appendix B

The opposite occurs, too. As Grisey describes in his writing, time expands when periodic events cause the listener to listen more to the overall texture and shape of the music than to the individual sound events. Their expectations lead them to believe that the same periodic pattern will continue in the same way, and small (or in some cases, large) changes in the texture suddenly catch their attention. The periodic 8/16 rhythmic motive set up in measures 55-62 creates this sort of time expansion.⁸³ The listener expects the same rhythm to repeat continuously. The metric modulation in measure 63 sets up the impression that this rhythmic motive, will, in fact, continue. By beat 3 of this 4/4 bar, it is clear, however, that that is not the case, and suddenly the music goes in a very different direction than what was anticipated by the listener. A similar effect happens in measure 177.⁸⁴ Time expands with this periodic lead in to the climax at measure 180. When articulations on the downbeats of measures 177 and 178 are followed by attacks in the low strings, tuba, and bass drum on the and-of-beat 2 and beat 3 in both measures, the listener expects this pattern to continue. Measure 179 gives the impression that this will be the case, but an extra beat of sustain on beat 4 of this measure throws off listeners' perception just enough to make an effective arrival on the downbeat of measure 180 with a massive tutti chord.

The importance of chronometric duration was stressed in Part II, as without this element, no transformation can be effective. It is clear that Lindberg has a masterful knowledge of this with regards to transformations of any musical parameter. Given the scope of this current paper, though, we will only look at chronometric duration as it relates to the perception of time and the

⁸³ See Example B-3 in Appendix B

⁸⁴ See Example B-5 in Appendix B

relation to the pulse. More analysis could be done examining the note durations, dynamics, tessitura, timbre, and other parameters.

Turning to the time feel in relation to the pulse, we can get some sense of the overall transformations of the pulse by quantifying the time spent accelerating, decelerating, doing a mix of both (a push-pull effect), playing a periodic pulse, and playing smooth time. Looking at this table, the total time spent in each classification can give us a rough mathematical representation of the general tendencies of each section. These tend to line up with our aural sense, but highlight how Lindberg shaped time differently in each section of the piece.

Section	Section 1	Section 2	Section 3	Section 4	Section 5	Total
Accel Time	0:47	0:43	0:20	1:06	0	2:56
Decel Time	0:30	0:15	0:30	0:05	0:38	1:58
Both Time	0:07	0:30	0:25	0:28	0	1:30
Periodic Time	0:26	0:16	0:21	0:05	0:28	1:36
Smooth Time	0	0	0:46	0:30	0:25	1:41
Total	1:50	1:44	2:22	2:14	1:31	9:41

Example 6: The chronometric durations of different transformations of time within each section of *Souvenir*, Movement I

Section 1 shows a remarkable balance of acceleration, deceleration, and periodic time. This reinforces the function of this introductory section, after setting up a periodic pulse on which the piece builds. After this pulsating is done, the time pushes and pulls, both accelerating and decelerating (with slightly more time being spent accelerating), setting up the push-and-pull

nature of the rest of the piece and leading effectively into Section 2. Section 2 clearly spends the most time in acceleration. Again, this makes sense given its function as the transition into the “development”, or main body of the piece. Section 3 includes a long period of smooth time—46 seconds to be exact—with nearly equivalent time spent accelerating, decelerating, and playing periodic pulses. The duration of acceleration in Section 4 is nearly equal to that of the four other approaches combined. This reinforces the perception of build up and climax within Section 4. The 30 seconds spent in smooth time also makes sense given the transition out of the climax. Section 5 counterbalances the immense amount of acceleration in Section 4 with a striking sense of deceleration. While not a single gesture within the 1 minute and 31 seconds of Section 5 accelerates, nearly half of that time is spent in deceleration. Lindberg clearly had the overall balance of the piece in mind here, and shaped the transformations of time to be, if not exactly symmetrical, relatively balanced.

As Grisey did in his music, Lindberg creates his own form for this piece. While the sections presented here might be debated, it is clear that Lindberg approached this piece placing importance on unity and coherence, no matter what the shapes in time create. An overall sense of speeding up, then slowing down gives a nice tempo arc to the piece. The types of time transformations Lindberg uses (see Example 6) help to distinguish each respective section. The motives he uses have very distinct features and are easy to detect, despite whatever transformation might occur to them. The same basic shape is recognizable. Perhaps the most recognizable of the motives explored are the pulse from the beginning, the melodic motive heard in the woodwinds in quarter note triplets throughout, and the 8/16 rhythm first heard in Section 2. While *Souvenir* is not structured around a classical form, all of the above and more combine to create a sensible shape and coherent unfolding of events over time.

Object to Process Relationship

The large-scale process Lindberg seems to explore with the overall pulse of the first movement is as follows: Set the pulse with a periodic beating, speed up, move to smooth time, speed up again, slow down, and finally, return to a periodic pulse. These processes are easily seen in the above table (Example 6), and as stated above, form a nice arc that helps shape the form of *Souvenir's* Movement I. There is no evidence to support that Lindberg ties this into any smaller-scale passages in this movement, though more analysis could be done to examine the harmonies, dynamics, or ranges used in this piece to see if this object-to-process relationship might exist.

Measurable/Homogeneous Time vs. Experiential/Heterogeneous Time

Measures 1-13 of this piece show good examples of the difference between homogeneous and heterogeneous time.⁸⁵ For the first six bars, time can be measured by “difference in degree,” against the periodic bass line. This passage exhibits measurable time. Measure 7 sees the start of a different type of time. Here, there are multiple layers of time going on and different sections of the ensemble seem to be presenting different pulses. Here the difference in degree is unhelpful, so instead we measure this time “in kind,” or experiential time. This experiential time continues until the return of the pulse in measure 12 (not seen in Example B-1). The rest of this opening section provides more good examples, alternating between measurable and experiential time and using different measures until the arrival of section 2.

⁸⁵ See Example B-1 in Appendix B

Metric modulations provide another good example of homogenous, measurable time. These abrupt changes in the pulse can be measured in degree. One note value can be measured against another one and compared directly. This is true of all of the many ways in which Lindberg stretches meter and rhythm to make the piece flow.

On the other hand, the amorphous sections differ *in kind* from the periodic sections. It does us no good to try and directly compare the metrical feel of the amorphous section to the bass line pulse set forth in the beginning, because we have no way of perceiving the pulse in the smooth time sections. These two types of time are meant to differ in kind, and thus we describe this relationship as experiential.

Multiple Temporalities

One final element of analysis to apply from Grisey's writing and composition is that of simultaneous temporalities, as developed in his later compositions. Lindberg uses this idea throughout the first movement of *Souvenir*, and though perhaps not as deeply structural as Grisey's multiple temporalities in *L'Icône Paradoxe*, similarities can be drawn with Grisey's *Vortex Temporum* in the way that Lindberg shifts between different meters in a rapid succession. Lindberg also seems to draw influence from Elliott Carter in the use of metric modulations, something not explored by Grisey. These build on the idea of multiple times through a constant value bridging the gap between two distant tempos. Polyrythms, or simultaneous conflicting divisions of the same beat, are also abundant in *Souvenir*. Turning our attention again to Excerpt 1, we can see the use of polyrythms in measures 7-8.⁸⁶ While violins I and II sustain into the downbeat of measure 8, the viola and cello play quick tremolos, the piano, harp, and double bass

⁸⁶ See Example B-1 in Appendix B

alter their periodic repetition of the pulse to go into a 5:4 polyrhythm, and the bassoon plays a slow and free line, almost a 3:4 rhythm. All of these rhythms come together on the downbeat of measure 8, with a quick *jéte* attack in the violins, and a 4:3 rhythm in piano, harp, viola, cello, and double bass that gives a sudden push to the pulse. Much later in the piece, polyrhythms can once again be seen in measure 202.⁸⁷ Eighth notes in the violins and viola, quarter note triplets in the horns and cello, and 4:3 in the woodwinds and brass provide an unsettling feeling that suddenly clears on the downbeat of measure 203, as the recurring melodic motive comes through with new clear pulse, and the eighth notes in the strings cease.

In addition to polyrhythms, measure 68 exhibits another type of simultaneous temporality.⁸⁸ This section of repose begins with an initial attack on the downbeat, which subsides with a decrescendo on the sustained notes in the woodwinds and brass. Meanwhile, the percussion, piano, and strings continue the faster momentum of the section before, presenting a different type of temporality while the rest of the ensemble fades into the smooth time of the section that is to come. Measure 164 presents a similar case.⁸⁹ The flute, oboe, and brass play a *tutti* chord, marking an arrival of sorts, but the quarter note pulsations in the clarinet and bassoon, coupled with the triplets in the piano and high strings, suggest a continuation of accelerating time, faster than the eighth notes in the preceding measure. This dichotomy of times, one decelerating, and one accelerating, suggests two different arrival points in the music, and adds to the intensity of this section as it builds toward the climax.

Conclusion

⁸⁷ See Example B-6 in Appendix B

⁸⁸ See Example B-4 in Appendix B

⁸⁹ See Example B-5 in Appendix B

The Spectral Revolution of the 1970s was a relatively short-lived movement, and did not catch on as much as other developments in contemporary music, such as serialism or post-Cagean experimentalism. Tristan Murail, Gérard Grisey, and the other spectralists were unable to develop a satisfactory system for themselves without repeating processes they had already used. Nonetheless, the ideas put forward by these composers shaped music in monumental ways. Thinking about the harmonic spectrum as a basis for harmony has not ceased to interest composers, and IRCAM continues to study the acoustics and properties of musical sounds and instruments. Often overlooked, perhaps due to the early death of Grisey, were the temporal theories central to the Spectral movement, and especially the music of Grisey. With a focus on phenomenology instead of mathematical processes, Grisey and the spectralists offered new ways to think about musical time. While spectral compositional techniques are less pervasive than in the past, these ideas about time and music continue to be relevant today, and perhaps no more so than in the music of Magnus Lindberg.

Lindberg notated things differently and used a vastly different compositional process, but his sound world was undeniably influenced by Grisey. Examining Lindberg's 2010 piece *Souvenir*, we find constant attention to the pulse, playful application of accelerations and decelerations, and a masterful command of the form, not based on a tone row or random toss of the dice, but using recurrent melodic and rhythmic motives, a clear tempo arc showing a big acceleration followed by a deceleration, and careful attention to the chronometric durations of temporal transformations, both on a small-scale level as it relates to the phrase and on the larger scale in the use of classifications of transformations to clarify form. Despite Grisey's death twenty-two years ago, his musical ideas continue to live on, and offer exciting opportunities in harmonic, temporal, and perceptible ways.

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[illegible]

Handwritten musical score for a symphony, page 31. The score is written on multiple staves for various instruments including Flutes (Fl.), Oboes (Ob.), Clarinets (Cl.), Bassoons (Fag.), Percussion (Perc.), Violins (Vn.), Violas (Vc.), and Cellos (Cb.). The music is in 4/4 time and features complex rhythmic patterns, including triplets and sixteenth notes. There are dynamic markings such as "pp" (pianissimo) and "ff" (fortissimo). A rehearsal mark "5" is present, with a note in French: "A partir du signe (C), tous les bois rallentissent indirectement! Allorché: le ralenti commence les notes d'entrée seulement les autres notes restent le plus vite possible." The page number "31" is visible in the bottom right corner.

Example A-2: Rehearsals 31-34 of *Partiels*

7''

1 2 3 4 5 6 7

Fl 1 2

Ob 1 2

Cl 1 2

Bs 1 2

Vn 1 2

Vla 1 2

Vc 1 2

Cb 1 2

Les signes du chef n'indiquent pas un départ, mais à partir de quel moment le musicien doit changer de souffle.

Example A-2 (Cont.)

7''

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Fl 1 2

Ob 1 2

Cl 1 2

Bs 1 2

Vn 1 2

Vla 1 2

Vc 1 2

Cb 1 2

32

Le chef de l'accelerando : durée minima : 1'' = 1'' au moins

Attention : la valeur du chef de l'accelerando concerne les notes d'arrivée seulement, la vitesse de l'accelerando reste inchangée (1'' au moins)

Example A-2 (Cont.)

Handwritten musical score for Example A-2 (Cont.). The score is written for a large ensemble, including strings (Violins 1 & 2, Violas 1 & 2, Cellos, and Double Basses) and woodwinds (Flutes 1 & 2). The time signature is 7/4, with a tempo marking of $\frac{1}{60} = 1$. The score features complex rhythmic patterns, including triplets and sixteenth notes, and dynamic markings such as *ppp* and *pp*. The woodwinds have specific instructions: "Flutes 1 & 2: *ppp* sempre" and "Flute 1: *ppp* sempre". The strings have various markings, including "Violins 1 & 2: *ppp* sempre" and "Violas 1 & 2: *ppp* sempre". The score is marked with measures 1 through 7, with a final measure marked "Finishing with a flourish".

Example A-2 (Cont.)

Handwritten musical score for Example A-2 (Cont.). The score is written for a large ensemble, including strings (Violins 1 & 2, Violas 1 & 2, Cellos, and Double Basses) and woodwinds (Flutes 1 & 2). The time signature is 2/4, with a tempo marking of $\frac{1}{55} = 1$. The score features complex rhythmic patterns, including triplets and sixteenth notes, and dynamic markings such as *ppp* and *pp*. The woodwinds have specific instructions: "Flutes 1 & 2: *ppp* sempre" and "Flute 1: *ppp* sempre". The strings have various markings, including "Violins 1 & 2: *ppp* sempre" and "Violas 1 & 2: *ppp* sempre". The score is marked with measures 1 through 7, with a final measure marked "Finishing with a flourish".

Example A-2 (Cont.)

4 $\text{♩} = 165$ *Précis*

a de note d'arrivée du glissando, pratiquement inaudible.
se avec les bois

Example A-3

Appendix B: Excerpts from *Souvenir*

IMPORTANT NOTICE: The unauthorized copying of the whole or any part of this publication is illegal.

SOUVENIR
I

Score in C $\text{♩} = 60$ In memoriam Edward Grieg **MAGNUS LINDBERG**
(b. 1958)

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19210

Example B-1: Beginning-m.10

19210

29 *accelerando* 7

Fl.
Ob.
Cl. in Bb.
Bsn.
Hr. in F.
Hr. in C.
Trp. in C.
Trbn.
Tuba.
Perc.
Pno.
Harp.
VI. I.
VI. II.
Vla.
Vcl.
Db.

19210

8 *♩ = 72*

Fl.
Ob.
Cl. in Bb.
Bsn.
Hr. in F.
Hr. in C.
Trp. in C.
Trbn.
Tuba.
Perc.
Pno.
Harp.
VI. I.
VI. II.
Vla.
Vcl.
Db.

19210

Example B-2: M.20-33

27 *♩ = 60* 9

Fl.
Ob.
Cl. in Bb.
Bsn.
Hr. in F.
Hr. in C.
Trp. in C.
Trbn.
Tuba.
Perc.
Pno.
Harp.
VI. I.
VI. II.
Vla.
Vcl.
Db.

19210

10 29

Fl.
Ob.
Cl. in Bb.
Bsn.
Hr. in F.
Hr. in C.
Trp. in C.
Trbn.
Tuba.
Perc.
Pno.
Harp.
VI. I.
VI. II.
Vla.
Vcl.
Db.

19210

[illegible]

Example B-2 (Cont.)

42 15

Fl
Ob
Cl in Bb
Bsn
Hr in F
Tpt in C
Tbn
Tuba
Perc
Pno
Harp
Vl. I
Vl. II
Via
Vc
Db

19210

47 16

Hr in F
Tpt in C
Tbn
Tuba
Perc
Pno
Harp
Vl. I
Vl. II
Via
Vc
Db

19210

Example B-3: M.42-60

52 17

Fl
Ob
Cl in Bb
Bsn
Hr in F
Tpt in C
Tbn
Tuba
Perc
Pno
Harp
Vl. I
Vl. II
Via
Vc
Db

19210

55 18

Fl
Ob
Cl in Bb
Bsn
Hr in F
Tpt in C
Tbn
Tuba
Perc
Pno
Harp
Vl. I
Vl. II
Via
Vc
Db

19210

58

19

This musical score page, labeled 'Example B-3 (Cont.)', contains measures 58 through 60. The instrumentation includes Flute (Fl), Oboe (Ob), Clarinet in B-flat (Cl in Bb), Bassoon (Bsn), Horn in F (Hr in F), Trumpet in C (Tpt in C), Trombone (Tbn), Tuba, Percussion (Perc), Piano (Pno), Harp (Harp), Violin I (Vi. I), Violin II (Vi. II), Viola (Vla), Violoncello (Vcl), and Double Bass (Db). Measures 58 and 59 feature complex woodwind and string passages with various articulations and dynamics. Measure 60 shows a continuation of these textures. The score is written for a full orchestra, with parts for each instrument clearly delineated on their respective staves. The page number '19' is located in the top right corner.

Fl

Ob

Cl in Bb

Bsn

Hr in F

Tpt in C

Tbn

Tuba

Perc.

Pno

Harp

Vi. I

Vi. II

Vla

Vcl

Db

19210

Example B-3 (Cont.)

68 $\text{♩} = 72$ 23

19210

70 24

19210

Example B-4: M. 68-76

72 25

19210

74 26

19210

50

163

Fl

Ob.

Cl in Bb

Bsn

Hr in F

1

2

Tpt in C

Tbn

Tuba

Perc

1

2

Pno

Harp

VI. I

VI. II

Vla

Vcl

Db

19210

51

167

Fl

Ob.

Cl in Bb

Bsn

Hr in F

1

2

Tpt in C

Tbn

Tuba

Perc

1

2

Pno

Harp

VI. I

VI. II

Vla

Vcl

Db

19210

Example B-5: M. 163-184

52

173

Fl

Ob.

Cl in Bb

Bsn

Hr in F

1

2

Tpt in C

Tbn

Tuba

Perc

1

2

Pno

Harp

VI. I

VI. II

Vla

Vcl

Db

19210

53

176

Fl

Ob.

Cl in Bb

Bsn

Hr in F

1

2

Tpt in C

Tbn

Tuba

Perc

1

2

Pno

Harp

VI. I

VI. II

Vla

Vcl

Db

19210

181

accelerando

$\text{♩} = 180 - \text{♩} = \text{♩}$

Fl I *mf* *poco f* *pp*

Ob *mf* *poco f* *pp*

Cl in Bb *mf* *poco f* *pp*

Bsn *mf* *poco f* *pp*

Hr in F *mf* *poco f* *pp*

2 *mf* *poco f* *pp*

Trpt in C *mf* *poco f* *pp*

Tbn *mf* *poco f* *pp*

Tuba *mf* *poco f* *pp*

Vibraphone *pp*

Perc. *pp*

Pan *pp*

Harp *pp*

accelerando

$\text{♩} = 180 - \text{♩} = \text{♩}$

Vi. I *mf* *poco f* *pp*

Vi. II *mf* *poco f* *pp*

Vla *mf* *poco f* *pp*

Vcl *mf* *poco f* *pp*

Dbl *mf* *poco f* *pp*

19210

Example B-5 (Cont.)

The image displays two pages of a musical score, labeled 60 and 61. The score is for a symphony, featuring a variety of instruments including Flutes (Fl.), Oboes (Ob.), Clarinets in Bb (Cl. in Bb), Bassoons (Bsn.), Horns in F (Hr. in F), Trumpets in C (Trp. in C), Trombones (Tbn.), Tuba, Percussion (Perc.), Piano (Pno.), Harp (Harp), Violins I and II (Vi. I, Vi. II), Viola (Vla.), Violoncello (Vc.), and Double Bass (Db.).

Page 60 (left) shows measures 202-205. The tempo is marked $\text{♩} = 96$. The score includes a *rallentando* marking. Dynamics range from *pp* to *ppp*. The bottom of the page is numbered 19210.

Page 61 (right) shows measures 205-208. The tempo is marked $\text{♩} = 90$. The score includes a *rallentando* marking. Dynamics range from *pp* to *ppp*. The bottom of the page is numbered 19211.

Example B-6: M. 202-end