Cognitive Mimesis in Music and the Extended Mind Theory

by

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Abstract

Andy Clark and David Chalmers redefined the boundary of the mind in "The Extended Mind" (1998). Clark and Chalmers's central argument is that if something in the world *functions* as a cognitive process while an individual performs some task, that part of the world *is* part of that individual's cognitive processes during that time. For example, someone with Alzheimer's might use a notebook to remember details, and that notebook should be considered a part of his extended cognitive system as long as it meets certain criteria. This dissertation takes this idea and applies it to music to create a personal phenomenology.

After a background of the extended mind theory in Chapter 1, Chapters 2 through 4 explore how specific pieces mimic cognitive processes and become part of an extended cognitive system. Following a more traditional analysis, Chapter 2 explores how György Ligeti's micropolyphonic composition *Lux aeterna* (1968) uses "gap" pitches to maintain an unchanging aural façade. In maintaining this façade, the typically active interplay between past, present and future becomes counteracted and the listener starts to hear *Lux aeterna* actively retaining the past in the present through the music, rather than through cognition. The result is a listening experience that allows the composition to function as the listener's processes of retention and attention. Chapter 3 also begins with a more traditional analysis before discussing how Steve Reich's *Piano Phase* (1967) enacts a similar sense of retention alongside the added process of comparison. By mimicking the process of comparison, *Piano Phase* evokes a goal-oriented listening experience where the listener makes quality decisions on different heard configurations to create a future work. I argue that Reich executed exactly this, using his early phasing works as external thought experiments within the global compositional process of *Music for Eighteen*

Musicians. Chapter 4 adapts the extended mind theory to grant cognition to characters in Claude Debussy's *Pelléas et Mélisande* (1895) and Sergei Prokofiev's *The Fiery Angel* (1927). With both works focused on a principle heroine with clouded intentions, the music mimics mental functions to create defined, music-bound cognitive states for the characters on stage.

Introduction

Traditionally speaking, there is a natural barrier, a "magical membrane,"[1] delineating the relationship between music and a listener's consciousness. Music is intrinsically "out there," removed from the human body as a series of auditory waves, while the listener remains firmly "in here," or inside one's body. One can access music through perception and it would seem that this act internalizes musical elements. But these elements are a series removed from the original music and, as sound waves are transformed into electrical currents through the interface of the inner ear, they exhibit different physical attributes. Even though the physical auditory waves may eventually be reborn through another interface (e.g., the vocal chords or a musical instrument), the music does not actually become a part of the listener between these two soundings. As an object of perception, music is always considered something outside of the listener's consciousness, or something innately separate from the listener. Even when listeners "internalize the beat" of a song, this internalization is nothing more than a metaphor. In reality, the listener is synchronizing an internal pulse with an external one and, thus, moving/playing "in time" with the separate, external music; the internalization of the beat is an illusion.

The same barrier holds true for any external object, or exogram, as anything that resides outside of the brain is traditionally considered to be outside one's consciousness. Put another way, exograms are objects of conscious perception, not part of consciousness proper. From a musicological perspective, this leaves a straightforward relationship between music and the

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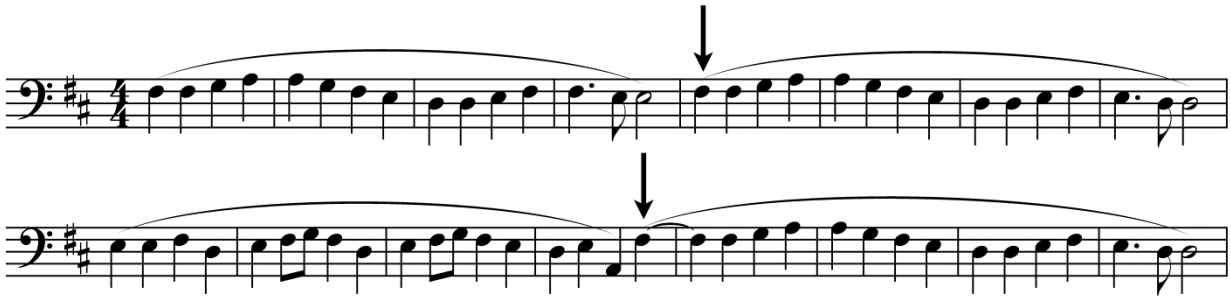
[1] Susan Hurley, "The Varieties of Externalism," in *The Extended Mind*, ed. Richard Menary (Cambridge, Massachusetts: The MIT Press, 2010), 103-105. See also Susan Hurley, *Consciousness in Action* (Cambridge, Massachusetts: Harvard University Press, 1998), 282-284 and 335-337.

listener: the listener perceives musical passages and these perceptions are interpreted within the bounds of her cognitive abilities, personal history and attention. Thus, David Huron is able to write the following:

> [An] example of a dynamic surprise can be observed in Beethoven's familiar setting of Schiller's "Ode to Joy" from the fourth movement of Symphony no. 9. The principle theme consists of four phrases with nearly identical second and fourth phrases [recreated here in Figure 1.1]. The surprise amounts to a single syncopated moment when the fourth phrase begins a quarter-note prior to the downbeat. As in Haydn's [Surprise Symphony no. 94], this unexpected onset occurs after Beethoven has already presented the phrase in its unsurprising form. In fact, each of the first three phrases begins on a downbeat. For the first-time listener, the expectation here is for the fourth phrase to begin on the downbeat of the next measure.[2]

Figure 1.1: Early Onset from the "Ode to Joy" in Ludwig van Beethoven's Symphony no. 9, op. 125, IV.[3]



In this passage, Huron clearly highlights the invisible line between listener and music. The listener acts as a cognitive computer, programmed by past experiences to expect certain

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[2] David Huron, *Sweet Anticipation: Music and the Psychology of Expectation* (Cambridge, Massachusetts: The MIT Press, 2006), 278-279.

[3] Recreated from Figure 14.6 in Huron, *Sweet Anticipation*, 279.

outcomes in similar situations.[4] With regards to the passage from Beethoven's Ninth Symphony, the music defines a background template for the listener by opening with two successive four-bar phrases. One can easily imagine a first-time listener building a temporal framework based on these phrases: as the first phrase ends, she notes the length of the passage from the hypermetric pulse and, as the second phrase ends, she notes that the two phrases are equal in length. The listener then takes this information and projects it into the future, creating an expectation that the third phrase will end after four measures as well. At first, this expectation appears to be confirmed as the third phrase ends with a leap of a perfect fifth, creating a half-cadence on beat three of the fourth measure (the same metrical location the previous two phrases cadenced). However, the abrupt start of the fourth phrase on the next beat breaks the hypermetrical template and creates what Huron calls a dynamic surprise.[5]

Christopher Hasty and Friedrich Neumann evoke parallel outcomes. Hasty notes that the onset of a tone creates a "potential for duration," which is concretized by the onset of a second tone. Once the duration is made whole, with both a beginning and end, this duration can be projected into the future with temporal expectations following suit.[6] Similarly, Neumann writes that the temporal distance between the first and second note's onsets creates an expected duration between the onsets of the second and third note. With regards to the passage from Beethoven

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[4] This can be considered a fairly straightforward input-output approach to cognition.

[5] According to Huron, a dynamic surprise occurs when "the music is constructed so that the work itself sets up some work-specific expectation that is then violated." Huron, *Sweet Anticipation*, 278.

[6] Christopher Hasty, *Meter as Rhythm* (New York: Oxford University Press, 1997), 84-88.

discussed above, Neumann would conclude that the "early" onset of the fourth phrase would cause a startled reaction in the listener.[7]

As previously stated, the relationship between listener and music is well defined in these analyses. In each case, the outside music affects the listener in a certain way and evokes some predetermined reaction. In a sense, the relationship between music and listener in these approaches is framed within a scenario of cause and effect where the music and listener *have* to be separated to fully understand the functionality of each as an entity. The listener thus acts as a cognitive whole with certain predispositions, and the music acts as an outside force on the listener, imposing its will based on historical contexts.[8] This is an interesting relationship if for no other reason than it seems counterintuitive to the way one normally interacts with the world. For instance, Henri Bergson defines the human body as "a center of action," "an object destined to move other objects."[9] Bergson's description of the human body falls in line with natural intuitions on how one interacts with the world: as a center of action, humans are normally the cause that creates an effect in the environment. Art intuits the opposite. As a collection of purposively orchestrated events and objects, it demands a place of prominence in the cause and effect hierarchy as the immovable object of influence.

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[7] Friedrich Neumann, *Die Zeitgestalt: Eine Lehre vom musikalischen Rhythmus* (Vienna: P. Kaltschmid, 1959), 18-20.

[8] It may be more correct to say that the composer imposes his will on the listener through the music. Either way, the important part is the historical, context-driven basis of these intentions. There is no doubt in the case discussed above that Beethoven intended the music to startle or surprise the listener since the music (Beethoven) plays off preconceived notions of metrical stability, as defined by the Ninth Symphony itself and the works that preceded it.

[9] Henri Bergson, *Matter and Memory* (New York: MacMillan Company, 1896), 5.

The natural reaction to this subservience is to exert some form of control on the music. Hence, a member of the audience taps his foot along with the beat in an attempt to internalize the music and a dancer choreographs a routine to perform alongside the aural artwork, as if the two were working collaboratively in the same process. In a way, the latter comes closer to breaking the barrier between one's consciousness and music as the dancer and music seem to work in tandem within the perceptions of the audience. By crafting a skillful set of motions performed in sync with the music, the dancer and music may become one for the audience member who is simultaneously viewing the dancer's motions and hearing the music. But the assimilation of the dancer and music is still a series removed from where it should be to break the magical membrane. Even if the audience member merges both dancer and music into a single object of perception, in reality, the dancer is not a proper part of the music; she is just being perceived that way. As with the internalization of the beat, the dancer never becomes part of the music and the only control she exerts is upon her own, independent motions.[10]

Yet the desire to interact with music on a more equal level remains. Marc Leman goes so far to claim that "the better we know the music, the more we enjoy its simulated control."[11] For Leman, perceiving music is a naturally multimodal process that is innately tied to physical action. The key to Leman's understanding of musical perception is found in his theory of

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[10] There is a colloquial saying that one can become "one with the music" that might be evoked while thinking about the connection between music and dance. One can imagine a skilled dancer who is so focused on her performance that all she thinks about is the music and her movements, as if the two were one. However, the music is merely the object of intense, possibly absolute, perception in this case, and remains separated from the consciousness of the dancer. In other words, while the dancer's consciousness may be completely occupied with the music, it cannot be occupied with it unless both entities are undeniably separate.

[11] Marc Leman, *Embodied Music Cognition and Mediation Technology* (Cambridge, Massachussetts: The MIT Press, 2008), 97.

mimesis, which holds that "(1) music imitates something, (2) the subject imitates the music, and hence (3) the subject imitates that same something."[12] The "something" in this case is physical motion encoded in the music by a composer or performer, virtually emulated through "moving sonic forms" and reinterpreted into physical actions by the listener. According to his theory, the listener is able to "mind-read," or become connected to, the composer/performer's intentions through an embodied approach to perceiving music. If a composer/performer is encoding certain physical movements into their musical performance, and the listener attunes their motor movements with this music, then the listener is recreating the original, physical intentions of the composer/performer and is able to understand the "structure, emotion, and cultural experience" of the composer/performer.[13] Through this motor-attunement, Leman argues that the listener is able to hear the music as if they were creating it through their own actions. The listener achieves a sense of control over the music.

As compelling as Leman's argument is, though, it is problematic. It turns on two salient assumptions: (1) that a composer intends music to portray some physical motion and (2) that physical imitation leads to cognitive understanding. The first problem can be laid aside by simply removing the composer's presence from Leman's argument. In most cases, there is a performative aspect to music that requires physical motion, and this motion can be imitated at a later time. A pianist may listen to a recording of a piece and "play" along with it on a flat surface, or a passenger in a car may act out the motions of a drummer on his favorite song. The relationship between musical creation and physical motion is solidly grounded. However, the idea that this imitation brings with it cognitive understanding seems fundamentally flawed.

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[12] Leman, *Embodied Music Cognition and Mediation Technology*,128.

[13] Leman, *Embodied Music Cognition and Mediation Technology*,160.

Leman cites the presence of mirror neurons in the brain that allow humans to imitate other, similar animals. However, it is not explained how imitating physical motions leads to an understanding of ideas as complex as emotion and cultural experience (as stated above). For example, when Hideo Nomo made his major league debut in 1995, my friends and I immediately wanted to imitate his unique pitching style. We all mastered the technique with considerable practice, and imitated Nomo's physical motions for months (if not years). However, I never felt I was able to read Nomo's mind while he pitched, or connect with him on some emotional level simply because I mimicked his actions during real-time television coverage. Despite my motor-attuning, I remained as disconnected from Nomo's Japanese upbringing and baseball acumen as I ever was.

The problem centers on the same mechanics of internalizing a beat. In truth, when imitating physical motion in-sync with a real-time event, such as music or pitching a baseball, one does not *internalize* anything or gain access to another's mentality. One simply synchronizes motor actions with those of an external performer. This synchronization may bring with it a feeling of empathy (imagine mimicking a particularly difficult passage of music while watching another performer struggle with it), but even these feelings are born out of one's mind and do not allow one to mind-read the performer, and especially not the music.

In defense of Leman, he notes from the outset that his study is just the beginning of a long process and he recognizes some of his intuitions need to be explored further. In addition, his basic goal is valid: to find a better way to access and engage with music.[14] Leman makes a strong point when he claims that "what is needed is a *transparent mediation technology* that relates

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[14] Leman, *Embodied Music Cognition and Mediation Technology*, xi.

musical involvement directly to sound energy" (emphasis added).[15] In theory, this type of transparent mediation would result in a direct connection between listener and music, making the listener become part of the musical process (generating it through her actions) and, subsequently, making the music become a part of her. Leman's mimesis theory aims to break beyond the magical membrane: the human body becomes the mediator. Yet the human body (and the actions emanating from it) will always remain a series removed from music, since music only offers *virtual* movement while the human body creates *actual* movement.[16] What is needed epistemologically is a mediary able to connect the human listener to sound without this type of incompatible formatting problem. To find the answer to this compatibility problem, one turns to the mind.

Andy Clark and David Chalmers's article "The Extended Mind" (1998) made a lasting impression on the modern philosophy of mind. In this article, Clark and Chalmers argue that our minds are not bound inside our heads. Rather, they see our minds as extending beyond our skin and skulls to actively include the surrounding environment in cognitive processes. In other words, the extended mind theory argues that intelligent beings become actively coupled with their environments, given the right circumstances. Applied to the listening process, we can dismantle the barrier between listener and music as the listener (or composer) creates circumstances where the music becomes part of his extended cognitive system. This dissertation explores this complex relationship, asserting that music can poise itself as part of a listener's

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[15] Leman, *Embodied Music Cognition and Mediation Technology*, 2.

[16] Music does create actual movement in the sense that sound waves physically move through their environment, but this is not the type of movement being referenced here or by Leman. The type of movement referenced in both places is the virtual motion through pitch space, as defined by anything from simple passing motions to complex chromatic leaps.

mind, and that this cognitive coupling can be central to one's listening experiences. Notably, this type of mental extension results in the listener offloading certain cognitive processes to the music, creating an experience that is simultaneously more passive (as certain cognitive processes are entrusted to the music) and more active (as the brain is freed to focus on different aspects of the music).

Chapter 1 of this dissertation focuses on the foundations of the extended mind theory and how its application to musical interactions opens a new domain of aural phenomenology. This chapter is broken into six sections, with the first focusing on the functionalist background of the extended mind theory. The following sections support the idea of mental extension by exploring different, more conservative ways humans expand their minds. The second section starts with the idea that one offloads mental processes to his body through habits and muscle memory, and the third section follows by drawing on the idea that one can actually expand his body schema. The next section takes this idea a step further, exploring how one can expand his *mind schema* in similar ways. This is the largest step. It views the human mind as expandable and adaptable in a similar way to the human body. But this step opens the door to cognitive offloading which, in reality, is much less radical than it sounds. The fourth section also works as a culmination for sections 1a-c and discusses the extended mind theory as it stands now, focusing on the second-wave argument that exograms complement the mind and further enhance one's cognitive abilities. With the assumption that the reader is less knowledgeable about this more recent philosophy of mind, the goal of these first four sections is to give a firm background in the extended mind theory. The fifth section of the first chapter brings music into the equation, and highlights the basic criteria needed to poise music for cognitive coupling. This section also defines how this cognitive mimesis relates to other studies on music.

Chapters 2 through 4 take the extended mind theory and apply it to the listening experience to outline a personal phenomenology. Each chapter focuses on one or two specific compositions, while also drawing upon other, related pieces. To further highlight the different phenomenology being argued here, each chapter opens with a "traditional" analysis of the composition that is later discussed with an extended mind approach. Ultimately, each chapter expands on how compositions can realize different forms of cognitive mimesis while also exploring how this act of mimicry creates a unique type of listening experience.

Chapter 2 focuses on György Ligeti's *Lux aeterna* (1968) and how this piece uses temporal extension to connect past and present events. Through this temporal extension, *Lux aeterna* effectively retains the past in the present and begins to work as an external memory system. Further, as pitches weave in and out the texture, the piece begins to mimic one's selective attention, casting its aural gaze on different parts of what will come to be known as a static structure. In the end, *Lux aeterna* defines itself as a piece that contains a version of working memory and attention, allowing one to offload these temporal burdens to the music. Without enacting this temporal interplay, one can fully experience the guided tour through pitch space this composition creates.

Chapter 3 turns to Steve Reich's *Piano Phase* (1967) and how this work mimics the mental process of potential exploration. The central process of phasing a twelve-beat set in *Piano Phase* begs the listener to compare the different configurations created through the phasing process and determine which configurations work "best." In this way, *Piano Phase* can be heard as a piece that allows the potential of a single set to unfold in front of one's ears. *Piano Phase* carries out a process of revealing new configurations the brain could never hope to unlock on its own. More than this, the external exploration of potential in *Piano Phase* sets into motion an

external global compositional process enacted by the composer. One can hear what Reich was thinking as a composer through an extended mind approach to his early phasing works. The extended mind theory not only connects the listener with the music, but reflects the composer's consciousness as well.

Chapter 4 focuses on how the use of leitmotivs in opera can be connected to apperception, or the integration of new ideas into standing beliefs. Opera presents a completely different experience than the music previously discussed: in addition to the complexities of the musical score, opera presents the listener with a storyline, characters and visual scenery. These extra aspects add to the role music can play in the cognitive processes of the listener. For instance, Debussy uses developing leitmotivs in his setting of *Pelléas et Mélisande* (1895) to reflect the changing desires of Maeterlinck's characters. Debussy's mimesis of the mental is the most in-depth example of music acting as consciousness discussed here. The nearly complete realization of consciousness enacted through Debussy's music grants the characters of Allemonde concrete thoughts. In other words, the audience can hear the music as the characters' consciousness. The musical mimesis of mental processes adds perceptual depth to Maeterlinck's Allemonde while still allowing the music to apperceive for the audience (as well as for the characters on stage).

Another act of apperception occurs in Sergey Prokofiev's *The Fiery Angel* (1927). The critical moment when Ruprecht realizes Count Heinrich is Renata's fiery angel in human form is realized through the music. Rather than revealing this new understanding of Heinrich through action or dialogue, Prokofiev transfers the focus to the music and allows it to integrate this crucial bit of knowledge for the listener. Music becomes the center of an extended cognitive system. All said, cognitive mimesis in music is heard as aiding the listening process in *Lux*

aeterna, composing works beyond *Piano Phase* and creating consciousness in *The Fiery Angel* and *Pelléas et Mélisande*.

Chapter 1

Extending the Mind to Music

Section 1a: Functional Underpinnings

The crux of Andy Clark and David Chalmer's extended mind theory is their *parity principle*. Originally proposed in "The Extended Mind,"[1] Andy Clark later reworked this idea to state that "if, as we confront some task, a part of the world functions as a process which, were it to go on in the head, we would have no hesitation in accepting it as part of the cognitive process, then that part of the world is (for that time) part of the cognitive process."[2] In short, if something in the world *functions* as a cognitive process would, then that part of the world *is* part of the cognitive process. The key role of the term "functions" comes to the foreground. Naturally, the parity principle begs the question: How does some external vehicle, or exogram, serve the same *function* as a matching internal process in the head? As pointed out at the beginning of the introduction, exograms are intrinsically "out there," while cognitive processes remain firmly "in here."

To properly answer this question, one needs to understand the underlying philosophy of mind that set the stage for the extended mind theory: *functionalism*. Simply put, functionalist theories argue that the identity of some mental state is defined by its causal relations to other

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[1] The original parity principle states that "If, as we confront some task, a part of the world functions as a process which, were it done in the head, we would have no hesitation in recognizing as part of the cognitive process, then that part of the world is (so we claim) part of the cognitive process." Andy Clark and David J. Chalmers, "The Extended Mind," in *The Extended Mind*, ed. Richard Menary (Cambridge, Massachusetts: The MIT Press, 2010), 29.

[2] Andy Clark, "*Memento's* Revenge: The Extended Mind, Extended," in *The Extended Mind*, ed. Richard Menary (Cambridge, Massachusetts: The MIT Press, 2010), 44.

mental states, sensory stimulations and behavior.[3] For the functionalist, the internal constitution of a mental state does not matter as much as the role that mental state plays in the functioning of the larger cognitive whole. For example, Andy Clark has often explored the cognitive differences between a fictional race of Martians and "normal" humans. In one of his thought experiments, Clark discusses the possibility of a race of Martians who, for all intents and purposes, function exactly as humans. The Martians are typical carbon-based life forms and, while they might look slightly different, they go about their daily lives in a way similar to humans. Based on this information, Clark argues there is no reason to doubt the Martians are cognitive beings. However, it is at that point that Clark introduces a twist. He inserts the idea that the Martians do not have the same memory system as a human. Rather, the Martians' memory system stores bitmapped images. Everything about the Martian memory system is the same as the human memory system—the Martians still store internal memories, either passively or on demand, and they can recall this information when needed or provoked—but its physical constitution is different.[4]

At this point, one might question the true nature of the Martians' memory. Since humans clearly do not store internal memories as bitmapped images, what are the chances that such a system can exist? This is a fair question. But as long as there is the slightest chance the Martians' bitmapped memory system can exist, the *probability* of its existence does not matter as its

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[3] Janet Levin, "Functionalism," *The Stanford Encyclopedia of Philosophy* (Fall 2013), Edward N. Zalta (ed.), forthcoming URL = <http://plato.stanford.edu/archives/fall2013/entries/functionalism/>.

[4] Andy Clark, "Intrinsic Content, Active Memory and the Extended Mind," *Analysis* 65, no. 1 (January 2005): 5.

plausibility.[5] The real question becomes: If a being with this mental construction exists, is it cognitive? Since the Martians' bitmapped memory serves the same *function* as our neural memory system, the functionalist would answer resoundingly "yes, the Martian is a cognitive being." With this answer, the functionalist defines herself as more concerned with the causal outcomes of any potentially cognitive being, not with the processes that create said outcome. For the functionalist, the ends justify the means.

The resulting philosophy of mind is wrapped up in the idea of *multiple realizability*. This idea posits that cognition is not born from a specific type of mental material, but is defined by how an organism functions.[6] In fact, the material does not even need to be "mental" as long as the resulting "functions" are considered cognitive. Defining what is "cognitive" thus becomes a point of contention for the functionalist, since functional states can be replicated by a myriad of systems. This problematic area does not distinguish functionalism from the other philosophies of mind. The "mark of the cognitive," or "mark of the mental," is one of the (if not *the*) most debated topics in the philosophy of mind. From the epistemological claims that an infallible and transparent self-belief show a mark of the mental, to the more modern view that the intentionality of a being (namely the idea that "every mental phenomenon includes something as an object within itself"[7]) defines the mentality of that being: many different claims of what gives an

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[5] As discussed later, many arguments about the philosophy of mind are based on the *plausability* of something's existence, not the *probability*. This derives from the simple fact that we do not have concrete answers for how the universe works, and as long as something is possible (even if it is not probable) it should be given due attention.

[6] Hilary Putnam, "Psychological Predicates," in *Art, Mind, and Religion*, ed. W.H. Capitan and D.D. Merrill (London: University of Pittsburgh Press, 1965), 37-48.

[7] Franz Berntano, *Psychology from an Empirical Standpoint*, trans. Antos C. Rancurello, D.B. Terrel and Linda L. McAlister (New York: Humanities Press, 1973), 88.

organism the right to be considered "cognitive" have been advanced over the centuries.[8] For the generalized functionalist, the mark of the cognitive is the presence of causal functions produced by an input-output system—which, in turn, is dictated by a mental state (and possibly other related mental states)[9]—that are equivalent to the causal functions being produced by an input-output system known to be "cognitive" (usually defined as a human). In short, some input-output system has the mark of the cognitive if it functions in an equivalent way to how a "normal" human would function in a similar situation.[10]

To see if these conditions are met, the functionalist may turn to a *Turing test*. Originally introduced by A.M. Turing in his highly influential paper "Computing Machinery and Intelligence" (1950), a Turing test is designed to determine whether one should attribute mental states to some entity (organic or not) based on how said entity performs in certain situations. For instance, Turing outlines an "imitation game" that involves three players: an interrogator, a man and a woman. In this game, the interrogator is isolated in a room and can only talk to the man and woman via keyboard terminals and monitors. The object of the game is for the interrogator to identify which person is the man and which person is the woman. The twist is that the man is told to mislead the interrogator into thinking *he* is the woman, while the woman is told to be truthful and help the interrogator in his pursuit.

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[8] For a brief overview of these ideas, see Jaegwon Kim, *Philosophy of Mind* (Cambridge, MA: Westview Press, 2006), 17-27.

[9] Kim, *Philosophy of Mind*, 123.

[10] Please note that the non-human input-output system does not need to function in the "same" way as the human, but in an "equivalent" way. If functioning in the same way was required, nothing beyond humans would be considered cognitive beings. However, the equivalent realization of these functions upholds the idea of multiple realizability at the center of functionalism.

After playing a round of the game, the three participants might take a quick break before returning to play another round. At this point, Turing introduces a twist: what if he replaces the duplicitous man with a computer? With the human man now being represented by a computer, the game is played exactly as it was during the first round. At the end of the second round, the interrogator might be asked: was the man as good at deceiving as he was the first time? If the answer is yes, the interrogator just interacted with a cognitive machine. If the answer is no, then the machine does not pass the Turing test and remains on some lower, non-cognitive level.[11]

The Turing test outlined here is simple at best; it may give the computer the illusion of cognition during the interrogation but, if its programming does not expand beyond this limited situation, its "mental attributes" will immediately fail in a different situation. This issue is counteracted by developing a more complicated test. For instance, a more acceptable Turing test may involve some entity interacting with other, cognitive beings for a month in varied situations. If the entity in question is able to function in a way that denotes cognition (reasoning, adapting, etc.) in these varying circumstances, maybe it would be granted cognitive status.[12]

Despite its flaws, the Turing test is a good base for functionalism as it allows the cognitive observer *some* insight into whether they should grant another entity cognitive status. With multiple realizability in hand, the observer does not need to know what materials make up the mental aspects of any given entity. Thus, functionalism is more inclusive than other philosophies of mind, such as physicalism, by including "those poor brainless creatures who

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[11] A.M. Turing, "Computing Machinery and Intelligence," *Mind* 59, no. 236 (October 1950), 433-460.

[12] This is a very general description of a Turing test.

nonetheless have minds," as Ned Block puts it.[13] Of course, its liberal foundations come with a downside. After touting the flexibility of functionalism, Block argues vehemently against it as *too* liberal a philosophy of mind. He does this through the example of a homunculi-headed robot (HHR). Block posits that functionalism reduces all mental processes into machine tables "represented as a finite set of quadruples (or quintuples, if the output is divided into two parts): current state, current input; next state, next output."[14] This set of quadruples can then be defined by machine tables that represent every mental state/process a being might have, and the system as a whole uses probabilistic laws to define every action an individual may carry out in the real world.

Taking this idea to the next logical step, Block defines his HHR as an exact physical recreation of a human, only with little men (homunculi) operating where a brain normally would. These homunculi carry out every function defined by the immense machine table of a "normal" human. Block's thought experiment is stipulated on the idea that the HHR would respond to any input the same way a human would. On this level, the HHR passes the Turing test as defined above: there is not a doubt that a person interacting with the HHR would attribute it with

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[13] Ned Block, "Troubles with Functionalism," in *Minnesota Studies in the Philosophy of Science*, ed. Herbert Fiegl and Grover Maxwell (Minneapolis, MN: University of Minnesota Press, 1978), 265.

[14] Block, "Troubles with Functionalism," 278.

cognitive abilities.[15] But, Block points out, "there is a *prima facie* doubt whether there is anything which it is like to be the homunculi-headed system."[16]

The claim that there is not anything it is "like" to be the HHR is based on the idea that there is something it *is* like to be a human. Notably, one's subjective experiences, or *qualia,* define a large portion of one's cognitive life and, thus, it is intuited that qualia play a large role in *all* cognitive life. Can something be considered cognitive if it cannot experience or reflect on the "redness" of red? Block calls into question the idea that there is any meta-subjective experience for the HHR (or the nation of China, referenced in footnote 31).

Block's *prima facie* doubt is part of a larger *Absent Qualia Argument* against functionalism that is based on two levels of analysis; one more instantaneous (the *prima facie* doubt), and one more reflective. The *prima facie* reaction Block outlines is based on a simple intuition: if someone's skull cracked open to reveal a colony of tiny people operating within his brain cavity, one would most likely doubt there was anything it was like to be the meta-organism. Cinema highlights this intuition all too well. In the 1939 classic *The Wizard of Oz*, Dorothy and her group of misfits arrive at the Emerald City and come face-to-face with the all-powerful Wizard of Oz. For a few moments, it seems the Wizard is a massive floating head. But soon Toto reveals the infamous "man behind the curtain" who is operating the holographic, floating head. Once the man behind the curtain is revealed, Dorothy (and the audience) perceives the floating head as nothing more than an illusion. With the reveal, the idea there was anything it

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[15] In expanding his HHR argument, Block goes on to describe how the nation of China (chosen because its population is closest to the estimated number of neurons in the human brain) could also theoretically execute a machine table flawlessly and thus create a massive, nation-consuming human that is functionally, and thus cognitively, the same as any other human.

[16] Block, "Troubles with Functionalism," 281.

was like to be the floating head vanishes. More recently, *Men in Black* (1997) contained a similar reveal with the same conclusion. While inspecting a human corpse, it is revealed that the human is not a human at all. It was a human-replica robot with a tiny alien operator inside the "head." While Agent K clearly knew the robot was not an actual human, the reveal is substantial for Agent J and the audience. Once the alien is shown to be where the brain should be, there is an instantaneous doubt there was anything it was like to be the robot.[17]

The latter example comes closer to Block's HHR and elicits a natural response: The human-replica does not have any qualia because it is simply a tool (or disguise) being used by the alien inside the head, who does have qualia. The previously discussed doubt is most likely born from the idea that some cognitive meta-being does not have cognitive micro-beings operating as integral parts of the meta-beings mental processes. This is the argument Hilary Putnam outlines in an earlier article supporting functionalism. In Putnam's view, "no organism capable of feeling pain possesses a decomposition into parts which separately possess [the ability to carry-out an independent machine table representational of mentality]."[18] Block refers to Putnam's stance as a typical functionalist response, summarizing as "a pain-feeling organism has a certain functional organization and that it has no parts which (1) themselves possess that sort of

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[17] While the robotic body surrounding the alien should not be considered cognitive in any way, the replica could be understood as an extension of the alien's body if he became proficient in using it to the point that he now longer paid conscious attention to its operation. This idea will be discussed further in Section 1c.

[18] Putnam, "Psychological Predicates," 42.

functional organization and also (2) play a crucial role in giving the whole system its functional organization."[19]

In response to this, Block describes a plausible part of the universe inhabited by a race of intelligent beings that are "smaller than our elementary particles."[20] He posits that this race of beings might notice our particles acting in certain ways and replicate their motions. In doing so, the tiny beings would become the particles in elementary elements (such as oxygen and carbon). If this were to happen, a new world would seem to exist in that section of the universe. This new world would look exactly like our world, only all of the elements in this world are constituted of microscopic intelligent beings repeating the motion of particles ad nauseam. Block concludes his counterargument by stating that if humans were to live in this part of the universe and thrive in this environment, their bodies would undoubtedly become mainly composed from the present "matter." Essentially, since the humans would be growing plants from the present "elements," breathing the "air" and drinking the "water," their bodies (including their brains) would become saturated with tiny, intelligent beings.[21] That said, would these "infested" humans be any less sentient creatures? The general intuition is no, since they would be the same person (they would even appear the same under close inspection since only their micro-particles are altered). In fact, one could be an infested person right now and never know it. No amount of brain scans would reveal this microscopic difference. Block defines a situation where a cognitive system can

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[19] The distinction between "containing functional organisms" and "containing functional organisms that play a crucial role in the whole system's functional organization" is crucial since, as Block points out, discounting organisms that contain a separable functional organism within them as not having mentality would discredit pregnant women and people with sentient parasites as non-pain-feeling organisms. Ned Block, "Troubles with Functionalism," 291.

[20] Block, "Troubles with Functionalism," 291.

[21] Block, "Troubles with Functionalism," 291-293.

operate on a macro level while the micro-elements that form said system can also be defined as fully functioning cognitive systems.

This is where Block pivots from intuitions to reflective empiricism. Since the realization that someone is an HHR is what makes one doubt his mentality, Block argues that one can *empirically* say that what makes up the seat of cognition matters. As he points out, the brain ("a hunk of quivering gray stuff") does not intuitively make a good seat for consciousness. However, since humans have brains and are privileged with the knowledge that they have mentality, one is able to deduce that *brain-headed systems* can produce mentality. The HHR does not receive the same grace. As a homunculi-headed system, there is a doubt that it can produce mentality and, unlike organisms with brains (even brains constituted of micro-intelligent beings), there is no overriding confirmation to prove its plausibility.[22] In conclusion, Block points out that

> it is a highly plausible assumption that mental states are in the domain of psychology and/or neurophysiology, or at least that mentality depends crucially on psychological and/or neurophysiological processes and structures. But since the homunculi-headed Functional simulation of you is markedly unlike you neurophysiologically (insofar as it makes sense to speak of something with no neurons at all being neurophysiologically unlike anything) and since it need not be anything like you psychologically (that is, its information processing need not be remotely like yours), it is reasonable to doubt that it has mentality, even if it is Functionally equivalent to you.[23]

The psychological and neurophysiological aspects of the HHR automatically cast doubt upon its mentality, since one can empirically say the only psychologically and neurophysiologically proven recipe for mentality stems from a brain-headed system.

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[22] Block, "Troubles with Functionalism," 293.

[23] Block, "Troubles with Functionalism," 295-296.

Block poses a strong argument, something which becomes evident when one considers it still threatens functionalism over thirty years after its inception.[24] However, going deeper into this argument, it becomes apparent that there are some cracks to be exploited. Block's main claim is based on the intuition that one would doubt there is anything it is to be "like" the HHR, making an open allusion to Thomas Nagel's "What Is It Like to Be a Bat?" (1974). Despite the fact that Nagel later retracted his argument,[25] it is widely accepted that his original article stands firmly against the functionalist viewpoint.[26] Even so, there are some points of Nagel's argument that support the functionalist agenda, especially the idea that mentality can be multiply realized.

While arguing for the inaccessibility of what it is like to be a bat, Nagel posits one does not need turn to exotic cases to realize that the mentality of another being is mostly inaccessible. For instance, he posits that the experiences of a person who was born blind or deaf are not accessible to the sighted and hearing. One does not need to turn to added perceptions such as the echo-location of a bat to come up against this inaccessibility.

Nagel continues:

> If anyone is inclined to deny that we can believe in the existence of facts like this whose exact nature we cannot possibly conceive, he should reflect that in contemplating the bats we are in much the same position that intelligent bats or Martians would occupy if they tried to form a conception of what it was like to be us. The structure of their own minds might make it impossible for them to succeed, but we know they would be wrong to conclude that there is not anything precise that it is like to be us: that only certain general types of mental state could

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[24] See Michael Wheeler, "In Defense of Extended Functionalism," in *The Extended Mind*, ed. Richard Menary (Cambridge, Massachusetts: The MIT Press, 2010), 265.

[25] See Thomas Nagel, "The Psycho-physical Nexus," in *New Essays on the A Priori*, ed. P. Boghossian and C. Peacocke (New York: Oxford University Press, 2000), 434-472.

[26] Janet Levin, "Functionalism", *The Stanford Encyclopedia of Philosophy* (Summer 2010 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/sum2010/entries/functionalism/>.

> be ascribed to us (perhaps perception and appetite would be concepts common to us both; perhaps not)… It would be fine if someone were to develop concepts and a theory that enabled us to think about those things; but such an understanding may be permanently denied to us by the limits of our nature. And to deny the reality or logical significance of what we can never describe or understand is the crudest form of cognitive dissonance… My realism about the subjective domain in all its forms implies a belief in the existence of facts beyond the reach of human concepts.[27]

While Nagel's closing argument that "what it is like" to be something should be a more objective pursuit resonates with Blocks "empirical" conclusions,[28] the previous quote takes us in a different direction. Nagel's statements resonate with the basic tenet of functionalism—the idea of multiple realizability—and thus form a perfect counterargument to Block's stance: while one cannot empirically conclude that the HHR has mentality, its potential for mentality should not be discounted based on the simple fact that humans lack the cognitive ability to realize what it would be like to be the HHR. To do so would be an act of mental chauvinism. As Nagel points out, a Martian with a non-brain-centered mind might come to the same conclusion as Block (that there is nothing it is like to be human since we have brains instead of whatever the Martian has), but we know the Martian would be incorrect. As Block points out, one can empirically say brain-

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[27] Thomas Nagel, "What Is It Like to Be a Bat?" *The Philosophical Review* 83, no. 4 (October 1974), 440-441.

[28] Nagel's argument concludes that *physicalism* is a fruitful pursuit as a philosophy of mind since it presents the most objective stance and has the best chance to bridge the gap between different species. For Nagel, the problem with knowing what it is like to be a bat is a subjective problem (we cannot truly experience sonar, even through imagination). However, if we approach the problem from a more objective viewpoint and define sensations by their physical construction (e.g., defining "hearing" as a process involving sound waves), we might reach a more universal theory of mind. In this case, each sensation and intentional mental event would be defined as a physical state and, as we already know, these physical states limit the breadth of "what is sentient" to more brain-based organisms. Despite this, I still feel parts of Nagel's discussion are sympathetic with the functionalist's claims and the fact that he later withdrew his argument can only bolster this idea. Nagel, "What Is It Like to Be a Bat?" 445-450.

headed beings have mentality. And if Block were to agree that the Martians with a different physiological construction would be incorrect to deny us mentality based on our brain-centered minds, then he would be at fault of countering his own argument.

Sadly, there is no conclusion to this debate: beings that function similar to humans but lack brains have not been discovered. However, one cannot discount the fact that it is plausible for such beings to exist. If one were to encounter naturally occurring homunculi-headed beings that showed all the functional signs of mentality seen in humans, one would be forced to recognize their cognitive abilities. For the functionalist, the same holds true for a non-naturally occurring system. For instance, imagine an exact human-replica—right down to the last neuron—consisting of non-organic materials. This human-replica functions exactly as a human in similar situations. With these simple parameters, a functionalist would strongly uphold the mentality of the human-replica since mentality is attributed to the operation of a functional system, not in its creation or materials. With this in mind, any high-functioning robot in a science-fiction movie or show is considered a sentient being (including R2-D2 and C-3PO from *Star Wars*, Data from *Star Trek* and Bender from *Futurama*).

It should be noted that even if Block the physicalist were to cede that naturally-occurring homunculi-headed beings *were* sentient, he would argue against the sentience of any non-naturally-occuring being. Their screams and winces would not be products of their own pain for Block, but merely a mimicry of our screams and winces. Again, Block gives preference to our naturally-occurring brains. The exact human-replica would not produce consciousness: consciousness is innate, not reproduced. Block points out that “we are not designed to mimic

anything," here relying on "another empirical fact." [29] As farfetched as it may seem, one could counter that the world we currently occupy could be nothing more than a replication of another world. One could point out that our world may have existed in a different part of the universe and, as humans evolved and became more intelligent, one of the "original" humans created our world as a science project. If this were the case, humans would be nothing more than a simulacrum of the inhabitants of this original earth and, according to Block's argument, would not be sentient; we would merely mimic sentience.[30]

This is where functionalism shines: whether we are simulacra of some ancient, original race of humans or not, mentality is defined by how we function, not by divine gifts or what is in our heads. As long as these two aspects of our being are present, mentality follows suit. This is why, when David Chalmers argues that it is possible for functionally equivalent beings that lack qualia to exist[31]—i.e., there is absolutely no possibility to be "like" them—the functionalist may counter that it is impossible to conceive of such a being since their functional states point to the presence of mentality. Thus, mentality is present.[32] In the end, the prominence of one philosophy of mind over the other is based on its plausibility, or possibly its conceivability. If one does not believe a HHR can produce mentality because it lacks a brain, he is more of a physicalist. If one

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[29] Block, "Troubles with Functionalism," 294.

[30] If this seems too farfetched, recall Block's argument about a colony where every element is constituted of intelligent beings smaller than our basic particles.

[31] See David Chalmers, *The Conscious Mind* (Oxford: Oxford University Press, 1996).

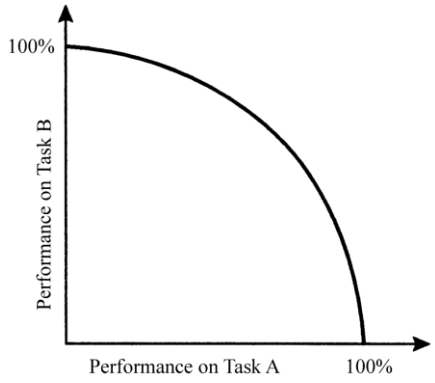
[32] Janet Levin, "Functionalism", *The Stanford Encyclopedia of Philosophy* (Summer 2010 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/sum2010/entries/functionalism/>.

believes the mentality of such beings is completely plausible, he is a functionalist; upholding the possibility of sentient minds that lack a "traditional" seat of cognition.

Section 1b: Body as Mind

To highlight the real-world differences between functionalism and physicalism, consider that the human brain (which both camps include in their conception of cognition) is limited in its processing power. Also, consider how each camp might respond to this deficiency. While no modern computer may be able to match the human brain's ability to quickly perceive, analyze and react to elements in the surrounding environment, the brain is not omnipotent. There is a certain amount of *mental bandwidth* that dictates one's everyday mental life. As Figure 1.2 shows, this bandwidth becomes more apparent when one tries to execute two simultaneous tasks that both demand use of one's working memory. As the graph illustrates, there is a negative correlation between one's performance on task A and task B. The better one executes one task, the worse he performs at the other.

Figure 1.2: Performance on simultaneous tasks.[33]



[33] Recreated from Figure 6-1 in Torkel Klingberg, *The Overflowing Brain: Information Overload and the Limits of Working Memory* (Oxford: Oxfod University Press, 2009), 70.

The negative impact on either task can be the result of either constantly switching between the two tasks, or simultaneously giving partial attention to both. Torkel Klingberg describes a situation where one is reading the morning newspaper (task A) while his significant other talks to him (task B). If one decides to focus on the newspaper and ignore his significant other (or vice versa), he will be able to achieve maximum proficiency in one task, while utterly failing at the other. The rewards in these circumstances are clear (either one gets to read the newspaper or gives his significant other the attention she deserves), but the downside is also present (he may have damaged his relationship by not listening or not been able to read the paper due to time constraints). Another option is to multitask and attempt to get both tasks done in a more time-efficient manner. As Kilngberg points out, the graph in Figure 1.2 outlines a way in which one can read the newspaper at 90% efficiency, while listening to his significant other at about 44% efficiency. One's brain is operating at 134% efficiency![34] However, by deciding to multitask, one may miss a crucial piece of information in the newspaper, or miss the real reason his significant other started the conversation. Even with his brain operating at 134%, he is missing 10% of one task and 56% of the other.[35] If one wants to do competently achieve a task, working at 100% efficiency on one task is the best way to go.[36]

There are two hypotheses on why humans run into this mental barrier. The less scientifically supported claim is there is a center of the brain designated to coordinating how we

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[34] With 100% efficiency being performing the two tasks consecutively. In effect, you might get two simultaneous tasks done in 74.6% of the time it would take you to do them consecutively.

[35] Klingberg, *The Overflowing Brain*, 69-71.

[36] Or, as Klingberg says, "You should not, for example, decide where to invest your pension savings while trying to plow through that morning's headlines, or conduct a job interview while reading your e-mails." Klingberg, *The Overflowing Brain*, 71.

handle two simultaneous activities, and it is not particularly effective at its job. The dominant hypothesis is that "the two tasks interfere with each other because they both need to use the same cortical area at the same time."[37] This hypothesis (the "overlap hypothesis") highlights the problem of mental bandwidth: if two tasks require the same cortical area, and if that area has limitations on its processing ability, the two tasks will negatively impact each other. Of course, this negative impact is only present as long as each task demands use of the same cortical area (usually working memory), and this inefficiency is remedied if only one of the tasks demands this precious brain space.

Such a case of performing two tasks where only one demands working memory is an adult walking in a straight line down an empty sidewalk while talking with a friend. In this case, there is only one activity that demands immediate attention (talking). The other activity (walking) is as an *automatic process*. An automatic process is a process that is not hindered by capacity limitations, does not require attention and is carried out to completion automatically, even if it is initiated through an active mental process.[38] Walking for a normal human adult is considered an automatic process, as it is often initiated through an active thought ("I am going to walk now"), and, once started, it generally carries out to completion without any additional strains on working memory. This idea is challenged when an active environment is introduced. Walking through an always changing environment is hazardous if automatic. For instance, a driver may find herself slamming her breaks as someone else sets his course and gives 100% of

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[37] Klingberg, *The Overflowing Brain*, 78.

[38] Richard M. Shiffrin and Walter Schneider, "Controlled and Automatic Human Information Processing," *Psychological Review* 84, no. 2 (March 1977), 160.

his attention to his phone (as if his feet will automatically avoid oncoming traffic). Such is the downside of automatic processes.

But there is an upside. Recall that if you are performing two tasks involving active memory, one's efficiency on one task may drop 10%, while his efficiency on the other task subsequently drops 56%. However, when engaged in two tasks, and one is automatic, his efficiency in both tasks remains at close to 100%.[39] Rather than walking to class or talking with her friend, one is able to accomplish both tasks well simultaneously. The mind is operating at almost 200% efficiency! This should prompt the question: where is this additional processing power coming from? There are clear limitations on the human brain when engaged in two active processes, so why is it that automatic processes transcend these limitations?

To answer this question, the discussion will turn to pitching in baseball since it is something with which I am very familiar, and seems pretty well understood in American society. There is a lot more to pitching than just throwing; there is a laundry list of mechanics one needs to learn and, eventually, everyone develops their own delivery. Assume the pitcher discussed here already knows how to throw a baseball, but has never pitched before. As he steps on the mound for the first time, he decides to pitch from a full windup. The first time the pitcher executes this move, his delivery will most likely be choppy: the ball can easily end up skipping in the dirt, or sailing over the catcher's head. After throwing from the windup multiple times, the pitcher should become more comfortable, and throw to the target more consistently. According

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[39] If one does not pay *any* attention to walking, he might trip. So one does need to split attention slightly between his friend and surrounding environment. However, as Alva Noë points out, if the person he is talking with shares the same environment, the degree to which one needs to split his attention is limited as "the conversation can unfold against the background of a single shared environment." The same cannot be said if one walks while talking on the phone. Alva Noë, *Out of Our Heads: Why You Are Not Your Brain, and Other Lessons from the Biology of Consciousness* (New York: Hill and Wang, 2009), 108.

to Stuart E. and Hubert L. Dreyfus, the pitcher would have moved from being a novice to being proficient at his task.[40] The pitcher may originally have had troubles navigating the pitching rubber and mound while going through a windup. Now, his feet seem to know where to go on their own; he is able to throw more naturally. Remember, the pitcher already knew how to throw, so what he is learning is how to pitch from a windup on a mound. Since throwing from a windup is the new skill, his mechanics (mainly involving his legs and feet) are what needed active attention. As this skill becomes more "natural" though, the mechanics become automatic and the pitcher can focus on accuracy.

Throwing accurately is yet another skill, and the pitcher will soon find himself focusing on his arm angle, velocity and release point. The mechanics of the windup take care of themselves while active attention is given to exactly how his arm is operating during each pitch. After practice, this too should become more automatic for the pitcher, allowing him to hit the catcher's mitt squarely more and more consistently. At this point, the pitcher will be a master at his task. Something amazing happens at this level: the pitcher does not have to think as much about pitching.[41] The process of going through the windup and throwing a pitch accurately becomes automatic, and he is ready to pitch in an actual game. Once immersed in a real-time game, the pitcher's active attention becomes focused on things such as remembering the scouting report for each batter and how to best attack the strike zone. It could also be focused on how to hold the runner on first base and so on. With all these things occupying the pitcher's active mind,

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[40] Stuart E. Dreyfus and Hubert L. Dreyfus, "A Five-Stage Model of the Mental Activities Involved in Directed Skill Acquisition," Operations Research Center Report (February 1980), 7-11.

[41] Dreyfus and Dreyfus, "A Five-Stage Model of the Mental Activities Involved in Directed Skill Acquisition," 12-14.

his brain would become overburdened if he also had to focus on the physical mechanics of the windup. This overload would most likely result in the pitcher becoming rattled, throwing erratically, and having a very short career.

The pitching scenario resonates with Richard M. Shiffrin and Walter Schneider's research on automatic processes, which they claim arise "as situations become familiar, always requiring the same sequence of processing operations."[42] Shriffrin and Schneider outline the benefits of automatic processes covered here. They note that "the development of automatic processing allows the limited-capacity system to be cleared and devoted to other types of processing necessary for new tasks" and "allows attention to be directed (through automatic-attention responses) to important stimulation."[43] Dreyfus and Dreyfus's model of skill acquisition comes to the same conclusion, noting that if the proficient performer of some task starts to focus on the automatic processes she is enacting, her performance will drop dramatically as active attention becomes split between the automatic task (the windup, for instance) and the important environmental stimulations (a runner leading off from first).[44] Alva Noë more recently made a similar observation, noting that an expert who focuses on the task at hand usually disrupts her own performance.[45] Citing a study by John Milton et al.,[46] Noë concludes that "for the experienced [person], the task takes over."[47]

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[42] Shiffrin and Schneider, "Controlled and Automatic Human Information Processing," 161.

[43] Shiffrin and Schneider, "Controlled and Automatic Human Information Processing," 161.

[44] Dreyfus and Dreyfus, "A Five-Stage Model of the Mental Activities Involved in Directed Skill Acquisition," 12-13.

[45] Noë, *Out of Our Heads*, 77.

Saying that "the task takes over" is a simple statement, but a loaded conclusion. Surely, the task does not complete itself; a master pitcher does not simply step on the mound and watch idly as pitches fly towards the catcher. A more correct conclusion might be that, for the experienced person, the body takes over during the task, leaving the brain free to focus on other issues. This resonates well with Dreyfus and Dreyfus. It also accords with Milton et al., who note that the biggest difference between a novice and expert is that "the motor programs of experts are more efficiently organized, i.e. they require less [neural] energy to execute."[48] But even this new conclusion seems to be fraught with problems: how does the body "take over" during a task? Is the body sentient?

The answer lies in whether one subscribes to the ideas of functionalism or not. For the non-functionalist, the answer may be that the body does not take over at all. Rather, the neural pathways in the expert's brain are more streamlined and, thus, less energy is required to traverse them. However, the functionalist would argue that the expert exerts the same amount of energy as the novice, but this energy is exerted in a different way. Rather than coordinating all the mental activity needed to accomplish some task in the brain, the functionalist argues that the energy is spread into the body as well, effectively making the body part of the mind. In other words, instead of overburdening the limited bandwidth of active memory, the expert simultaneously utilizes the expanded processing power of both active and muscle memory to achieve a higher efficiency while exerting the same amount of mental energy (if not more).

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[46] John Milton, Ana Solodkin, Petr Hlustik and Steven L. Small, "The mind of expert motor performance is cool and focused," *Neuroimage* 35 (2007), 804-813.

[47] Noë, *Out of Our Heads*,100.

[48] Milton et al., "The mind of expert motor performance is cool and focused," 810.

The idea of multiple realizability comes into play here, as the body (or muscle memory) functions in a way that, were it done in the head, would be considered cognitive. Consider the scenario of a person learning to pitch. When he was a novice, the execution of the windup was brain-based. If there was a scanner hooked up to his head, there would have been an exorbitant amount of activity in his motor regions as he attempted to coordinate his body on the mound. However, once he becomes a master of this motion, his brain activity would decrease (as shown by Milton et al.) in so much as processes are offloaded to muscle memory. With this offloading, the functionalist cites the body as part of the mind. The body is now carrying out a process that is cognitive because it was originally executed by the brain. The first example of automatic processing used in this section (walking) illustrates the same conclusion. While walking seems like an automatic process for the normal adult human, it is actually a learned process, one that at one time took all of one's active memory. As an infant transitioning to a toddler, one would have exerted all his mental bandwidth coordinating his body to achieve upright walking. After going through these stages of "body babbling,"[49] he eventually masters the skill and it becomes an automatic process. Even walking, one of the most "automatic" processes, was once controlled solely by the brain until offloaded to the body.

The resulting *expanded mind schema* is an instance of what Andy Clark calls *nontrivial causal spread*. According to Clark, "nontrivial causal spread occurs whenever *something we might have expected to be achieved by a certain well-demarcated system turns out to involve the*

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[49] A. N. Meltzoff and M. K. Moore, "Explaining facial imitation: A theoretical model," *Early Development and Parenting* 6 (1997), 179-192.

exploitation of more far-flung factors and forces [sic]."[50] Clark uses motor systems in modern robotics as a launching pad for this idea. He points out that robots with motor-controlled joints (such as Honda's Asimo) use up to sixteen times as much energy to walk as humans, who use their body's natural motions to pendulum their joints with minimal effort.[51] Nontrivial causal spread is not limited to motor applications, though. The mind can enact nontrivial causal spread as it is an energy-using object trying to achieve some goal. Thus, automatic processes are not the result of the *brain* becoming more efficient. Rather, they are the result of the *mind* becoming more efficient by using all available resources to their full potential. Since the brain is best used to perceive and interpret real-time situations in an environment, and the body is best used to enact physical action, the mind allows the brain's bandwidth to focus on perceiving and interpreting, while reallocating certain, previously brain-based processes to the body as soon as possible (i.e., as soon as the body becomes adept enough to carry out the process on its own). And if processes within the brain are considered "mental processes," or "processes of the mind," the processes now being enacted through the body should be given the same grace. Hence, when executing an automatic process, the body is enacting a mental process. The mind is not bound to the brain. Rather, it extends into the body as mental processes are offloaded, allowing for a more efficient execution of tasks.

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[50] Andy Clark, *Supersizing the Mind: Embodiment, Action, and Cognitive Extension* (Oxford: Oxford University Press, 2011), 7.

[51] Clark, *Supersizing the Mind*, 3-7.

Section 1c: Extending the Body

The expansion of the mind to the body is not a liberal idea when one considers her day-to-day activities: have you ever arrived home without remembering much of your daily commute? Or have you ever been so engrossed in the details of some task that you did not realize what your body was doing during that time? These are two simple examples of how one can expand her mind outwards from the brain into the body. The term "expand" denotes an internal-to-internal transformation; namely, the mind stays firmly within the body to this point. However, this becomes contended—and more interesting—when one posits one's ability to extend (not expand) her *body schema* into the surrounding environment.

Returning to the example of the pitcher, there is a piece of equipment that is always at the ready as he goes through his windup: his glove. No matter the skill level of the pitcher, he will always have a glove on his non-throwing hand. (The pitcher discussed here throws with his right hand.) Adding more detail, one can imagine the pitcher only has one baseball while he perfects his mechanics. Thus, the catcher has to throw it back after every pitch. This means every time the pitcher throws a pitch, and works on making his windup an automatic process, he also uses his glove to catch the return throw from the catcher. Over numerous days of working on his mechanics, the pitcher finally becomes a master at his task and, one can imagine, has likewise mastered using his glove to catch the ball. In fact, he became so comfortable with his glove, it became an extension of his left hand.

This is not a colloquial turn of phrase. Rather, it is a strong assertion: as the pitcher becomes more comfortable with using his glove, the glove becomes a part of his body schema. The same conclusion was implicit in the last section, though the argument did not extend beyond

what has normally been called "the body." When discussing how walking becomes an automatic process for a toddler, the argument was that the body became what Martin Heidegger calls *transparent equipment* for the toddler.[52] In other words, the limbs, ligaments and muscles of the toddler's body were originally viewed as tools to achieve task completion (such as taking all the books off a bookcase). Yet once the toddler did not need to consciously think to move these contiguous parts, he "saw" through them to the task at hand. The limbs, ligaments and muscles became transparent. The same transformation occurs when the windup becomes an automatic process for the pitcher: he no longer sees his feet and arms, but looks through them to getting the batter out.

The idea is to take this intrabody transparency and apply it to extrabodily equipment that is, as Heidegger would say, "ready-to-hand."[53] Heidegger's own thought was always aimed towards equipment or tool use, and its application to the different parts of the body here is a more liberal approach. This approach views the body not as something innately devoted to achieve tasks, but as equipment. The "equipment-ness" of the body is readily apparent in the pitching example, as the body becomes opaque again while a new task is learned. It makes sense that this opaqueness originates in an infant learning to use the equipment with which he has literally been equipped.

Thus, the body can be thought of as whatever is transparent equipment, or whatever is readily accessible and frequently implemented. Starting from birth, the physical "body" (head, neck, shoulders, arms, etc.) becomes transparent, and is understood as a part of one's body schema. In the case of the pitcher, the glove is readily accessible and frequently used over long

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[52] Martin Heidegger, *Being and Time* (London: SCM Press, 1962), 99-107, H. 69-76.

[53] Heidegger, *Being and Time*, 99, H. 69.

periods of time. It has become transparent to the pitcher (he no longer thinks about using his glove, he only thinks about catching the ball). As with one's physical body, it should follow that the glove has become part of the pitcher's body schema.

This is where one might balk: since the glove is detachable, how could it be part of one's body schema? One's physical body seems to hold a divine place in her body schema as it is naturally given and eternally bound with the mind (at least while one is alive). This idea can be expounded if one imagines an amputee who lost his leg. The leg has been detached from the physical body, and thus is no longer part of the body schema. However, consider a functionalist spin on this statement: the leg no longer serves a functional role in the body schema and, thus, it is no longer part of said body schema. The crux of the matter is "what role does it play?" If an amputee who sees through a prosthetic as transparent equipment claims he considers this detachable equipment as part of his body schema, would there be any grounds to argue? The prosthesis would serve the same role as the original organic leg. Further, one does not need to think about it anymore (physical therapy would serve as a body babbling stage for the new limb). So why would the prosthesis not count as part of his body? The conclusion is clear: the transparent prosthesis is part of the amputee's body schema, despite its non-organic and detachable nature.

Accepting the prosthesis as part of the amputee's body but not the pitcher's glove focuses on the idea of enhancement. The problem with the glove is not detachment, since many prostheses can be detached and reattached at will.[54] What is problematic is that the amputee's prosthesis has a clear place in the traditional body schema, substituting for a missing part (the

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[54] A similar argument might point out that any limb can be detached from the physical body; it is just not designed to do so. It is also good to note that, when the prosthesis is detached from the amputee, it would not be part of the body schema since it would not be readily accessible.

original leg). The pitcher's glove does not do the same thing. Rather, it enhances the pitcher's ability to catch a baseball by extending the fingers and introducing a pocketed web between the thumb and pointer.

The enhancing features of the glove should not automatically exclude it from the body, though. Recent studies in neuroscience support this claim. In 2004, Angelo Maravita and Atsushi Iriki demonstrated that the brain's plasticity actually incorporates external equipment into the body schema as it becomes transparent.[55] In their study, Maravita and Iriki placed desirable objects (rewards) out of the reach of Japanese macaques, but placed a rake capable of reaching the desired object easily within reach. Maravita and Iriki monitored bimodal neurons that responded to both somatosensory and visual stimulation throughout the task, and noticed that once a macaque became proficient with the rake its brain integrated the rake into its body schema as an extension of its right arm, enlarging the physical space occupied by the bimodal neurons for the right arm.[56] Once the brain adopted the rake into the macaque's body schema, what was once *extrapersonal space* became *peripersonal space*. The study affirmed earlier findings by Anna Berti and Francesca Frassinetti. Berti and Frassinetti showed that a patient who did not recognize items in his peripersonal space stopped being able to recognize items that were originally part of his extrapersonal space once he incorporated a stick into his body schema.[57]

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[55] Maravita and Iriki do not actually use the term "transparent equipment," but they do note that the brain only adopted the tools as part of the body schema once their subjects were proficient with them. This conclusion evokes the term "transparent equipment." Angelo Maravita and Atsushi Iriki, "Tools for the body (schema)," *Trends in Cognitive Sciences* 8, no. 2 (February 2004), 79-86.

[56] Maravita and Iriki, "Tools for the body (schema)," 79-81.

[57] Anna Berti and Francesca Frassinetti, "When Far Becomes Near: Remapping of Space by Tool Use," *Journal of Cognitive Neuroscience* 12, no. 3 (2000), 415.

Both of these studies have a far-reaching impact on how one defines his body schema. As Andy Clark puts it, they both "suggest a real (philosophically important and scientifically well-grounded) distinction between true incorporation into the body schema and mere use."[58]

The studies by Maravita and Iriki and Berti and Frassinetti lend more insight into how the aforementioned pitcher and his glove interact. Namely, if the glove is transparent for the pitcher, it would most likely have a neurophysical impact on his body schema: the neurons associated with his left hand would expand in number. In addition, this expansion of his left hand would also affect how he reacts to his environment. In Maravita and Iriki's study, the incorporation of the rake into the macaque's body schema made for a new approach to retrieving the reward: with the treat now within reach, the easiest (most efficient) way to obtain the reward is to reach with the extended right arm (as opposed to getting up and relocating the entire body). The incorporation of the rake caused a new approach to the environment. The same can be said for the pitcher: once the glove is adopted into the body schema, he reacts to fast approaching baseballs in a different manner. With the glove incorporated, the natural reaction is to catch the ball with his left hand (something he would not attempt without his glove). This change is noticed while comparing a novice with a glove to a master: the novice will most likely still shy away from the approaching baseball, even with a glove on his hand.

From these examples, it is clear that the main impact of incorporating transparent equipment into the body schema is related to task achievement—the macaque approaches how to retrieve treats differently, while the pitcher approaches how to stop a fast moving object differently. The force of the impact derives from *how the transparent equipment functions during this task*. The functionality of the equipment fosters the incorporation of said equipment into the

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[58] Clark, *Supersizing the Mind*, 38.

body schema. Returning to an earlier argument, one can conclude that a prosthetic leg is an *enhancement* for an amputee, not a remedy for a deficit. The amputee is truly *enhancing* the current body schema, not restoring it to some factory setting. The body does not have a factory setting; the body is negotiable.[59] The body is nothing more than what one incorporates into her body schema as a collection of reliable, transparent equipment serving the functional purpose of task completion.

Section 1d: Extending the Mind

If the mind expands into the body, and the body extends beyond the skin, it logically follows that the mind extends beyond the skin as well. That is to say, if the pitcher's glove can become incorporated into his body schema, then some exogram can be incorporated into his *mind schema* as well. What matters most when considering this type of *cognitive coupling* is the function the exogram plays during the task, and whether that function serves some traditionally "in the head" role.[60]

One can now consider the extended mind theory at face value and get to know Otto. Otto is a hypothetical person on whom Andy Clark and David Chalmers based their original thought-experiment in "The Extended Mind." Otto suffers from Alzheimer's disease and has problems retaining/accessing information in long-term memory. Aware of this memory deficit, Otto records information he believes might be useful in a notebook he carries with him at all times. One bit of information in this notebook is the location of the Museum of Modern Art (MOMA)

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[59] Term borrowed from Andy Clark. Clark, *Supersizing the Mind*, 30-43.

[60] See Clark and Chalmers's parity principle on page 13.

in New York City. If Otto wishes to go to the MOMA, he checks his notebook and heads to 53rd Street, because that is where the MOMA is located according to his notebook. Otto's actions contrast with those of the other character in this thought experiment, Inga, who has full cognitive capabilities. Inga simply consults her memory to recall the MOMA's location.

Despite these different approaches, Clark and Chalmers argue that both Otto and Inga are "remembering" where the MOMA is using only their minds. What matters is not the location of the information, but the role it plays and how it is used. For instance, if one looks up information on a smartphone in the same way Otto does with his notebook, can she claim she knew said information the whole time? Chances are no. That is not *her* information and she does not rely on her smartphone as a long-term memory system.[61] Clark and Chalmers argue that the notebook by contrast is a part of Otto's extended cognitive system. The notebook serves the role of long-term memory for Otto and is used consistently in this fashion. In other words, the notebook works within Otto's cognitive system in the same capacity as does Inga's internal memory system.

This is because Otto has a very close relationship with his notebook. The notebook falls under three criteria for cognitive coupling laid out by Clark and Chalmers: (1) the exogram is reliably available and typically invoked, (2) any information accessed through the exogram is more or less automatically endorsed and (3) the exogram is easily accessible as and when it is needed.[62] For Otto, the notebook is not something he simply references when he needs to remember, it is a resource he "typically invokes." The moment Otto needs to remember something, he automatically reaches for his notebook and "introspects" until he finds the

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[61] However, there is a way your smartphone might become an extension of the mind. This line of thought will be expanded on in pages 45-46.

[62] Clark, "*Memento's* Revenge: The Extended Mind, Extended," 46.

necessary information. The second criterion is critical as it separates Otto's use of the notebook from simply referencing a data source. Otto automatically endorses the information in his notebook, just as a normal human automatically endorses the information in her brain. In the case of the smartphone, the user most likely does not automatically endorse the information (at least she should not). Finally, the notebook is accessible as and when it is needed since Otto always keeps it nearby. There is always a chance Otto could become separated from his notebook. With the notebook no longer meeting one of the three criteria, it would no longer be functioning as part of Otto's extended cognitive system. Absent the notebook, Otto returns to having no long-term memory.

But there is still a distinct line drawn between Otto and Inga's minds. Where Otto has to reference an outside data source, Inga can simply retrieve information stored within her brain; Otto relies on external data, while Inga operates with a purely internal system. Further, Otto appears to be accessing information through visual *perception*, where Inga is accessing information through *introspection*. Between the two, introspection appears to be the more "natural" act, making the perceptual access to Otto's notebook seem "unnatural." However, if one considers the notebook to function as part of Otto's mind, then the notebook and Otto's brain are both part of the same cognitive system. That is to say, they are both *internal to his mind*. And if the notebook is internal to his mind, then the notebook is accessed not through perception but introspection.[63] This response seems to sidestep the problem, but in truth the distinction between perception and introspection is not much of a barrier to the extended mind theory. The natural implementation of introspection does not give it an *a priori* superiority claim.

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[63] Clark, *Supersizing the Mind*, 100.

Even with this altered point of view, there is still a vital difference between Inga and Otto's modes of introspection: Otto's introspection involves an exogram that can be easily altered and perceived by another person. As Martin Davies points out in a personal communication with Andy Clark, this transfers Otto's memory to the public domain.[64] It could be argued that the public availability of Otto's long-term memory separates it from the cognitive, since the organic brain is naturally inaccessible to others. For instance, it would be easy for someone to mimic Otto's handwriting and make him "believe" something he did not write. However, this supposed defect is not exclusive to the notebook. The contents of the organic brain are not publicly perceivable, yet this does not preclude them from being manipulated by an outside person. Such is the job of an attorney: to make one believe something he might not have originally. Internal beliefs are just as malleable as external ones. [65]

It is clear Otto's notebook does not operate in the same way as Inga's internal memory, but it does serve the same functional role. Both Otto and Inga naturally invoke their memory storage, automatically endorse it (whether the information is true or not) and are able to reliably access it (unless Otto loses his notebook or Inga is impaired). It should also be clear that Otto's deficit has certain advantages over Inga's factory system and vice versa. Otto can never effectively "forget" something as long as his notebook is intact, while Inga can easily forget information that is not accessed regularly. To her benefit, though, Inga's memory evokes a *generation effect* without conscious effort that links related information (possibly integrating new exhibits at the MOMA with its physical location), while Otto has to physically link related

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[64] Clark, "*Memento's* Revenge: The Extended Mind, Extended," 57.

[65] See Elizabeth Loftus, *Eyewitness Testimony* (Cambridge, Massachusetts: Harvard University Press, 1996).

information within his notebook. Robert Rupert seizes this difference, noting that the bounds of a notebook would restrict these types of connections (if Otto does not plan well, he could run out of space for linking information with the MOMA's location). Rupert concludes there are two explanatory kinds of memory: internal memory and external resources *used as memory aids*.[66]

Rupert's distinction between internal and external memory sources is predicated on the psychological evidence that natural phenomena such as the generation effect are inherent to the internal human memory system, and these types of phenomena do not occur when one uses an external memory source.[67] This creates a problem for the extended mind theory: it is debatable whether Otto's notebook functions as something would "in the head." Without the presence of a generation effect, the notebook only functions as the brain-bound process of memory retrieval on the surface without carrying the same underlying functions—relating pertinent information—that natural, normal-operating memory does. Thus, Otto's long-term memory remains at a deficit as his notebook cannot possibly function in the exact same way as a naturally occurring internal memory system.

This dynamic distinction between physically internal and external memories does not invalidate the extended mind theory. One way to counteract this dilemma is to introduce modern technology to the argument. Since it has been over a decade and a half from Otto's inception, it is easy to imagine Otto replacing his old notebook with a tablet computer (or possibly a smartphone) to store his long-term memory. The tablet has less physical limitations than the

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[66] Robert Rupert, "Challenges to the Hypothesis of Extended Cognition," *Journal of Philosophy* 101, no. 8 (August 2004), 415-418.

[67] Rupert cites Samuel A. Bobrow and Gordon H. Bower, "Comprehension and Recall of Sentences," *Journal of Experimental Psychology* 80 (1969), 455-461 to lend psychological support to his claim.

notebook since it has more storage capacity. The exhibits at the MOMA could be updated for many years before Otto ever needed to get a new tablet. Further, the tablet could easily be made to exhibit a generation effect similar to one's "natural" memory system. It is not hard to imagine a program entitled "long-term memory" that can keep a tidy record of data, while simultaneously creating links between related information. This type of generation effect is already at work online as websites present banner advertisements based on one's browsing history.

With the tablet recreating phenomena associated with internal memory, Otto's external memory system is considered a proper part of his cognitive processes. Otto's external memory is able to do everything Inga's internal memory can, if not more. Recall that Otto's memory is not subject to the same deterioration as is Inga's (or younger Otto's) since it is bound within a computer. And while the computer could be destroyed, or the hard drive could fail, Inga's brain could fail just as easily through physical or chemical damage. Given the mortality of both memory systems, Otto's is the superior method of information storage and recall. Where the fluid nature of the brain may subtly change information, that in Otto's computer remains fixed: he has a photographic memory.[68] This would seem to offer a clear advantage over the naturally malleable nature of brain-bound memory.

The shift from remedying a deficit to actually improving an ability is substantial. As Richard Menary puts it, this type of cognitive integration "allows [the organism] to perform cognitive functions that it otherwise would be unable to; or it allows it to perform functions in a

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[68] The only current downside of Otto's external memory system is the interface used to introspect it. As it stands, the only way Otto can retrieve information from his tablet is through visual or aural perception, which will most likely result in a slower retrieval time. However, if future advances in technology allow Otto to interface directly with the tablet, this issue would be resolved. Dr. Bin He at the University of Minnesota recently developed a non-invasive interface that allows users to control a helicopter using only their thoughts, so the development of brain-to-computer interfaces does not seem unattainable.

way that is distinctively different and is an improvement on how the organism performs those functions via neural processes alone."[69] Menary posits that Otto with his tablet can function at a higher than natural level through this type of integration (a step beyond trying to remedy a deficit). As was the case with the offloading of automatic processes to the body, the ability to permanently fix memory through external devices enhances mental efficiency. It does not do this by freeing processing power in the brain like automatic processes, but by executing processes the brain cannot hope to achieve (like perfect retention). Integrating the tablet as an external memory source makes the tablet the cognitive equivalent of the pitcher's glove and other extensions of the body, allowing the organism abilities it would not otherwise have.

Thus we arrive at the second-wave of extended mind theories, those based on what John Sutton calls the *complementary principle*. As Sutton describes it:

> In extended cognitive systems, external states and processes need not mimic or replicate the formats, dynamics, or functions of inner states and processes. Rather, different components of the overall (enduring or temporary) system can play quite different roles and have different properties while coupling in collective and complementary contributions to flexible thinking and acting.[70]

While the first-wave of the extended mind theory is based on parity, or the equality of all things despite their physical makeup, the second-wave argument focuses on exograms' abilities to complement given capabilities. In moving away from the deficit-remediation model of the first-wave argument, the second-wave argument removes the need for exograms to act *exactly* like engrams. Menary and Sutton posit respectively that exograms can "function in a way that is distinctly different" and "play quite different roles." Interestingly, this reopens the door for

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[69] Richard Menary, "Cognitive Integration and the Extended Mind," in *The Extended Mind*, ed. Richard Menary (Cambridge, Massachusetts: The MIT Press, 2010), 231.

[70] John Sutton, "Exograms and Interdisciplinarity," in *The Extended Mind*, ed. Richard Menary (Cambridge, Massachusetts: The MIT Press, 2010), 194.

Otto's original notebook to be considered part of his extended cognitive system. Given the second-wave argument, one does not view Otto's notebook as a replacement for his long-term memory. Rather, it is understood as a complementary exogram for an Alzheimer's patient. One no longer needs to expect certain phenomena to accompany Otto's notebook (such as a generation effect). The notebook functions to complement present-day Otto—an organism without long-term memory. In the same way, the amputee's prosthesis complements his current state, rather than returning him to a previous state. It may be a similar, but it is distinctly different.

The advantages for Otto using a notebook or computer for some version of long-term memory are clear. But the use of these types of exograms is also advantageous for people with normal long-term memories. Recall that brain-bound memory is often fluid: details deteriorate over time, and one can be manipulated to change the content of memory. The fallibility of human memory has been commonplace for centuries and there is a strong history of using exograms to discipline memory. In medieval culture, it was sometimes common practice to create rooms full of signs/images that would act as a more permanent storage for long-term memory for monks or scholars, as natural memory was bound to confusion after the Fall.[71] The proliferation of online calendars and need for personal assistants attest to the same anxieties in modern day life. Given life's demands on active thought, maintaining an internal personal schedule that is both updated and flawless would take up too much processing power. There are better uses for these resources.

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[71] See Mary Carruthers, *The Craft of Thought: Meditation, Rhetoric, and the Making of Images, 400-1200* (Cambridge, Massachusetts: Cambridge University Press, 1998) and Mary Carruthers, *The Book of Memory: A Study of Memory in Medieval Culture* (Cambridge, Massachusetts: Cambridge University Press, 2008).

This completes a circle as processing power, or the efficiency of the mind, takes its spot as the central reason to endorse the extended mind theory. When trying to complete some task, human minds tend to execute whatever process results in the most efficient outcome. For example, Wayne Gray and Wai-Tat Fu studied the use of in-the-head versus out-of-the-head information while programming a VCR. Participants in this study were asked to program a virtual VCR through interaction with a screen. Each participant was told how to program the VCR, and the information was also repeated onscreen. However, the information on the screen was only accessible if it was specifically requested in one test, while for others the information was automatically available. After analyzing their results, Gray and Fu concluded that "the cognitive control of interactive behavior minimizes effort using a least-effort combination of all the mechanisms available to it [measured by time]. All mechanisms or subsystems are on the table. There is no reason to think that one mechanism or subsystem has a privileged status in relation to another."[72] In other words, milliseconds spent on a task matter regardless of the type of activity (internal or external) with which they are filled.[73]

These findings argue for the extended mind theory as they show parity between information sources. As Clark points out, this impartiality remained the rule: subjects often forwent hard information on the screen for their imperfect, brain-bound knowledge just to save

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[72] Wayne D. Gray and Wai-Tat Fu, "Soft constraints in interactive behavior The case of ignoring perfect knowledge in the world for imperfect knowledge in the head," *Cognitive Science* 28, no. 3 (May 2004), 380.

[73] See Wayne D. Gray, Chris R. Sims, Wai-Tat Fu and Michael J. Schoelles, "The Soft Constraints Hypothesis: A rational analysis approach to resource allocation for interactive behavior," *Psychological Review* 113, no. 3 (July 2006), 461-482.

time.[74] From this, Clark defines his Hypothesis of Cognitive Impartiality, which states that "the biological control system does not care about differences of location or type of resource but simply uses whatever it can, relative to some cost-benefit trade-off, to get the job done."[75] In the case of programming a VCR, the cost of relying on imperfect memory is the danger of a show not being recorded, while the benefit is being done programming the VCR quicker. In other cases, such as installing a storm door, the benefit of relying on external sources of information outweighs the extra time to ensure proper execution.

The cost-benefit trade-off changes depending on the situation, but the main takeaway is that *the location of the information does not matter*. Whether in the head, or on a screen, all that matters is *how the information functions during the task at hand, and how efficiently it can be used*. If coupling with an external object has a greater benefit-to-cost ratio, human minds are more apt to couple with said objects than rely on purely internal processes. As Clark points out, this offloading is rarely consciously invoked. This suggests one's coupling with exograms is sometimes an automatic process, or something executed without conscious attention.[76] In viewing the mind as such, one starts to understand that the makeup of the mind is just as negotiable as the makeup of the body. There is no doubt that cognition is organism centric, but the scaffolding that delineates cognition is defined by how each organism interacts with the world surrounding them. Mimicking body schemas, mind schemas adapt to environments and incorporate useful exograms, creating couplings wherever the three criteria set out by Clark and Chalmers are met. The closing argument for the extended mind theory might be best laid out by

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[74] Clark, *Supersizing the Mind*, 119.

[75] Clark, *Supersizing the Mind*, 121-122.

[76] Clark, *Supersizing the Mind*, 137.

Robert Wilson, who states that "for at least a variety of cognitive activities, the physical configuration of the brain is not metaphysically sufficient for their performance *qua* cognitive activities. Something more is needed and that something more involves the physical configuration of the world beyond the head."[77]

As stated in Section 1a, the prominence of any philosophy of mind is bound to its plausibility and there is substantial evidence that the extended mind theory is without question plausible. The use of pen and paper in longhand multiplication stands as the exemplary case for the extended mind theory. Longhand multiplication *can* be done in the head, but often is not. The ability to record numbers solidly on a piece of paper allows the brain's processing power to be used strictly for mathematics, rather than for mathematics and memory.[78] Truth be told, there is no functional difference between solving equations solely inside the head or through coupling with exograms: both methods yield the same results and even use the same processes (remembering numbers and performing mathematical operations). However, coupling with an exogram often results in a more efficient process.

Section 1e: Extending the Mind to Music

Applying the extended mind theory to music is a complicated task, but the unique perspective it brings to certain pieces is well worth the effort. Music is usually considered an object of perception, not a "tool" for task completion. Yet, as outlined in the introduction, the

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[77] Robert A. Wilson, "Meaning Making and the Mind of the Externalist," in *The Extended Mind*, ed. Richard Menary (Cambridge, Massachusetts: The MIT Press, 2010), 179.

[78] Clark and Chalmers, "The Extended Mind," 28.

desire to control or interact with music in a more direct way is often sought. For instance, Jonathan Kramer notes that for a non-teleological composition "to be appreciated and enjoyed, the listener must become a creative participant in making the music… In this way he or she becomes a part of the music, and thus the distinction between the self and the other, the listener and the music, is minimized."[79] As noted, Marc Leman's idea that motion can be used as a "transparent mediation technology" to directly access music is a more empirically-based attempt to connect music and listener. But, also as noted, the inability to connect the physical motion of the body with virtual motion in music works against this attempt to cross the barrier between the two.[80] But if one turns to the mind, the mediation technology needed for accessing music comes equipped from birth. The mind is a malleable object, unbounded by skin, extending into the world. Thus, if music can function like a process which would be considered cognitive were it carried out in the head, the listener is able to couple with said music. Absorbing it into one's extended cognitive system, the "magical membrane" that keeps music "out there" and the listener "in here" is broken.

To explicate this thesis, a certain type of functional interplay needs to be invoked. Recall that Otto's relationship with his notebook is very specific. He relies on it completely as a long-term memory source and there are three criteria the notebook needs to meet to be considered part of Otto's cognitive system. These criteria are (1) the exogram be reliably available and typically invoked, (2) any information accessed through the exogram be automatically endorsed and (3)

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[79] Kramer's ideas on how we interact with non-teleological music will be discussed more in Chapter 2. Jonathan Kramer, *The Time of Music: New Meanings, New Temporalities, New Listening Strategies* (New York: Schrimer Books, 1988), 384.

[80] See pages 6-8.

the exogram must be easily accessible as and when it is needed.[81] If music is to be taken as such an exogram, it must fulfill these three criteria. It would seem to as (1) it is reliably available (one cannot hear music unless it is present), and (2) any information accessed through the music is automatically endorsed as music is usually performed from a set score—and even if it is not, each performance of an aleatoric piece is authoritative for that performance.[82] Finally, music is (3) easily accessible when needed as it is only needed during the listening process.

Similar to Otto's notebook, music poises itself to be a strong candidate for coupling. However, Otto's notebook plays a functional role in his everyday life. It is hard to imagine music filling a similar role. In fact, the notion of incorporating music as part of one's everyday cognitive processes is generally counterintuitive. Music makes an awkward external data system since information would have to be retrieved in duration (unlike a notebook or computer where the information can be displayed simultaneously on a screen). Music also cannot help solve complex mathematical equations or allow the offloading of certain physical processes to allow the brain to focus on the task at hand. In fact, music is generally detrimental to focusing on the task at hand as it often acts as more of a distraction than enhancement.[83] There is some proof music can help certain people with cognitive and emotional disorders,[84] but there is little hard

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[81] Clark, "*Memento's* Revenge: The Extended Mind, Extended," 46.

[82] In other words, each performance of a chance piece creates a microcosm in which that performance is the ultimate authority on what is true to that piece.

[83] See Eyal Ophir, Clifford Nass and Anthony D. Wagner, "Cognitive Control in Media Multitaskers," *Proceedings of the National Academy of Sciences of the United States of America* Vol. 106, No. 37 (Sep. 15, 2009), pp. 15583-15587.

[84] Cognitive disorders will be discussed briefly at the end of this chapter. The main goal of this dissertation remains discussing music's relationship with the average listener, though, which is admittedly a hard thing to define.

evidence that music complements an average person's mind in a way that helps her more efficiently complete any task usually discussed in second-wave extended mind theories.[85]

This does not mean music is unable to complement any task. For instance, it is easy to imagine someone exercising at the gym and simultaneously listening to music. Generally, the music is more up-tempo, and its up-tempo nature plays a functional role. By listening to up-tempo music, one hopes to keep her adrenaline running. Music can be understood as a type of mood regulator. Just as "Song 2" by Blur is played in stadiums around the country to get fans excited, individuals use music to grant themselves a heightened physical status to attack their workout. Smartphone applications such as Spotify Running take this a step further by using a smartphone's accelerometer to judge the pace of running and adjust the streamed music's bpm to match. An application like Spotify Running is an exogram that complements one's workout routine by providing a steady beat with which to keep pace.

These are very physical activities, though. "Song 2" is used to raise one's adrenaline, and this action is typically attributed to the body. For example, when presented with danger, one's body reacts by pumping adrenaline of its own accord; it is an automatic process. But this process is different than the automatic processes previously discussed. There is nothing learned about pumping adrenaline in the face of danger—i.e., there is no babbling stage—it is an inherent attribute of being alive. The action is more wrapped in the physical state of being alive than the mental state of intentionally interacting with the environment. One hears "Song 2" working to complement the *body's* natural ability to produce adrenaline, not the mind's.

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[85] Using music as a mnemonic device to help remember things does not count as an act of extending the mind to music. Using music in this sense makes the information less likely to be forgotten, but it does not actively remember the information. One still has to remember the song and, thus, the song does not function as a type of memory. It functions as a type of memory aid.

An application like Spotify Running is a little harder to define. As a pace regulator, Spotify Running acts within the second-wave argument of enhancing one's natural attributes: the heart and lungs present a natural pace of life, but they do not keep a saliently consistent tempo while running. As an automatic process of the body, one understands this application's pace-keeping as complementing the body. However, there is clearly a mental aspect to using Spotify Running as one consciously synchronizes her pace with the beats of the music. Does this make it an extension of the mind? Running, by definition, is a physical action. However, it can also be considered a mental action as one has to learn to use her limbs to achieve this feat, and there is also mental strain on how to best coordinate one's body. Thus, Spotify Running enhances an activity one might consider mental on some level. There is a distinction between this and a purely mental activity, though. The mind does not control the heart and lungs in the way it controls fingers and arms. Presenting a consistent beat can help the mind synchronize limbs during a run, and the heart and lungs might respond to this, but this remains a purely physical action. The heart and lungs are responding to the body's movement, not to the mind's will. At its core, Spotify Running complements a physical action. And, as with the man tapping his foot, there is some disconnect between the mental and the music.

Yet despite its general lack of complementary ability with regards to everyday mental tasks, music does poise itself to aid in one specific mental task: listening to music. In other words, the music one listens to can help one listen to music. Consider the act of listening to music: The listener is often asked to track one or more melodic lines, while also associating accompanying harmonies and potentially following a text or storyline. For the more educated listener, there may be additional details to entertain, such as the progression of some meta-process (such as an *Urlinie*) or the transformational relationships between different sections of a

piece. On top of this, the listener is asked to process all this information in real-time, since music unfolds in unhindered duration. Combining these aspects of the listening process reveals an extremely complicated event exhibiting a potential for information overload. As discussed previously, the listener can either pay attention to one of the aforementioned aspects, thus consciously ignoring the other musical aspects, or attempt to pay attention to multiple lines of activity, thus sacrificing a certain efficiency. But if the music itself does the work of some of these cognitive processes, the listener is left with more available mental bandwidth to hear the other aspects of the music.

The ability to free mental bandwidth by offloading certain cognitive processes puts music on the same level as the pen and paper during longhand multiplication. Recall that using a pen and paper enhances one's efficiency in problem solving. One incorporates the written system into his cognitive system as a type of external memory source. The brain is not tasked with remembering the numbers throughout the processing period since the paper stores this information. Along the same lines, music may be able to take over some cognitive processes and allow the listener to better attend to other aspects of the listening experience.

For the purposes of this dissertation, I will define five main mental processes during listening: attending, remembering, comparing, apperceiving and expecting. These meta-processes represent the most generic functions one enacts while listening, and thus provide a good starting point for discussing how music can become an integral part of the listener's extended cognitive system.

One can understand these functions in action by returning to David Huron's hearing of Beethoven's Ninth Symphony.[86] As the listener consciously *attends* to the second phrase, she *remembers* the length of the first phrase. After the second phrase ends, the listener *compares* the length of the two and determines they are equal. The listener then assimilates this information through *apperception* and applies her past experiences to her *expectations* for the third phrase. As known, the third phrase belies these expectations and the listener is left with a dynamic surprise. The same processes can be applied to larger levels of listening as well. For example, a listener may be attending to the formal structure of a sonata, and begin by comparing the sounding second theme to the remembered first theme. Then, through apperception, he may start to form expectations for the recapitulation. But during these processes, one's processing power will most likely be maximally taxed, and other aspects of the composition may escape conscious attention. This could be the reason so many people return to artwork they love only to discover something they never noticed before. Music seems especially apt for this type of rediscovery as its temporal nature fights in-the-moment analytical perceptions.

Consider an instance where music subsumes one of the aforementioned meta-processes for the listener: remembering. For the music to "remember" for the listener, the listener must approach the music with a specific task in mind. For this example, the listener wants to gain a better aural understanding of the tonal relationships in the exposition of Beethoven's Piano Sonata No. 1, Op. 2, I. With this clear task in mind, the listener pays close attention to the tonal relationships as they sound, while also following along with a score. However, he finds he cannot keep everything in his mind. He is only able to hear the tonal relationships during the opening twenty measures of this movement before his mind becomes overburdened and he is lost

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[86] See pages 2-3.

in pitch space. At this moment, he may skip a recording back to the beginning, but this same grace is not afforded during a live performance. The orchestra will carry on with their predetermined musical routine and the idea that the listener would be able to internally recreate the subsequent twenty-seven measures for aural analysis seems unlikely. However, the listener is familiar with this work and knows the exposition is repeated. Thus, the listener simply waits for the repeat of the exposition when the composition will remember the unheard twenty-seven measures for him, allowing him to complete his task of hearing the tonal relationships during the exposition.

Note that the argument being made here is more complicated than repeats = remembering. To be heard as a remembrance, the listener must approach the music with the innate trust that it will remember and resound what was just played. The listener wants something specific from the music (in this case, to remember the exposition for him) and this creates a coupled relationship between music and listener. In contrast, a listener without the aforementioned trust in mind will most likely hear the repeat as a repeat. There is a clear distinction between when the listener's mind is active in these two examples: when the *piece* remembers the exposition, the listener actively hears the end of the exposition as leading towards a memory, and when the *listener* remembers the exposition, a memory is evoked by the start of the repeat, which retrospectively marks the end of the exposition as an "end" after the moment has passed.[87]

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[87] There is also no need to remember the primary and secondary themes while listening to a piece in sonata form since the music will remember them during the recapitulation. If this seems off, consider the functional aspects of remembering motives and the musical task at hand. According to James Hepokoski and Warren Darcy, the "tonal goal of the entire sonata form" is the Essential Structural Closure (ESC), which is reached when the secondary theme closes on a I:PAC during the recapitulation and the music moves forward to non-secondary theme material. One has a

Taking the example of the tonal listener a step further, imagine a listener who wants to hear tonal relationships in the exposition of Beethoven's first Piano Sonata without referencing a score. This is a more tedious task. As such, the listener may restrict himself to only listening to recordings so he could repeat the exposition as many times as needed. The listener would still be tasked with physically responding whenever the recording progressed to the development by pushing the back button, though. And while this is not a major task, it is still a mental exertion that does not add to the task of hearing the transformational relationships in the exposition. To remove this unwanted mental exertion, the listener may manipulate the recording so it repeats the exposition on a continual loop. The listener "manipulate[s] the environment so it is able to help complete a cognitive task."[88]

To be clear, the cognitive task being discussed here contains only processes that could be done "in the head," and it is completely plausible for someone to approach a piece of music hoping to retain it in their memory for analysis. Music majors are often presented with listening tests where they are asked to define the relationships between notes without the aid of a score. Depending on the students' proficiency, they may be required to hear all these relationships after the composition is played only once. And while some students might catch every relationship,

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well-defined musical task to attend to, which is set-up by the juxtaposition of two competing tonal areas in the exposition. Imagine one trusts the music to execute this task and subsequently relies on it to remember the primary and secondary themes at the appropriate structural moment. With the music "remembering" the themes, the listener does not need to worry about remembering exactly how the primary and secondary themes sounded. Rather, his brain-bound processing power would be free to pay attention to the tonal architecture or other aspects of the currently sounding music. By tracing the tonal architecture and keeping Hepokoski and Darcy's musical tasks in mind, the listener is (usually) alerted to the structural return of the primary theme. Again, the listener approaches the composition with a task in mind and trusts the music to carry out some cognitive process to aid in mental efficiency. James Hepokoski and Warren Darcy, *Elements of Sonata Theory* (Oxford: Oxford University Press, 2006), 16-20.

[88] Menary, "Cognitive Integration and the Extended Mind," 233.

others will be stuck replaying the melody in their head for aural dissection. Hence, teachers might play the melody again to relieve the burden of holding everything within the student's fickle brain-bound memory. One can imagine this as a moment where memory is being aided rather than a moment where cognition is being extended, but imagine if the student knew the composition would be looped as many times as he needed. At this point, the student would not need to remember the melody as it would be held in stasis in front of him, waiting to be picked apart. Hence, the listener would offload the previously brain-bound process of remembering the composition to the eternally looping melody. The tonal listener is simply a more complicated version of this task: he complements his mind by manipulating the recording to remember the exposition. Music complements the mind.

The idea being pursued in the following chapters is that musical works can be manipulated by their composers in similar ways to complement the listener's mind in task achievement. This is not to say that all the discussed composers purposefully sought these cognitive complements. Rather, it is understood that the composers created a musical framework that produced these complementary byproducts, and the intentionality behind these actions is not considered a prerequisite for the hearings pursued here. Further, the listener need not approach the work with an *analytic* task in mind. The listener can simply seek a way to hear the currently sounding composition in more depth by offloading certain cognitive processes to the music. Both ends define some task being pursued by the listener, which the music might be able to complement. What is sought here is music that poises itself for active cognitive couplings through the mimesis of one or more of the cognitive meta-processes previously discussed.

George Rochberg seems to approach a theory similar to this when he notes music's ability to function as a type of memory bank. Rochberg hinges this claim on music's innate

ability to store recurring themes within its boundaries. However, he does not elaborate much on the idea of music as "memory analog," only observing that music cannot "physically constitute memory functions" as they exist in the human body and, thus, music cannot remember itself.[89] The idea of the listener approaching music with some complementary task in mind is not mentioned and the comparison between music and memory does not pass beyond crude metaphor (i.e., the brain stores information and so does a composition). Despite this, Rochberg concludes that music should be understood as "a complete manifestation of mental process."[90] He comes to this conclusion by discussing music's reflection of intuitive teleological time, which he claims stems from the central nervous system. By reflecting this intuitive time sense, music creates an identity for itself "which can be remembered in all its constituent details as well as overall design; i.e., committed to memory."[91]

Rochberg's argument revolves around the claim that music mimics what he feels is the most intuitive feature of human cognition: the creation of memorable structures. Fred Lerdahl comes to a similar conclusion when he states that music consists of cognitively transparent layers, which themselves are defined by their ability to be perceived within meta- and micro-grouping structures.[92] Thus, music relies on a defined hierarchical structure which, Lerdahl

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[89] George Rochberg, "The Structure of Time in Music: Traditional and Contemporary Ramifications and Consequences," in *The Study of Time II*, ed. J.T. Fraser and N. Lawrence (New York: Springer-Verlag, 1975), 141.

[90] Rochberg, "The Structure of Time in Music," 147.

[91] Rochberg, "The Structure of Time in Music," 139.

[92] Fred Lerdahl, "Cognitive Constrains on Compositional Systems," *Contemporary Music Review* 6, 2 (1992), 118.

argues, reflects a structure that is easier to remember.[93] Lerdahl brings another layer to this argument, though. Specifically, he outlines a task the listener hopes to achieve while the music sounds. Defining his listener as naturally equipped with a "listening grammar," Lerdahl notes that "from the grouping and metrical structures the listener forms the rhythmic units, or *time-span segmentation*, over which the dominating-subordinating relationships of time-span reduction take place; and from the time-span reduction the listener in turn projects the tensing-relaxing hierarchy of prolongational reduction."[94] Lerdahl's listening grammar defines the listener's task as spontaneously forming "mental representations of musical structures from musical surfaces."[95]

More than this, Lerdahl outlines ways composers can manipulate music to help with this cognitive task through compositional constraints. For instance, constraints 3 and 5 claim that "the establishment of local grouping boundaries requires the presence of salient distinctive transitions at the musical surface" and that "the establishment of a metrical structure requires a degree of regularity in the placement of phenomenal accents" respectively.[96] By following his seventeen constraints, Lerdahl claims that a composer can better synchronize his "compositional grammar" with one's listening grammar, thus complementing one's intuitive inference of structure.

While one can coax an extended mind hearing from Lerdahl and Rochberg's theories, this goes against their arguments. Through his compositional constraints, Lerdahl is literally defining

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[93] Lerdahl, "Cognitive Constrains on Compositional Systems," 108.

[94] Lerdahl, "Cognitive Constrains on Compositional Systems," 103.

[95] Lerdahl, "Cognitive Constrains on Compositional Systems," 118.

[96] Lerdahl, "Cognitive Constrains on Compositional Systems," 105-106.

a musical grammar that *aids* in the completion of some cognitive process, not a musical grammar functioning *as* a cognitive process. Rochberg also enacts these intuitions. There is no way to consider the music as *structuring itself* for the listener in these approaches. Rather, the music is manipulated so it may be better *perceived* as a clear hierarchical structure. The magical membrane is upheld.

Ironically, it is the music that Rochberg and Lerdahl belittle in their arguments that holds the most potential for an extended mind hearing. It is clear from their writings that Rochberg and Lerdahl feel music that lacks some type of memorable structure is somehow "worse" than metrically and tonally structured compositions. Rochberg goes so far to claim that music "lacking such identity… could hardly be said to exist as an organic entity, which is to say, it cannot be described as art."[97] For Rochberg and Lerdahl, the aesthetic value of music rises from its ability to mimic goal-oriented, repetition-laden structures which reflect the totality of human cognition. Hierarchically structured music is heard as an independent, closed cognitive system not poised for coupling.

This leaves the listener with poorly-grouped compositions, most notably aleatory and non-teleological compositions "that are not apprehended hierarchically,"[98] to function as one or more complementary cognitive processes for the listener. Due to its lack of comprehensible structure, Amy Bauer describes this music as reflecting "an altered state of cognition, perhaps

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[97] Rochberg, "The Structure of Time in Music," 141.

[98] Lerdahl, "Cognitive Constrains on Compositional Systems," 117.

even psychosis."[99] Bauer's claim stems from Rochberg and Lerdahl's definition of hierarchical music as a reflection of "normal" human cognition. Non-teleological music's lack of connected groups and layers leads Bauer to "a provocative, if ultimately damning metaphor: modern music as a model for the phenomenology of madness."[100] All music is understood as a reflection of some form of cognition. Hierarchically structured music reflects the organized thought of a "normal" cognitive being, while modern music reflects the disconnected musings of someone suffering from psychosis.

But the functional aspects of madness can also be understood as a lack of certain cognitive processes.[101] In the case of modern music's madness, it is clear that the missing piece of cognition is the intuitive grouping of structures. But this is a misconception. While the music is perceived by a cognitive being, the grouping of modern music is enacted by the cognitive listener. In a sense, modern music does not need to group itself as it can rely on the listener to complete this cognitive task. Modern music needs the listener's mind to realize a complete cognitive system, and, in turn, modern music is able to act within an extended cognitive system. So if the goal of music is to exist as an organic entity, as argued by Rochberg and Lerdahl, both hierarchical and non-teleological music seem to achieve this goal, albeit through different means. Where hierarchical music acts as an organic entity by itself, non-teleological music relies on the

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[99] Amy Bauer, ""Tone-Color, Movement, Changing Harmonic Planes": Cognition, Constraints and Conceptual Blends in Modernist Music," in *The Pleasure of Modernist Music*, ed. Arved Ashby (Rochester, New York: University of Rochester Press, 2004), 124.

[100] It should be noted that Bauer's article aims to "rehabilitate contemporary music from a listener's perspective." Bauer, ""Tone-Color, Movement, Changing Harmonic Planes"," 130-131.

[101] In the same sense, one does not hear modern music as a model for the phenomenology of madness, it is heard as a model for the phenomenology of partial cognition.

listener to complete its organic nature. One hears the structured music in Beethoven's Ninth Symphony as an external, fully realized organic entity to be perceived and processed, while one hears a composition such as Ligeti's *Lux aeterna* as a partial reflection of an organic structure which can be coupled with and absorbed into one's extended cognitive system. This understanding inverts the value-based relationship between the two musics, with hierarchically structured compositions becoming a poor candidate for cognitive coupling and less-structured, more "mad" music being poised to function as an aspect of the listener's cognitive system. In other words, there is more value in modern music because of its ability to interact as an extension of our cognitive lives.

It should also be noted that while Rochberg and Lerdahl claim their structured listener is based on a more intuitive model, modern research coupled with the extended mind theory reveals the structured listener as a learned entity. Lerdahl leans on a visual analog of perception, noting one creates an "internal mental representation of the visual field upon which computations such as "mental rotations" can be performed."[102] However, recent studies have shown a person is more apt to physically manipulate the environment,than mentally recreate and manipulate it internally.[103] Further, the idea that one intuitively creates mental representations has been thoroughly challenged by philosophers such as Alva Noë, who notes that one does not "represent the whole [visual] scene in consciousness all at once"; rather, the scene is accessible through potential sensorimotor interaction with the world and virtually enacted.[104] The intuitive nature of

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[102] Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music* (Cambridge, Massachusetts: The MIT Press, 1983), 306.

[103] This is discussed in depth in Chapter 3.

[104] Alva Noë, *Action in Perception* (Cambridge, Massachusetts: The MIT Press, 2004), 66.

the mind is to allow the environment to represent objects, and the idea that one internally recreates the world is understood as a learned, inefficient behavior of the analyzer. Applying this to music, one understands the desire to mentally recreate musical structures as a learned feature of humanity, with a more intuitive approach consisting of allowing the music to represent itself. It is more intuitive to assume less of a mental burden while listening.

Section 1f: Cognitive Disabilities and Music (A Brief Interlude)

Like Clark and Chalmers's fictional Otto, many people suffer from cognitive deficits beyond the normal bandwidth issues of the mind, and there is a chance that scientific research into the extended mind theory will improve their quality of life. An Alzheimer's patient with a computer-powered memory system would be an amazing achievement, but it seems clear that music will not be the answer for that particular complementary role. It has been theorized, however, that music can be used as a cognitive tool to enhance the everyday lives of people with cognitive disabilities.

Rory Allen and Pamela Heaton have explored the use of music to help Autistic patients with Alexithymia recognize and vocalize their emotional states. Allen and Heaton's thesis is simple and brilliant: if an Autistic person with Alexithymia shows an emotional response to music, they are experiencing an internal state related to this emotion. And if they are experiencing an internal state related to a certain emotion, they may be able to recognize it and identify it in the future (possibly as their "Barber's Adagio mood").[105] The key to this type of

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[105] Rory Allen and Pamela Heaton, "Autism, Music, and the Therapeutic Potential of Music in Alexithymia," *Music Perception* 27, No. 4 (April 2010), 258.

identification is the ability to evoke the same emotional state every time the composition is heard, which is a daunting task. As David Huron and Daniel Levitin have pointed out, the ability for people with Autism to sympathize with emotional states in music is impaired. Levitin states this "extends to their utter inability to appreciate the aesthetic qualities of art and music."[106] To the contrary, Heaton has shown it is possible for people with Autism to associate certain emotions with specific music.[107] For the time being, one can accept Allen and Heaton's basic thesis to understand the difference between this type of cognitive interplay and the extended mind theory.

In Allen and Heaton's thesis, it can be said that music is used to enhance the cognitive ability of the Alexithymia patients to recognize emotions in the same way that Otto's notebook helps him remember certain information. However, there is a large disconnect between the two. In the Alexithymia example, the music is being *used* to evoke *internal* emotions, which are then identified. In no way is the music ever considered part of the cognitive system of the Alexithymia patients, and the emotional states being realized are a series removed from any emotional state that might be attributed to the music. Put simply, the music is not feeling any emotions for the listeners, it is evoking them. So while this is a clear example of how music can enhance everyday life, it is not an example of music becoming part of an extended cognitive system. Suffice it to say, music will probably never work as an efficient object for cognitive

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[106] Daniel Levitin, *This is Your Brain on Music* (New York: Dutton Press, 2006), 253. Also see David Huron, "Is Music an Evolutionary Adaptation?" *New York Academy of Sciences* 930 (June 2001), 43-61, and Anjali Bhatara, Eve-Marie Quintin, Bianca Levy, Ursula Bellugi, Eric Fombonne, and Daniel J. Levitin, "Perception of Emotion in Musical Performance in Adolescents with Autism Spectrum Disorders," *Autism Research* 3 (2010), 214-225.

[107] See Pamela Heaton, B. Hermelin and L. Pring, "Can children with autistic spectrum disorders perceive affect in music? An experimental investigation," *Psychological Medicine* 29, no. 6 (November 1999), 1405-1410.

processes in everyday life, unless the task at hand is listening to music. This is not to say music does not enhance one's daily life (it is a giant part of some Autistic people's lives),[108] but its mood enhancing abilities are more similar to external pleasure than internal processes.

[108] Allen and Heaton, "Autism, Music, and the Therapeutic Potential of Music in Alexithymia," 253-254.

Chapter 2

Retention and Attention in *Lux aeterna*

Section 2a: Manipulating Serialism

Stripped to its basic elements, György Ligeti's *Lux aeterna* (1968) is a set of three aural expanses dominated by four canonic progressions, each of which is separated by a "Ligeti Signal."[1] While this may come off as an overly crude description, it is apt as the work's structural foundation is legitimately simple. Ligeti's canonic progressions dominate the work, but it is his manipulation of these musical automata that draws the ear and ultimately allows *Lux aeterna* to work as an extension of the listener's mind, poising itself for a novel listening experience.

The term "musical automata" rightfully lends itself to an image of serialism, which can be considered a precursor to the compositional processes used in *Lux aeterna*. In his "Metamorphoses of Musical Form," Ligeti goes to great lengths to describe the limits of total serialism. He also describes how composers can push beyond these limits to create a work that is not "the cheap function of being a more or less pleasant wallpaper-pattern in sound."[2] For Ligeti, the main problem with total serialism is the overvaluing of equality between different musical characteristics, which ultimately leads to a "flattening-out" of music. Citing the basic tenets of serialism—notably that "each element should be used with equal frequency and should be given

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[1] Michael D. Searby, *Ligeti's Stylistic Crisis: Transformation in His Musical Style 1974-1985* (Lamham, Maryland: The Scarecrow Press Inc., 2010), 9.

[2] György Ligeti, "Metamorphoses of Musical Form," in *Die Reihe: Form-Space, 7*, ed. Herbert Eimert and Karlheinz Stockhausen, trans. Cornelius Cardew (Bryn Mahr, Pennsylvania: Theodore Presser Company, 1965), 10.

equal importance"[3]—Ligeti notes that the more integral serialism is to a composition, the more difficult it is to achieve contrast. The resulting music displays a structure based on the lack of structure; i.e., the music becomes Ligeti's "wallpaper-pattern in sound," riddled with indistinct characteristics while lacking a true focal point. Ligeti looks to a music that moves beyond serialism.[4] Despite this, he speaks of what is positive in serialism: the whitewashing left an unscathed musical surface where the "concepts of 'consonance' and 'dissonance' no longer be applied: tension and relaxation are surrendered to the statistical properties of form, e.g. relationships of register, the density and weave of the structure."[5] The forced equality of musical characteristics produces a side-effect by decreasing one's "sensitivities to intervals," creating music that is more "permeable," or easier to move through.[6]

The birth of permeability can also be thought of as the death of boundaries. As both a compositional and listening technique, permeability is understood as the loosening of constraints on movement and flow. For instance, Ligeti notes that serial permeability allows Stockhausen to simultaneously control activities in different tempi in *Zeitmaße* (1956) without the constraints of historical tendencies.[7] For Ligeti, serialism breaks from previous music and defines a new historical state.

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[3] Ligeti, "Metamorphoses of Musical Form," 10.

[4] Total serialism was already being abandoned by the time Ligeti wrote "Metamorphoses," which he readily acknowledges despite the fact that the article is aimed at moving beyond it.

[5] Ligeti, "Metamorphoses of Musical Form," 7.

[6] Ligeti, "Metamorphoses of Musical Form," 8.

[7] Ligeti, "Metamorphoses of Musical Form," 9.

This is not necessarily true, though. The roots of this permeability are traced to Arnold Schoenberg's *emancipation of the dissonance*. In a way, Schoenberg's twelve-tone technique is the parent of serialism's intervallic permeability.[8] As he writes in "Composition with Twelve Tones (1)," emancipating the dissonance results in comprehending dissonances in the same way as consonances. Since consonances are considered to be in a state of repose, while dissonances are bound up in tension, this emancipation results in a dissonant repose; hearing tension is replaced with hearing different qualities of sound that do not have a teleological conclusion.[9] Consider the traditional definition of tendency tones. Augmented intervals *resolve* outwards, diminished intervals *resolve* inwards, $\hat{7}$ *resolves* to $\hat{1}$, $\hat{4}$ *resolves* to $\hat{3}$ and so on. According to historical constructs, these tones *must* resolve since they create an audible tension.[10] However, Schoenberg asks the listener to forget these constructs and allow so-called dissonances to exist without the force of tension in their aural characteristics. Rather, the sounds should be considered harsher or denser, or any number of terms with no teleological ends.

Schoenberg further argues that the tension heard in dissonances is not inherent in the sounds themselves. Rather, humans as listeners are less familiar with dissonances since they occur later in the overtone series. He claims this unfamiliarity causes us to generally dislike dissonances and yearn for their resolution. However, through the works of composers such as Wagner, Strauss and Debussy, Schoenberg argues that the ear can become "gradually acquainted

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[8] Going further with this metaphor, Debussy's lack of regular metrical pulses could be taken to be the parent of serialism's temporal permeability.

[9] Arnold Schoenberg, "Composition with Twelve Tones (1)," in *Style and Idea*, ed. Leonard Stein, tr. Leo Black (Berkley, California: University of California Press, 1975), 216.

[10] The most recognizable example of this is when someone plays the first seven notes of a major scale and omits the resolution at the octave. As $\hat{7}$ hangs in the air, the desire to hear $\hat{1}$ is usually overwhelming.

with a great number of dissonances, and so los[e] the fear of their 'sense-interrupting' effect."[11] Schoenberg goes so far to claim that "one no longer expect[s] preparations of Wagner's dissonances or resolutions of Strauss' discords; one [is] not disturbed by Debussy's non-functional harmonies, or by the harsh counterpoint of later composers."[12] For Schoenberg, the steady climb up the overtone series progressed to a point at the beginning of the twentieth-century where dissonances could be heard as acceptable resting points, just as consonances. Rather than needing to be resolved—or essentially fixed—dissonances sound as legitimate to the ear as a perfect interval; they are simply another flavor, or color, of sound. Schoenberg's desire to emancipate the dissonance bore his twelve-tone composition technique, in which each note is treated as equal to the others. This technique is clearly a precursor to serialism, where every aspect of music is treated with the same equality.

It is interesting that the free movement of dissonances in serialism is one of the main sources of value for Ligeti since its conception grew from Schoenberg's supposed emancipation of the dissonance almost fifty years earlier. This makes it anything but a new idea. But Ligeti distinguishes between Schoenberg's ideas and practice, noting that modern serial rows would be "viewed as an impoverishment" to ""traditional" twelve-tone composers."[13] Where Schoenberg was concerned with forcing equality between tones without a hint of historical tendencies, modern serial composers are more concerned about the processes that pervade the *entire* composition. The tone row becomes nothing more than a cog in the machine, with pieces such as Luigi Nono's *Cori di Didone* (1958) featuring a simple chromatic scale as a row. The shift from

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[11] Schoenberg, "Composing with Twelve Tones (1)," 216.

[12] Schoenberg, "Composing with Twelve Tones (1)," 216.

[13] Ligeti, "Metamorphoses of Musical Form," 5.

pitch-centric equality in Schoenberg's twelve-tone system to *composition*-centric equality in total serialism fosters this type of large-scale homogeneity; with the whole composition defying historical constructs, the pitches themselves become less of a rallying point for emancipation as this burden is distributed throughout every aspect of the work.

The shift from pitch-centric equality to composition-centric equality also results in a shift in compositional focus. In Nono's case, the focus is on the building up and tearing down of "piles of layers" which, Ligeti notes, would be the focus regardless of which tone row is used due to the nature of total serialism.[14] With the notion of octave equivalence at hand, composers can create different textures with distinct sound qualities from basically any row in a serially derived piece. This ability to work with any row exhibits the level of permeability Ligeti admires in total serialism, as it goes a step beyond Schoenberg's practices to achieve his ideas. Again, Schoenberg's idea was to emancipate the dissonance and allow it to move freely in aural space, but he attempted to achieve this goal by constructing twelve-tone rows that fought against historical tendencies. What Schoenberg really achieved was the freeing of dissonances from an old hierarchy by placing them under a new one fundamentally opposed to the former (essentially building a system whose basic principle is to be unlike its predecessor). The resulting constructs, while definitely not "tonal," do not allow dissonances to move freely as much as they allow dissonances to move differently. It was not until the flattening-out of the entire composition—the disposal of *all* historical tendencies—that the musical landscape was thoroughly liquefied enough to allow dissonances to move freely—including moving in a way similar to tonality—without eliciting traditional hierarchies.

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[14] Ligeti, "Metamorphoses of Musical Form," 5.

The ability to move freely in aural space is a boon for serialism, but its double-edged nature still cuts: while the equal balance of serially composed works gives the composer a blank canvas for sound, the method of delivery is so restricted that the resulting artwork is more a waste of potential than a realization of unrestricted aural movement. If Schoenberg's twelve-tone technique is restrictive based on its historically opposed origin, total serialism is restrictive based on its very nature. By completely controlling every aspect of the work, serialism locks itself into a state as to render the composer's role almost non-existent; once the rows are determined, the serial process takes over (i.e., it is automatic). The artistic result is impoverished. Thus the need for reform. Schoenberg's twelve-tone technique and total serialism align in this way: they are both systems aimed at freeing the musical process, but they both must be accepted and deconstructed before true emancipation is achieved.

Ligeti's goal in "Metamorphoses" becomes clear as he aims to take the gift of serialism (the permeability of sound structures) and bring the composer's role back to the forefront of constructing the work. Ligeti proposes that serialism should be retained in composition, but its role should be pushed back to the global aspects of music. This action results in a compositional process where "the total form is serially guided, but the individual moments are, within given limits, left to the composer's discretion."[15] By working within the limitations of a serially defined form, he notes that the composer will be more productive than if she left her imagination unrestricted. By having a "preformed network of choices and limitations," the composer can work more freely.[16]

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[15] Ligeti, "Metamorphoses of Musical Form," 11.

[16] Coincidentally, Ligeti's proposed compositional process falls right in line with the arguments of the extended mind theorists. Ligeti argues that working within a predesigned structure allows

In *Lux aeterna*, one finds some of Ligeti's compositional ideas put into play. As stated at the outset, *Lux aeterna* consists of three aural expanses that are dominated by canonic progressions and separated by "Ligeti signals." One rightfully points to the canons as musical automata at work on this global layer. The execution of a canon is nothing more than an automatic/serial process carried out by multiple voices; with the *cantus* set, the voices mimic each other until they conclude their directed progression. *Lux aeterna* introduces some wrinkles as Ligeti predetermined a pattern of 3:4:5 rhythmic subdivisions among the voices as a nod to Ockeghem's multi-speed unison canons in *Missa prolationum*.[17] This creates a canon where rhythms are not exactly mimicked, but the execution of the process remains the same. With the *cantus firmi* and rhythmic subdivision set, the completion of the canonic process creates a serially-guided global structure, but not the completed composition. The execution of the canon simply creates a structure in which Ligeti can manipulate individual moments to create the aural contrast he desires, as outlined in his ideal compositional process in "Metamorphoses."

But Ligeti eschews his ideals and asserts his control on the aural structure before the serially-guided background is created. Shown in Figure 2.1, the *cantus firmus* in the opening

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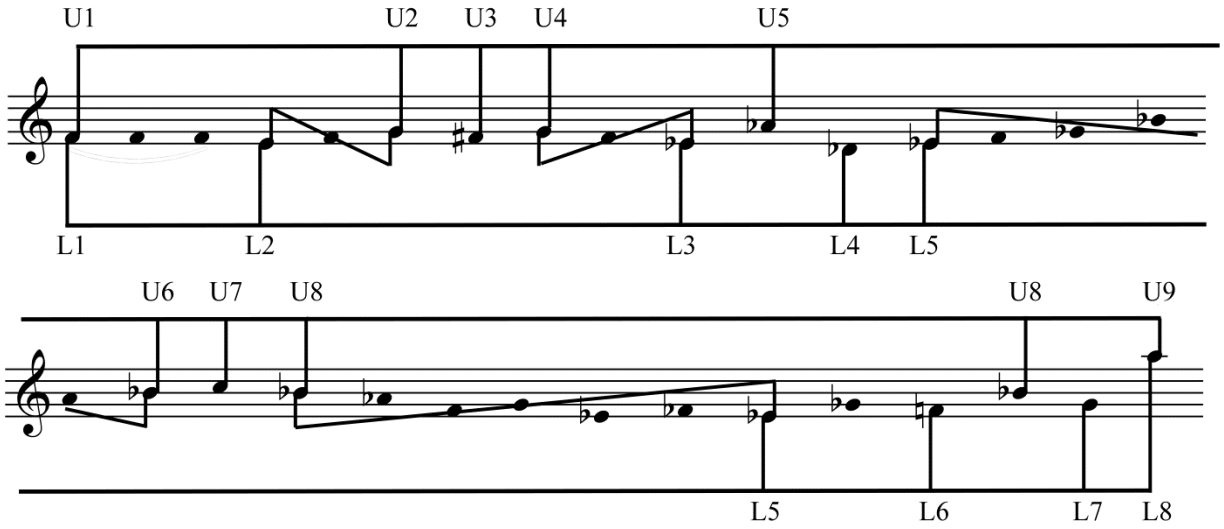
composers to be more productive, but he also notes that by relegating serial techniques to the global form of the piece, these techniques fulfill the function of general planning. It is not hard to find the ties between this statement and the extended mind theory as Ligeti cites the *function* of general planning. Traditionally, the general planning of the piece is controlled by the composer, but Ligeti advocates for the serial process to subsume this function. Put another way, serialism can be considered an external process that is now carrying out the function of something that used to be done in the head. The serial process is inherently trusted by the composer since it is something he started and it is present when he needs it (i.e., during the compositional process). The serial process is thus considered part of the composer's extended cognitive system. With this process in place, the composer is able to offload the work needed to create a musical form and turn his full attention to the individual moments within the composition.

[17] Richard Toop, *György Ligeti* (London: Phaidon Press Limited, 1999), 115.

canon exhibits a carefully defined structure with a compound melody.[18] The upper portion of the compound melody, shown in Figure 2.2, does not define a traditional scale, but there is a recognizable pattern of relationships. While the melody is completely stepwise, the size of the steps are broken into two chunks with notes 2-5 (G-F♯-G-A♭) progressing by half-steps, and notes 5-8 (A♭-B♭-C-B♭) progressing by whole-steps. This leaves the first and last notes as outliers within their respective groups (F is a whole-step below G, while A is a half-step below B♭). However, the opening F can be considered part of the half-step group since it is only a half-step below F♯, leaving the final A as the only outlier.[19]

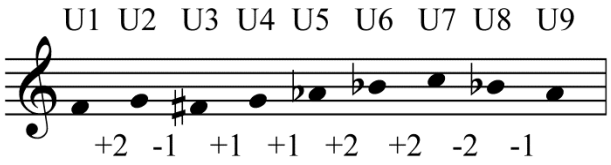
Figure 2.1: Opening *cantus firmus* in *Lux aeterna* with the compound melody outlined.



[18] Originally noted by Jonathan W. Bernard in "Voice Leading as a Spatial Function in the Music of Ligeti," *Musc Analysis* (Blackwell Publishing) 13, no. 2/3 (Jul.-Oct. 1994), 227-253.

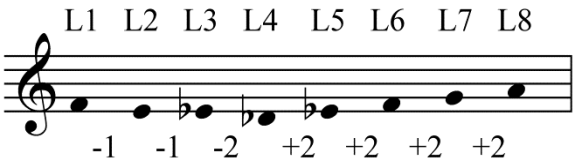
[19] The difference comes from considering the opening four notes as a vertical cluster rather than as a horizontal progression. In this hearing, the F is a little early in arriving melodically, but still fits within the half-step motif of the larger grouping.

Figure 2.2: Upper melody in the opening *cantus firmus* of *Lux aeterna*.



The importance of half-step versus whole-step groupings becomes salient when considered alongside the lower portion of the compound melody. Shown in Figure 2.3, the lower melody progresses by half-steps during notes 1-3 (F-E-E♭) and whole-steps during notes 3-8 (E♭-D♭-E♭-F-G-A). Referring to Figure 2.1, one can see that the half-step and whole-step groupings line up with one another; the shift to whole-step dominance in the lower melody is confirmed at L4 in the *cantus firmus*, with the first whole-step in the upper melody following at U6. In fact, the first 11 notes of the *cantus firmus* are connected by half-steps, spanning E♭$_4$ to A♭$_4$, reflecting the observations made in the extracted melodies. But the second portion of the *cantus firmus* does not follow with solely whole-step relationships. Due to interpolated half-steps throughout that do not reside in the background compound melody, almost every note in the second half of the *cantus firmus* is also connected by half-steps, spanning E♭$_4$ to B♭$_4$.[20] While the surface chromatic nature of the second half cannot be ignored, the dominating background structure sets a desired opposition of half-steps and whole-steps.

Figure 2.3: Lower melody in the opening *cantus firmus* of *Lux aeterna*.



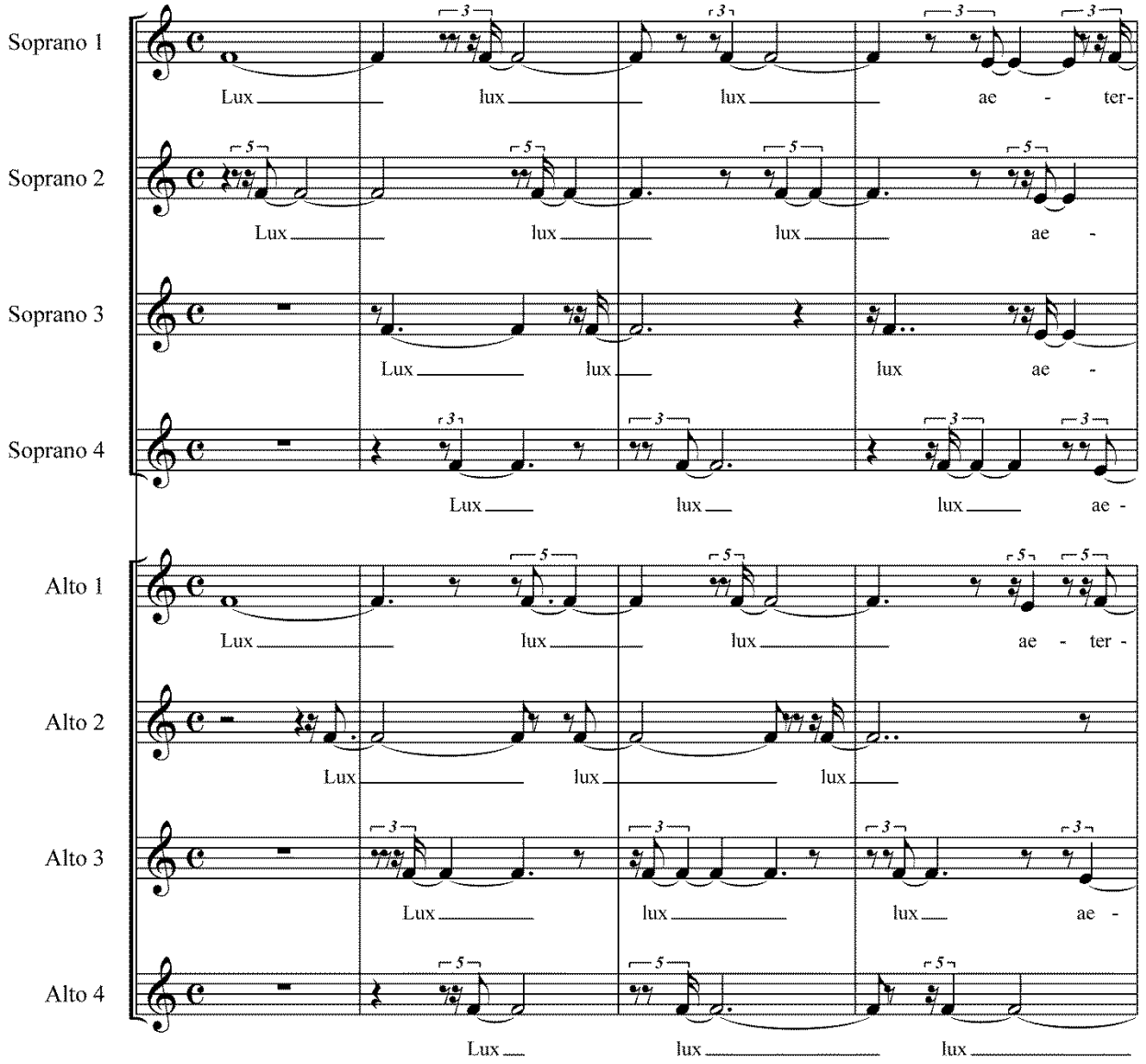
[20] D♭$_4$ and C$_5$ are left out of the half-step relationship since D$_4$ and B$_4$ are not present.

Even with this early intervention, the resulting serial outcome does not completely enact what Ligeti desires. To correct this, he asserts his dominance over the aural structure by manipulating the length of each pitch. As shown in Example 2.1, the entrances and lengths of notes in *Lux aeterna* are extremely varied, with the opening unison between Soprano and Alto 1 being the only real moment of synchrony in this example. Singling out the Soprano 1 line on the score further expounds this as this line shows no clear serial pattern. By scanning this line (or singing it aloud), the lack of a pattern stands out, being punctuated by the twenty-fourth note in the sequence: an $E\flat_4$. While there is nothing significant about this note in the abstract (it does not hold some mathematical spot of importance in the *cantus firmus*), its rhythmic duration is staggering in context. Starting in the second measure of Example 2.2, this $E\flat_4$ lasts for over three times as long as the second longest note in the first Soprano during the opening *cantus firmus* (the second longest is the closing A_5 at just over five beats).[21]

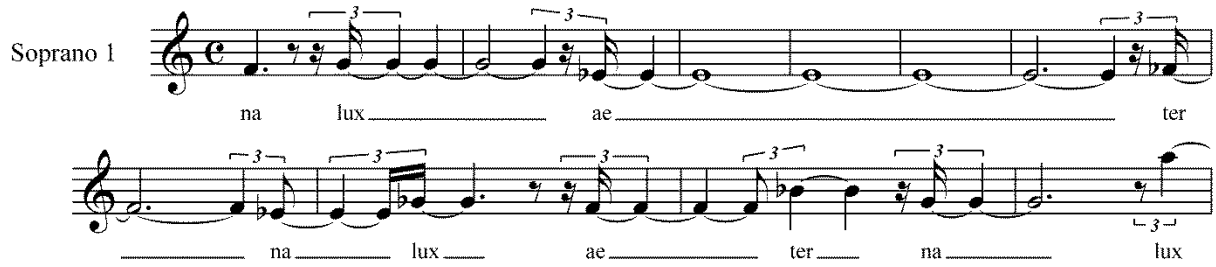
While it seems a bit extraneous in the abstract, this anomalous note serves a strong purpose in the desired harmonic construction of *Lux aeterna*. Defined as notes held for a proportionally long duration in any given voice, there are five anomalous moments in the soprano parts during the opening canon: the aforementioned $E\flat_4$ (note 24) in Soprano 1, C_5 (19) in Soprano 2, $B\flat_4$ (29) in Soprano 3 and $A\flat_4$ (11) and C_5 (19) in Soprano 4. These notes do not overlap to form a sounding harmony within the opening section. They also do not form an

[21] This analysis excludes the repeats of A_5 at the end of this passage since these notes do not fit with the rest of the *cantus firmus* and act merely as "waiting" or "gap" tones (discussed later) until the Ligeti signal marks the end of the first canon.

Example 2.1: *Lux aeterna*, ms. 1-4.

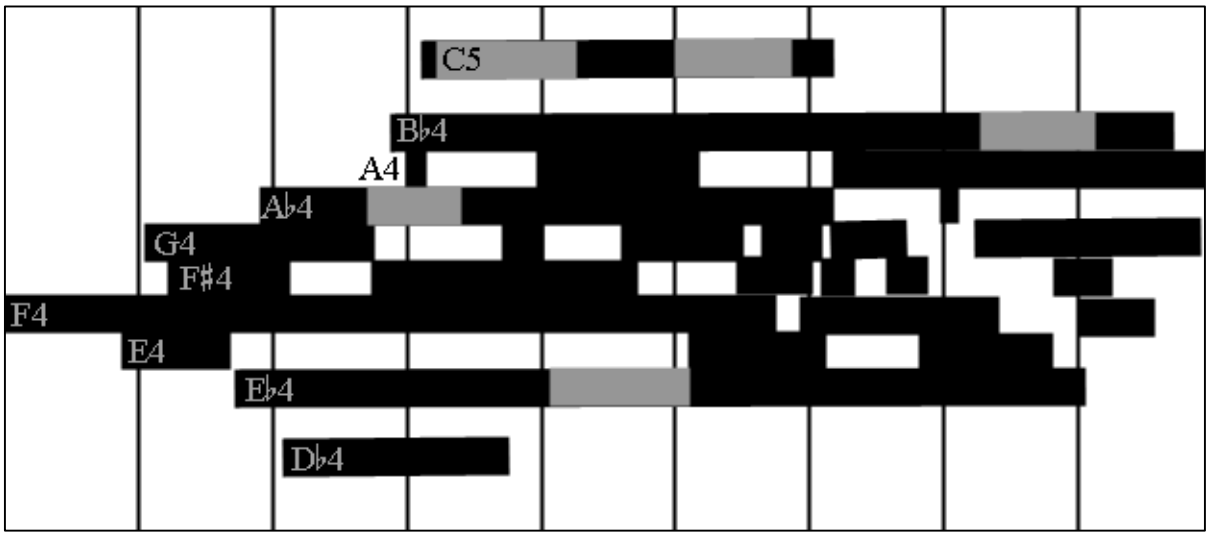


Example 2.2: Soprano 1, *Lux aeterna*, ms. 15-24.



abstract mathematical progression (the fourteenth note of the *cantus firmus* would need to be held as well to create a plus-5 progression).[22] Instead, they act to retain the presence of each pitch in the overall harmonic construct. Put another way, these anomalous notes ensure that each of these pitches will be heard during a certain time-span in the opening canon. Figure 2.4 shows the opening canon (sans the closing A_5) with the anomalous notes highlighted in grey against the remaining, black pitches. Figure 2.4 is configured so the five grey segments are in the "background," meaning if any other voice is singing the same pitch during these spans, there will be a black mark in the middle of the grey segment. While there is some overlap occurring at the beginning and ends of these pitches, the grey segments are continuous. No other voice sings these pitches for the bulk of their duration.

Figure 2.4: Temporal/spatial graph of the opening *cantus firmus* in *Lux aeterna*.[23]



[22] As discussed later, the anomalous pitches in the opening section do create pitch-class set [0,2,4,7], which plays a role at a more global level.

[23] This graph was created using Microsoft Excel, Paint and Adobe Photoshop CS3. Time is represented horizontally and pitch space is shown vertically (the higher the bar, the higher the frequency). All of the graphs were based on breaking *Lux aeterna* into 1008 equal units (eighth-note subdivision), though there is a margin of error of one unit due to triplet and quintuplet rhythms. The vertical bars mark every fifteen beats.

Figure 2.4 shows these anomalous notes waiting for another voice to reach a given pitch to ensure that specific pitch does not exit the sounding structure. For instance, the E♭4 is held for an extreme duration in the first Soprano as the other voices have already reached and left E♭4, or are still a ways off from sounding it. With an intent to keep the E♭4 present throughout this extended time span, the first Soprano cannot sound the note and leave it like any other; it has to wait for the first Alto to come and relieve it in measure 20. One can understand the first Soprano as "spanning the gap" between when the fourth Alto abandons E♭4 in measure 16 and the first Alto picks it up in measure 20. Either way, these five anomalous/waiting/gap pitches all serve a vital function in maintaining the harmonic layers desired by Ligeti.

With these manipulations in place, Ligeti pushes the onus of contrast back on the pitches, creating a harmonic half-step versus whole-step opposition that becomes the main discourse of the opening canon.[24] As shown in Figure 2.4, the execution of the opening canon in *Lux aeterna* results in a completely chromatic cluster until E♭4 enters in the first Soprano in measure 7. E♭4 introduces the first whole-step to the harmonic texture, even though the compound melodic line is still progressing by half-steps. This premature whole-step acts to foreshadow the upcoming melodic dichotomy. By the time D♭4 (the first melodic whole-step) is introduced to the texture in

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[24] This is true as long as this opposition remains a comparison of sound qualities rather than a teleological progression (half-steps resolve to whole-steps or vice versa). Ligeti stumbled upon this slippery issue by returning the focus from total serial control of the composition back to the intentional control of intervals. Through this action, he effectively negated the equality of pitches and reintroduced harmony to the quasi-serial soundscape. But, as he notes, this harmony should not be heard as a pre-serialist harmony since the historical process is irreversible. Rather than pushing towards a teleological goal as in tonal music (or fighting against it as in twelve-tone composition), harmony should still be heard as functionally neutral entities with no agenda. While Ligeti has an agenda in creating intervallic relationships in *Lux aeterna*, the relationships themselves have no bearing. Any given harmony does not fundamentally lead "away from" or "to" another; the harmonies simply "are." György Ligeti, "György Ligeti talking to Himself," in *Ligeti in Conversation*, tr. Gabor J. Schabert (London: Eulenburg Books, 1983), 126.

measure 9, whole-steps have commandeered the harmonic texture and created a more open soundscape. This soundscape is not composed of only whole-steps: the rubbing of G_4 and $A♭_4$, eventually replaced by the rubbing between F_4 and $F♯_4$, continues to provide a bit of contrast within the harmonic texture. The movement of this "rub" tone is heard as the most contrast in the canon until E_4 ($F♭_4$) returns at the end of measure 20 and a staircase of chromaticism ensues (as visible in Figure 2.4).

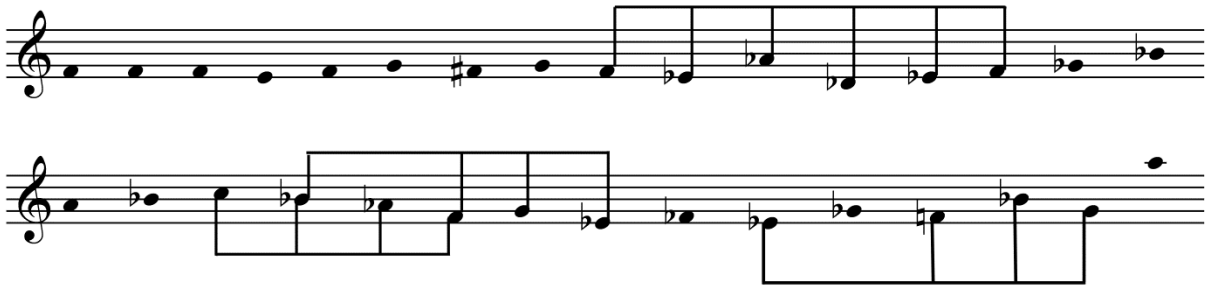
This pitch-centric opposition runs contra Nono's *Cori di Didone* and the aesthetic principles of total serialism. The soundscapes are not flattened out and one can hear the resulting contrast that arises from Ligeti's intentional manipulations. The compositional process outlined in "Metamorphoses" is enacted as a serially-guided background (albeit, a serially-guided background that is intentionally set to create this opposition) is manipulated to create a desired outcome. The composer has asserted his dominance over the music.

Ligeti's manipulation does not stop at this local level. Following the chromatic staircase at the end of the first section, the harmonic texture thins out until all that is heard is the unwavering presence of a Ligeti signal composed of $F♯_4$, A_4 and B_4 (or pitch-class set [0,2,5]). As shown in Figure 2.5 (page 84), this pitch-class set is the staple Ligeti Signal for *Lux aeterna*, appearing at the end of each section. It also appears as a general harmonic motive. The expanded pitch-class set [0,2,4,7] is also heard throughout *Lux aeterna*. Pitch-class set [0,2,4,7] is interestingly reflected in the anomalous pitches in the opening section [A♭, B♭, C, E♭] As shown in Figure 2.6, this pitch-class set is also prominent in the melodic relationships in the opening *cantus firmus*. In addition to these global pitch-class set relationships, the half-half-whole-step pattern that opens the lower melody in the opening canon is heard at the beginning of the second

canon, and the opening chromatic cluster [0,1,2,3] is reprised at the beginning of the fourth canon.

These global motives give *Lux aeterna* an abstract feeling of unity, while the ever-changing harmonies provide the desired contrast. Lacking a teleological goal, these harmonies are heard varying in density and quality, while exploring extremes in register. In real-time, and viewed in simultaneity in Figure 2.5, the work starts towards the middle of its registral range before beginning a steep descent in the second canon. This is countered by the hovering third canon. The composition closes with the registrally sparse fourth canon, accompanied by two Ligeti Signals set an octave apart. The harmonic structure eventually dissolves on a whole-step after beginning life on a half-step, echoing the opposition highlighted melodically and harmonically in the opening section. *Lux aeterna* is heard as a complex interweaving of interval relationships created through the intentional manipulation of a strict serial progression, which is filtered through a whitewashed musical background.

Figure 2.6: Opening *cantus firmus* with [0,2,4,7] highlighted.



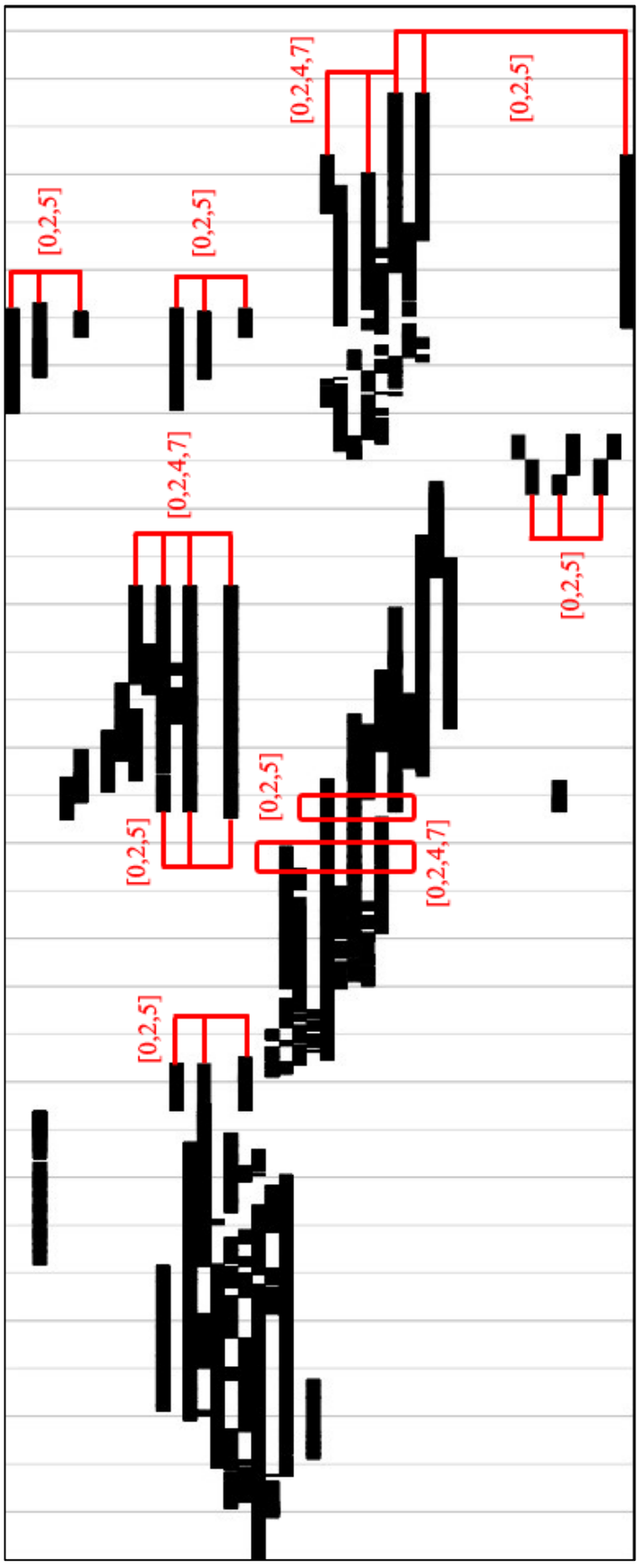


Figure 2.5: Temporal/spatial graph of *Lux aeterna*.

Section 2b: Temporal Offloading

The above traditional analysis is a perfectly valid way to understand *Lux aeterna*, but it is lacking from a phenomenological perspective. If calling *Lux aeterna* "a set of three successive aural expanses dominated by four canonic progressions" is a crude description, then the previous analysis is a slight disservice to the sonic being of the composition. Again, the analysis itself is completely valid and gives the listener a great understanding of how *Lux aeterna* comes into being—as well as how it *came* into being—but it only gives a glimpse into the sounding existence of the work. In other words, this analysis is an example of know-that knowledge that only gives a brief glimpse into *how* the piece is heard. Thus, the knowledge that *Lux aeterna* is constructed out of a series of canons does little to capture the listening experience as the canons are not audible. As Ligeti himself points out, "you hear a kind of impenetrable texture, something like a very densely woven cobweb…The polyphonic structure does not come through…; it remains hidden in a microscopic, underwater world, to us inaudible."[25] Ligeti calls this technique *micropolyphony* ("such a beautiful word!"),[26] and it remains one of the main discussion points on *Lux aeterna* to this day.

However, the aim here is to move past the point of understanding what composes the music to understanding how a composition is received by the listener. From this viewpoint, *Lux aeterna* separates itself from more traditional musical experiences and poises itself for a novel listening experience. Despite the presence of submerged canons, *Lux aeterna* lacks an aural progression of themes and chords. Instead, it offers the listener a stream of notes that reflect

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[25] Ligeti, "György Ligeti talking to Péter Vánai," 14.

[26] Ligeti, "György Ligeti talking to Péter Vánai," 15.

more on one's interaction with musical events than one's intellectual grasp of musical processes. The opening thirteen seconds of this piece attest to this focus by presenting an aural paradox:[27] either the piece opens with a single sustained F_4 being performed by eight soprano and alto voices, or with twenty-four overlapping F_4's, three in each voice. As Example 2.1 showed, the latter statement is clearly true. But this does not agree with how one traditionally hears a passage of this type. For example, consider a performance of the excerpt from Felix Mendelssohn's *Elijah* shown in Example 2.3. In this excerpt, the second bassoons are asked to hold a D_2 at *forte* for close to thirteen seconds starting at measure 18. Visually, the aesthetics of these two settings have drastically different lives: the sustained tone in *Elijah* presents a unified whole bound together through ties, while the F_4 in *Lux aeterna* is staggered and broken. It should be noted that *Lux aeterna's* opening *could* have been written within the same constraints as the passage from *Elijah*. Ligeti could have abandoned the premise of a series of canons and created his desired aural product through sustained tones in each voice. Anyone performing *Lux aeterna* would be able to sustain a pitch for thirteen seconds as the music asks the performers to start holding notes for at least sixteen seconds starting in measure 13. But the opening measures of *Lux aeterna* demand a different approach than those at measure 13, and a markedly different approach than *Elijah*.

In *Elijah*, the bassoon holds a pedal point on the root of D major as support for the singers and violins, who perform the main melody line. The listener's attention is drawn to the moving melody in this passage as the singers separate themselves from the orchestra both aurally and physically on stage. One's attention might be drawn to the bassoons and other sustained

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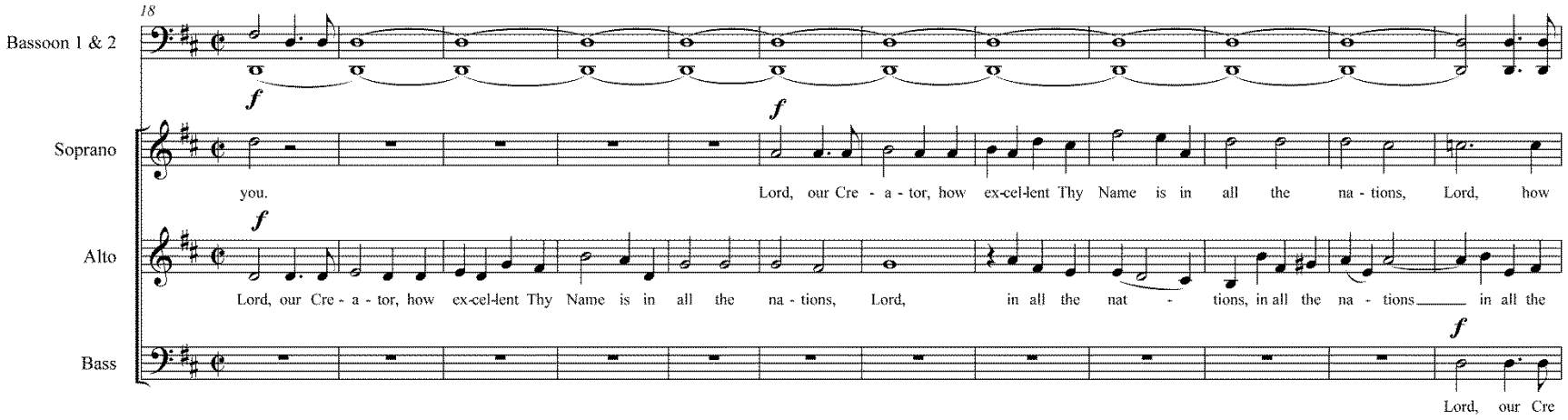
[27] Thirteen seconds is approximately thirteen beats with quarter-note = 56, as marked in the score.

Example 2.3: *Elijah*, ms. 18-29



pitches, but this is unlikely. The main role of these instruments is not to provide a focal point, but a backdrop for the melody to metaphorically move through. The listener hears a single sustained pitch in the bassoons even if they stagger their breathing (as her attention is drawn away by the melodic lines).

In *Lux aeterna*, the multiple overlapping pitches from similar sources likewise create the illusion of a single pitch. This leads one towards hearing the opening paradox in *Lux aeterna* as a single pitch. But the sustained pitches at the beginning of *Lux aeterna* are not afforded the same grace as the bassoons in *Elijah*. For the opening thirteen seconds of *Lux aeterna*, the burden of maintaining the listener's attention falls solely on the F_4. Taken as a sustained pitch, the F_4 is not on its own able to hold one's attention for thirteen seconds, especially once the length of one's attention span is brought into the equation. While thirteen seconds might seem like a short amount of time, it has been widely accepted that the length of a single present, or "now," for an observer usually lasts around two to five seconds.[28] Since the length of this *conscious present* constricts or expands based on how many successive events one is able to group or "chunk" together, a single, elongated event will likely evoke a conscious present closer to two seconds than five. Thus, a length of thirteen seconds is composed of up to six-and-a-half successive nows, or instants of conscious thought for the observer, all of which are occupied by a single, sustained tone. This being the case, there is a fair chance a listener would quickly become bored with *Lux aeterna*, tuning out for the remainder, or skipping to another piece.

Yet this only remains true if one hears the opening as a single, sustained pitch. Taking the other side of the paradox, one can hear the opening thirteen seconds as a series of twenty-four

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[28] John A. Michon, "The Making of the Present: A Tutorial Review," in *Attention and Performance VII*, Edited by Jean Requin (New York: Lawrence Erlbaum Associates, Inc, 1978), 89-92.

successive F_4's being performed between eight voices.[29] Since there are multiple events for one to chunk together in this hearing, the length of the conscious present expands from two seconds towards five seconds (possibly upwards of ten seconds).[30] After the first soprano and alto open the piece in unison, the next voice (the second soprano) enters just short of two seconds into the piece. The second alto enters next, also waiting about two seconds before joining the choir. After this, entries start to speed up as the remaining four voices enter within a second or less of each other. Thus, a single elongated note becomes a complex series of perceptual events. It is no coincidence that the second and third entrances sound around two seconds after the opening note's onset, as this is the lowest threshold of one's conscious present. By placing these entrances at these exact moments, the composition is constructed to draw one's attention back towards the aural landscape at the moment one's window of consciousness is about to close: the entrance of the second soprano acts to draw the listener's attentional gaze towards the piece just as it starts to drift off. As this stringing along of the listener to the edge of his attention can become taxing, the acceleration of entrances that follows relieves the listener of continuously stretching his conscious present.

But while discussing these entrances as clearly separated events has its advantages, this approach leans on non-aural intuitions; the entrances start to lose their audible character when

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[29] Prominent aural philosopher Casey O'Callaghan would argue in favor of this point, noting that "a temporally seamless transition from a trumpet playing B-flat to another trumpet playing the same note counts as involving two different sound tokens" due to the different sound sources involved. Each token is considered a different *sound particular* and, therefore, perceptually different. Casey O'Callaghan, "Sounds and Events" in *Sounds and Perceptions: New Philosophical Essays*, ed. Matthew Nudds and Casey O'Callaghan (New York: Oxford University Press, 2009), 37-38.

[30] Christopher F. Hasty, "Rhythm in Post-Tonal Music: Preliminary Questions of Duration and Motion," *Journal of Music Theory* 25, no. 2 (Autumn 1981): 184.

perceived as a series of isolated events. One can demarcate each voice's entrance on the page as a new and separate event, but the aural quality of these entrances suggests a competing idea. As each voice enters "very gently,"[31] they do not stand out as separate events as much as they strengthen the already sounding voices. This aural quality counteracts hearing the opening as a set of separate entrances and pushes one back towards hearing a single event. But one should not abandon the advantages of hearing multiple sources in this context, and a synthesis of the two hearings comes closest to the phenomenal reality. This synthesis comes about by hearing each voice as singing the same pitch, defining the opening of *this* particular instance of *this* particular piece, and considering each entrance as a *re*-entrance and redefinition of the original pitch. From this perspective, one no longer hears the opening as a single, elongated pitch or as a set of twenty-four events. The opening becomes a single, elongated pitch that is introduced once and reintroduced over and over again to hold the listener's attention.

The idea of reintroducing a sustained pitch is not what differentiates *Lux aeterna* from more traditional musical experiences, though. The previously discussed passage from *Elijah* contains a canon in the vocal lines, and this canon has a similar quality to the opening of *Lux aeterna*. In *Elijah*, the canon is sung in fifths between the alto (starting on D_4) and soprano (A_4), as well as between the bass (D_3) and tenor (A_3). While the opening pitches do not align perfectly (the male lines are an octave lower than the female lines), the idea of renewal is still prevalent. The listener is introduced to the simple theme and the text "Lord our Creator…" in the alto line, which is then retreaded in the soprano line up a fifth. During the "retread," the listener is introduced to the text and theme again (literally, reintroduced) along with a change in pitch. In this way, the canon in *Elijah* deals with a reintroduction of something that is familiar, yet

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[31] From the score: "*strets sehr weich einsetzen*."

changed in a small way. The change in pitch is a noticeable change on the surface, but the overall identity of the theme remains intact. (This is similar to seeing a friend in a different location; he may have moved, but he is still the same person.)

Most, if not every, canon contains the same idea of reintroduction heard at the opening of *Lux aeterna*. The canon in *Elijah* clearly contains both a single, elongated theme section and four separate entrances. But a "single, elongated theme section" is not the same as a "single, elongated pitch." Simply put, the elongated theme section in *Elijah* is more of an elongated *collection of events*, while the elongated pitch in *Lux aeterna* is literally a *single*, elongated event. It is easy to aurally discern where one event in *Elijah*'s canon ends and another begins: the opening pitch in each voice is separated by a fifth or an octave, and the new voice never doubles a pitch that is already sounding. The entrances remain as demarcated in the aural texture as they appear on the visual score. This leaves this passage from *Elijah* as a group of *marked events* that one, as a conscious listener, groups together due to their similar qualities. Referring back to the previous metaphor, the canon in *Elijah* is similar to simultaneously viewing a collection of images of a single person in multiple places.

Lux aeterna differentiates itself from these traditional interactions by simultaneously offering a collection of images of the same person *in the same place*. Each voice enters in canon, but nothing new is introduced during the first thirteen seconds; the voices achieve nothing more than literally reintroducing the opening pitch. These literal reintroductions force the listener into a unique relationship with a unique topic: time. Before delving too deeply into this relationship, we need first clarify what "time" is in this discussion. While this is no small task, it may be simpler than originally thought. From the start, it is good to distinguish between scientific and

philosophical time.[32] Simply defined, scientific time refers to *measured* temporal passages (e.g., seven seconds), while philosophical time refers to *experienced* temporal passages not defined by an exact measurement. Both of these times have been referenced here, though the focus of this analysis will be on philosophical time. Granted, there are references to scientific time throughout, but this is simply an inconvenient consequence of discussing time. As Henri Bergson writes: "we cannot measure time, we cannot even talk about it, without spatializing it."[33] In other words, there needs to be an agreed upon intermediary to compare perceptions and, as of right now, scientific (spatialized) time is the only answer. Despite this need for scientific time, when I refer to "time" or theories of time, I am referencing philosophical time unless otherwise stated.

Unlike the concrete nature of scientific time, philosophical time is a slippery topic. Cornelius Benjamin sums up the dilemma of philosophical time perfectly when he states that "the problem of time is insoluble because time is one of the ultimate irrationals of the world. It is something whose presence must be admitted as a brute fact but whose understanding is forever beyond [our] grasp."[34] Benjamin's admission of defeat is predicated on the idea that time is something one perceives; similar to how one perceives physical objects in the world. And while one can describe *how* he perceives physical objects, either through light entering his retinas and continuing on to his visual cortex, or through the feel of the object touching his skin and the somatosensory signals that follow, one is not able to define how he perceives time in a similar

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[32] These might also be referred to as "quantitative" and "qualitative" time.

[33] Henri Bergson, *Duration and Simultaneity* (Manchester: Clinamen Press, 1999), 115.

[34] Cornelius Benjamin, "Ideas of Time in the History of Philosophy," in *The Voices of Time,* ed. J.T. Fraser (New York: George Braziller, Inc, 1966), 29.

manner. As with *Lux aeterna*, time presents a paradox: it is something whose presence is always confirmed, but whose presence can never be confirmed.

The paradox only exists while the confirmation of time's presence relies on perception, though. James J. Gibson's theories on time completely dissolve the issue at hand. According to Gibson, time is not an object one directly perceives, but rather an "intellectual achievement" one infers from events in the surrounding environment.[35] Gibson's claim is a beautifully simple answer to the insoluble puzzle of perceiving time: one does not perceive time, one simply abstracts the idea of time from the perception of persistence versus change in an environment. In other words, the change one perceives in the environment leads one to infer that *something* is passing, and we call this something time.

Oddly enough, this *inference* of time *implies* another attribute: the ability to notice change. As Henri Bergson claims in his theory on time: "Without an elementary memory that connects the two moments, there will be only one or the other, consequently a single instance, no before or after, no succession, no time… Duration therefore implies consciousness; and we place consciousness at the heart of things for the very reason that we credit them with a time that endures."[36] Time is not something that is passively thrust upon cognitive beings, but something

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[35] James J. Gibson, "Events are Perceivable But Time is Not," in *The Study of Time II: Proceedings of the Second Conference of the International Society for the Study of Time*, ed. J.T. Fraser and N. Lawrence (New York: Springer-Verlag, 1975), 299.

[36] Henri Bergson, *Duration and Simultaneity* (Manchester: Clinamen Press, 1999), 33.

that is actively entertained by those who are able to recognize the difference between past and present events.[37]

It is this understanding of time that informs Thomas Clifton's personal phenomenology on how humans hear music. Clifton makes this point readily apparent when he states that "time is understood to be the experience of human consciousness in contact with change."[38] Along this line, he notes that listeners effect a temporal process on music by continuously connecting past, present and future events. This constant temporal interplay is a cornerstone of Clifton's musical phenomenology, and one can consider it a branching out of Bergson's and Gibson's theories on time. The past and future perpetually color the present through retention and protention respectively. As a consequence of this constant temporal interplay, time in music becomes something one does, with each composition opening a parenthetical timeframe within the larger time of his life.

This type of temporal interplay is experienced while listening to the previously discussed canon from *Elijah*. The theme is presented in its original form at measure 18, and when it is heard reintroduced in the soprano in measure 23, one makes several time-related observations. First off, one recognizes that the sopranos are presently singing the text already heard in the alto line. One notes that they are singing the same melody the altos sang as well. These are fairly straightforward examples of recognition: a current event sparks a connection between it and a similar event from the past. After this recognition, one starts making predictions about the future of this passage. For instance, if the sopranos are singing the same theme and text the altos *were*

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[37] This line of reasoning is why philosophical time is not attributed to devices like a clock or stopwatch. These devices are unable to connect past and present moments, so they are unable to infer the presence of time.

[38] Thomas Clifton, *Music as Heard* (New Haven: Yale University Press, 1983), 56.

singing, one can predict how the rest of the theme will sound based on his memory. Through this action, one's past reaches into one's future while present experiences confirm or deny predictions, causing alterations throughout. The piece carries on unhindered and the bass eventually enters at measure 29 with the same theme and text. At this point, the listener once again draws from the past and reaches into the future by predicting that the tenors will eventually (in about five to six measures) enter a fifth above the bass's opening pitch (as this is what happened previously). The three temporal modes (past, present and future) interact with one another in this listening experience as recollections, experiences and predictions actively play out in one's consciousness.

With this traditional temporal interplay defined, the novel temporal phenomenology of *Lux aeterna* becomes more accessible. Recall that the opening thirteen seconds of *Lux aeterna* consists of a set of literal reintroductions in which the same tone is heard being punctuated by multiple voices to hold the listener's attention. With the unshifting nature of F_4, one can conclude that the same event is occurring in all three temporal modes during this opening. The future becomes equal to the present, the present becomes equal to the past and, by default, the past becomes equal to the future; it is all F_4. Through this collapse of temporal modes, the roles of past and future come under question as the present becomes the sole constituent of perception. When listening to a traditional work like *Elijah*, the past gives the listener a template for what to expect from present and future events. But when listening to *Lux aeterna*, there is no need to look to the past for this information, as it is being held in the present for the listener. Through this action, the past loses its ability to color the present; perceptual depth cannot be expanded through the addition of sameness.

Even if one were to instantiate actively looking to the past through recollection, the dominance of the present would still obtain. Recall that the piece opens with the simultaneous attack on F_4 by the first soprano and alto. As the second soprano enters on the same F_4, a listener could easily connect these two onsets to each other through an act of recollection. Once the second alto enters with the same F_4 as well, the listener could look to the past and recognize that this voice is also reiterating the same pitch as the original onset. But the very act of consciously recollecting this past situates one's train of thought on a single now: in this case, the original onset. The more one relates present entrances with this past entrance, the more their equality begins to resonate. Eventually, one will abandon the past and fall into a mode of listening where the present now is replaced by itself, rather than coordinating two temporal planes (the past and the present). Focusing on one temporal plane is more efficient. The past can be released from the listener's conscious thoughts; the isolated present and future dominates one's attention for the moment.

But the future suffers the same fate as the past during the opening, as it too eventually becomes unnecessary. Recall that the opening thirteen seconds of this work can be described as several "nows" of conscious present. During these nows, the listener realizes that the past holds little sway on the present, as the two are equal. The same logic is applied to the future: the listener anticipates, or predicts, when a new pitch will enter and, as nows continue to pass without any aural change, these anticipations become anathema. This causes the listener to withdraw her future probe and retract ever closer to the present. In fact, the length of the opening section works to counteract one's ability to correctly anticipate the future. As Justin London notes, one tends to react to a new onset rather than anticipate it when the two onsets are separated by more than two-point-four seconds (suspiciously close to the minimum width of the

conscious present). Further, London notes when one does anticipate the onset of events beyond this threshold, one is almost always early.[39] This phenomenon reflects the varying nature of the conscious present: without another event to "chunk" with the initial event, one closes one's window on the present now sooner than one might if there were had two events to group together. With the opening F_4 spanning 13 seconds, the listener is unable to anticipate the entrance of a second pitch. (If anything, the increasingly closer attacks would preempt anticipation.) It is easier/better to abandon the interplay between past, present and future than attempt to support it in these thirteen seconds.

But this fixation on the present appears to fall apart halfway through measure 4, as the soprano line moves from F_4 to E_4, before passing through F_4 to G_4 and eventually settling on $F\sharp_4$. With the introduction of new pitches, the present no longer subsumes the past, and the future becomes uncertain once again. Recall that it was the perfectly stationary aural landscape that allowed the temporal modes to become equal in the opening seconds; by breaking this stationary landscape, the piece has also broken the normalizing of the three modes. The onset of these four pitches in the soprano voice can be grouped into a single conscious present, as they occur within a four to five second span, and there is no reason to believe a listener would not attribute these notes to a single motion (a double neighbor note that ends a half-step higher than it began, otherwise known as the BACH motive). As with all moments, though, this episode is fleeting, and *Lux aeterna* soon establishes a new stationary landscape for the next eight-and-a-half seconds. This new landscape is just as stable as the opening thirteen seconds (no new notes are introduced), but it is much more dissonant, containing four notes separated by a half-step each.

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[39] Justin London, *Hearing in Time: Psychological Aspects of Musical Meter* (New York: Oxford University Press, 2004), 31.

Despite this dissonance, the stability of this passage evokes a recollection of the opening thirteen seconds: the listener once again enters into a momentary state where past, present and future are equal to each other.

This state is different than the original one, though. The idea that the submersion in the now can be broken at any time has been introduced, and is no doubt being consciously entertained. Through this thought, the past is acting in the present as the listener continues to try and predict the future; the damage caused by the moving notes seems irreparable as one probes into all three temporal modes. But the construction of *Lux aeterna* continues to frustrate one's temporal interplay by committing to expanses that outlast the conscious present. Consider the eight-and-a-half second length of the second stable landscape in measures 4-7. Clearly, this is outside the two to five second range of the conscious present. The idea that this passage might evoke a longer conscious present is upended as there are no new events to group together; as with the opening, there are only reintroductions of the already sounding pitches. More than this, the length of this section does not allow one to correctly anticipate the eventual break from this landscape. Recall that people tend to over-anticipate event onsets that are separated by more than two-point-four seconds, which this section overreaches threefold. So even if the listener *knows* this stable landscape will be broken, his ability to anticipate or place this event will be impossible. Using one's cognitive abilities to anticipate the next event onset leads to upwards of six seconds of wasted time. Waiting and anticipating, one completely neglects the present in front of him.

This is the ultimate dilemma of *Lux aeterna*: will the listener bother trying to predict and/or anticipate the future, or will this type of temporal interplay be cast aside? From the standpoint of what is physically possible, trying to anticipate the future is a fruitless act. It is

clear *Lux aeterna* is constructed in a way that discourages anticipation, and for good reason. The opening of *Lux aeterna* is so deliberate about focusing the listener on the present that spending any conscious effort trying to anticipate the future seems counterproductive. While the listener must focus on the present to know exactly when the anticipated event will occur (between anticipation and prediction, anticipation is the more "in-the-moment" action), anticipating an event still stretches his attention into the future and away from the present. It is admittedly a small act one performs during almost every conscious present—one of the curses of being human—but it is still an active move away from the present, which can be detrimental to how this piece is constructed to be heard.

Prediction falls under the same premise: predicting events draws one's consciousness away from the present and into the future. Unlike anticipation though, predictions can span over several years and rely more heavily on the past as they are often based on what has happened in similar situations. Also unlike anticipation, predicting what will happen next is extremely easy in *Lux aeterna*: from the start, the composition sets itself as a series of stable landscapes that progressively expand outward from F_4. But even with the simplicity of this prediction, the slow development of this expansion wreaks havoc on one's predictions, and, because of the drawn out nature of the piece, any predictions—even true ones—become hard to confirm. In other words, the listener may correctly predict that the piece will expand outwards from F_4, but by the time this prediction is fully confirmed, the listener will most likely have succumbed to over-anticipation and ceased predicting any further events. Like many other temporal aspects discussed in this work, this type of *temporal fatigue* is evoked by the construction of the piece. The stability of F_4 leaves little for the listener to cast into the future, and the slow expansion from this point leaves just as little information on which to base predictions. All in all, the piece

creates an aural structure that is nearly unpredictable, except on a very basic level, and nigh unanticipatable.

The nullification of these two future probes brings the listener back to the present. Even if one considers the simple prediction of the piece expanding outwards from the opening F_4, this aspect of reaching into the future is removed during future hearings of *Lux aeterna*; once the listener knows what is going to happen, he no longer predicts the future but anticipates it and, as known by now, this leads to complications. The future becomes expendable, as it was during the opening thirteen seconds. One can try to predict and anticipate what will happen, but *Lux aeterna* will defeat such actions (conscious or otherwise). It is ultimately most efficient to abandon probes into the future.

In abandoning the future, the role of the past once again becomes suspect. By its very nature, the past works on two fronts: to inform current events and help predict or anticipate future events. Since the future has been abandoned as unanticipatable, the past is left solely informing current events. Unlike the opening thirteen seconds, where the past is equal to the present, there is now a past defined as past (the original landscape featuring the sole F_4) and a present defined as present (the current dissonant landscape from measure 4-7). The demarcation of past and present informs the listener that the past still plays a role in coloring current events. But even this coloration becomes unrewarding, as the comparison between the two aural landscapes is shallow at best: there was one note before, now there are three more notes surrounding it.

Further complicating traditional temporal interplay, *Lux aeterna* continues to actively maintain the past in the present by creating *aural footprints*. As previously discussed, when a voice introduces a new pitch, this pitch is often elongated in the same way as the opening F_4. The

metaphor of an aural footprint evokes a sense that each note imprints itself on the aural landscape and subsequent voices follow in the previous voice's footprints by subtly sliding through the aural framework, not displacing anything old with something new. Through this act of temporal extension, *Lux aeterna* builds each new landscape on the foundation of the previously sounding pitches and, much like how one does not look to the first floor of a building as its "past," the previous landscapes become subsumed into a sort of spatialized present.

The result of these actions is a piece where the present becomes isolated from the other temporal modes during extended static spans. Despite the fact that one could conceivably execute a temporal interplay based around her changing mental states,[40] by frustrating one's ability to probe into the future and actively retaining the past within itself, *Lux aeterna* demands the isolation of the present in the listener's mind. Put another way, *Lux aeterna* is built as a commentary about how one interacts with time. The composition actively toys with the length of one's conscious present and takes advantage of temporal shortcomings, begging the listener to forgo traditional temporal interplay and emancipate temporal expectations (much as Schoenberg sought to emancipate tonal expectations). In accepting this outcome, one enters into a more *passive listening experience* where the only temporal mode needing conscious attention is the present. Borrowing a term from Antonio Damasio, this mode of listening is more in line with one's *core consciousness*, whose scope is focused on the here and now without illuminating the future and allowing only vague glimpses into the recent past.[41] This more passive, *core mode of listening* can thus be equated with a lower brain function (typically, we operate on the level of

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[40] This will be discussed more in section 2c.

[41] Antonio Damasio, *The Feeling of What Happens: Body and Emotion in the Making of Consciousness* (New York: Harcourt Press, 1999), 16.

extended consciousness), and allows one's mind to entertain other, non-temporal aspects of the work at hand. In other words, *Lux aeterna* allows the listener to offload the burden of her traditional temporal interplay.

Recall that Clifton posited that a listener effects a temporal process on music by continuously connecting past, present and future events. However, with the present isolated in *Lux aeterna*, the listener is forced to abandon this temporal interplay. Yet this temporal interaction does not disappear, it simply relocates from the brain of the listener to *Lux aeterna* itself. It is offloaded. Recall that Bergson stated that some "elementary memory" must connect past and present moments for time to be evoked, and that this connection implies some type of consciousness. While there is clearly more to consciousness than this, *Lux aeterna* is able to mimic a conscious being's ability to retain the past by extending past aural structures into the present through the aforementioned aural footprints. This retention should not be understood as a past note being repeated in the future, but literally as the preservation of the same note throughout extended periods of time. Through this act of *temporal extension*, *Lux aeterna* mimics conscious retention.

The basis of the second-wave extended mind theory is the ability for exograms to serve the same function as some mental process and, in this case, the retention of notes in *Lux aeterna* serves the same function that brain-bound retention does; notably, keeping some past event in the present. The credibility of this claim does not hinge on the music's abilities to retain the past, but the listener's ability to enact this cognitive extension. Since the process of retention must be consciously offloaded, the listener must intrinsically trust the music to retain pertinent information from the past. If she does, one can understand *Lux aeterna* as absorbing the process of retention for the listener.

The resulting listening experience becomes focused on the listener's interaction with the composition, not on the listener or the composition itself. Granted, the composition needs to be constructed in a certain way to become poised for this type of coupling (e.g., the previously discussed example from *Elijah* cannot be heard in the same way as *Lux aeterna*) and the listener needs to consciously couple with the music, but the defining feature of this experience is how the listener is able to offload the past and simply listen to the present without the twin burdens of retention and expectation. By trusting *Lux aeterna* to retain information for her, the listener is able to have a closer relationship with the music (as sought by Lehman and others in the introduction) through a technology of cognitive extension.

Section 2c: Multiple Temporalities

The idea that music can thwart temporal expectations does not constitute the entirety of the novel conclusion pursued here.[42] The passage from Beethoven's "Ode to Joy" discussed in the introduction is a classic example of how temporal expectations can be undermined. While the listener is led to believe the fourth phrase will start on the downbeat, its early onset belies these expectations and leads to Huron's "dynamic surprise."[43] But this might be too abstract of a connection, as the examples of thwarted temporal expectations in the "Ode to Joy" and *Lux aeterna* are not equivalent. With the "Ode to Joy," one has an experience of expectations being deliberately defined during the first three phrases, only to be destroyed by the onset of the fourth.

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[42] While the process through which this conclusion is reached is novel, the conclusion itself is not new.

[43] See pages 2-3.

In *Lux aeterna*, one experiences a composition where expectations play no part at all, are in fact suppressed.

This is not a novel idea either, as compositions where expectations and temporal interplay assume a passive role have recently been studied in more depth. For instance, Thomas Clifton notes the presence of *static successions* in Notre Dame organum—used to symbolize the timelessness of God—as well as at the beginning of Richard Wagner's *Das Rheingold* (1869) and Richard Strauss's *Also Sprach Zarathustra* (1896). As Clifton notes, one hears sameness succeeding itself during these expanses.[44] This is similar to how the opening F_4 in *Lux aeterna* is discussed in section 2b.

But there is a difference between Clifton's static succession and our hearing of *Lux aeterna*. Clifton posits that someone *might* equate a condition of timelessness with a passage of static succession, since time cannot be inferred without the presence of change, but he finds this conclusion flawed. While the aural structure may remain unchanged throughout the listening process, he argues that the listener's conscious attention is directed towards different parts of the sounding construction; listening to its "insides," its top or bottom edge, or even to the intensity of the pitch as a whole.[45] When the environment fails to present change, Clifton's listener still effects a temporal process by referencing her own conscious fluctuations: she compares how she heard an event in the past to how she presently hears it, as well as how she expects to hear it in the future.

The inference of time is inherent in Clifton's listening process, and he is not alone in this sentiment. Theodor Adorno argues a similar position when discussing the ballet music of Igor

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[44] Clifton, *Music as Heard*, 105.

[45] Clifton, *Music as Heard*, 97-98.

Stravinsky. Adorno notes that Stravinsky and his school rejected the duration of time and instead created compositions based around time's spatialization. With this spatialization of time, Adorno notes that Stravinsky's music was degraded to a "parasite of painting," where everything is present at once without the guiding hand of temporal flow. This led Adorno, as listener, to experience the "consciousness of duration" imposing a false temporal intentionality on the music.[46] With change not present in the music, the consciousness of the listener supplies the change and directedness needed to hear the composition in a temporal setting.

Clifton and Adorno's conclusions imply that a fundamental component of all music, change, is missing from such static expanses or spatialized compositions, and that in the absence of external markers the burden of constructing time is shifted to the listener. Clifton views this positively, as a new possibility for engagement. Adorno views this more negatively, the element of temporality being off-loaded to the figures traced on the ballet stage, to the optical centers of the cortex. Yet it would seem that each attempts to overlay a traditional temporal experience onto a novel temporality, that each sees there to be some sort of deficit that must be rectified (or which will prove musically fatal). This, though, would forestall the possibility of a different sort of listening, one in which (as argued for in *Lux aeterna*) the music itself is aware of the act of listening, and one in which the notion of absence does not imply a deficit but rather the offloading of some of the mechanics of listening.

Perhaps this is not a new view either, though, as Jonathan Kramer offers an alternative insight into how one can experience compositions that do not operate in a normal temporal setting. He refers to compositions lacking temporal interplay as happening in *vertical time*.

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[46] Theodor Adorno, *Philosophy of New Music*, tran. Robert Hullot-Kentor (Minneapolis: University of Minnesota Press, 2006), 143.

Vertical time is defined by its lack of demarcated moments and any possibility of goal-directedness. According to Kramer:

> Vertical music denies the past and future in favor of an extended present. The past is defeated because the music is in certain fundamental ways unchanging, nonlinear, and ongoing. It appears to have come from nowhere other than where it presently is. Its refusal to provide cues for chunking makes remembering specific events or information difficult, if not irrelevant. Such music tries to thwart memory in order to focus on the present, the now. Similarly, there is little implication toward the future in this music, other than it will continue, largely as it has been, without major change or articulation. Future as well as past orientation is minimized. The future, to the extent that it is anticipated at all, is expected to be the same as the present. This kind of music tries to create an eternal now by blurring the distinction between past, present, and future, and by avoiding gestures that invoke memory or activate expectation.[47]

Philip Glass echoes Kramer's stance on vertical time:

> When it becomes apparent that nothing "happens" in the usual sense, but that, instead, the gradual accretion of musical material can and does serve as the basis of the listener's attention, then he can perhaps discover another mode of listening—one in which neither memory, nor anticipation (the usual psychological devices of programmatic music, whether Baroque, Classical, Romantic, or Modernist) have a place in sustaining the texture, quality, or reality of the musical experience. It is hoped that one would be able to perceive the music as a… pure medium "of sound."[48]

Kramer further posits that "[vertical time] can induce a feeling of timelessness. But the term "timelessness" does not, despite its etymology, imply that time has ceased to exist, but rather that ordinary time has become frozen in an eternal now."[49] Kramer's definition of "timelessness" appeals to a lower, core consciousness. Kramer makes this connection overt,

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[47] Kramer, *The Time of Music*, 375-376.

[48] Philip Glass, quoted in Wim Mertens, *American Minimal Music*, trans. J. Hautekiet (New York: Broude, 1983), 79.

[49] Kramer, *The Time of Music*, 378.

noting that a work in vertical time is an example of what J.T. Fraser calls *regressive artwork*:[50] "The childlike quality of some of the most temporally regressive music, that of vertical time, can be charming… Its metaphorical expression of lower temporalities gives artistic voice to the archaic Umwelts from which we, as individuals, as members of human society, and even as physical entities, evolved."[51] The extended mind hearing of *Lux aeterna* is a more scientifically-grounded take on the phenomenon of Kramer's timelessness. The hearing pursued here also provides a more embodied approach where one not only understands how one hears music, but how one *interacts* with it. *Lux aeterna* is heard as a "pure medium of sound" not because the music lacks change, but because the listener offloads temporal processes. The music elicits an active coupling and a new listening experience is evoked.

But this still does not define the entirety of the listening experience. There is more to *Lux aeterna* than a static work that elicits a core mode of listening. There is also action within *Lux aeterna* that is not present in Kramer's typical "vertical" works as the automata of the voices carry-out their canonic progressions. The listening experience presents another paradox: a composition that is constantly changing, yet never evoking a sense of change in the mind of the listener.

Kramer inadvertently begins a response to this paradox when he posits that "listening to a vertical musical composition can be like looking at a piece of sculpture. When we view the sculpture, we determine for ourselves the pacing of our experience… If we hear only part of the performance we have still heard the *whole* piece, because we know that it will never change… As with sculpture, the piece has no internal temporal differentiation to obstruct our perceiving it

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[50] J.T. Fraser, *Of Time, Passion, and Knowledge* (New York: Braziller, 1975), 435-446.

[51] Kramer, *The Time of Music*, 397.

as we wish."[52] This statement has two parts: (1) vertical compositions are present in their entirety at any given moment and (2) this creates a temporal experience similar to viewing a sculpture. Ligeti echoes the former when he states his static works are "simultaneously present in all [their] moments."[53] One can also reference Adorno's criticism of Stravinsky's music as resonating with this point.

The latter can be understood through Eric Drott's hearing of Ligeti's *Atmosphères* (1961). *Atmosphères* opens with a static cluster that lasts upward of forty-eight seconds. There are minor changes in this structure as the contrabassoon slowly fades out after eighteen seconds, with the four flute parts dropping out around six seconds later and the remaining bassoon parts following suit twelve seconds after the flutes. But these changes do not remove *Atmosphères* from the realm of the static. The thick polyphony masks the subtraction of these instruments and their departure goes unnoticed (similar to how one does not hear the staggered breathing in *Elijah*). Further, Drott argues "[*Atmosphères*] appears static relative to the developmental and tonally directed music of the eighteenth and nineteenth century."[54]

With its static nature defined, the act of hearing an analogue to how one views a sculpture prevails in Drott's analysis: "*Atmosphères* seems to present to the listener a series of aspects of a fixed object. Though it is necessary that there be an ordering of these aspects, no ordering is any more valid than any other. The disconnection between successive clusters, the denial of semblance of directedness, the absence of motion—all these factors contribute to the impression

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[52] Kramer, *The Time of Music*, 57.

[53] György Ligeti, "György Ligeti talking to Josef Häusler," in *Ligeti in Conversation*, tr. Gabor J. Schabert (London: Eulenburg Books, 1983), 92.

[54] Eric Drott, "Agency and Impersonality in the Music of György Ligeti," (PhD dissertation, Yale University), 2001, 92.

that the work could be just as valid were its ordering of clusters shuffled."[55] This hearing evokes Kramer as the composition does not contain an *a priori* temporal ordering. Rather, the object is subject to the perceiver's temporal inclinations.

Yet it should be clear that the latter half of Kramer's insight creates a fallacy. Vertical time centers on the idea of entering into a more passive, core mode of perception, one where temporal interplay does not occur, yet here the listener actively controls the temporal progression of the composition analogous to perceiving a sculpture. One can say she controls her pacing, now hearing the insides and outsides of the sound, then hearing the top and bottom. The connection to Clifton is overt as time is imposed on the listening experience.

Hearing vertical time as one views a sculpture is clearly flawed. But consider flipping the relationship, applying the listening experience of vertical time to perceiving a sculpture. A visual simulacrum of hearing in vertical time is perceiving with "tunnel vision." Tunnel vision presents a very focused gaze on a small portion of the environment, with thoughts not reaching far beyond the current subject. One can imagine this type of perception arising in the face of danger as the source of trouble becomes the focus of the eye while the mind works through what is happening right now and what might happen in the next second or two. Applying this tunnel vision to perceiving a sculpture creates an odd experience where the viewer becomes so fixated on one aspect of the sculpture that the other aspects fade into the background. It is hard to imagine this being a "normal" way to view a sculpture, and it is also hard to imagine a sculpture evoking this type of experience. While the sculpture is undoubtedly "simultaneously present" during every moment of perception, a simple flick of the eye introduces change and a temporal

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[55] Drott, "Agency and Impersonality in the Music of György Ligeti," 111.

story begins to unfold. Further, the three-dimensional nature of a sculpture will always present the mind with more to explore as certain aspects remain obscured by others.

One can imagine a *painting* that evokes Kramer's timelessness. I once encountered a painting that was simply a canvas painted blue. There were no noticeable demarcations in the painting; to view any part is to view the whole. One can imagine adopting a tunnel vision with this painting and pondering the "blueness" of the blue on a lower temporal level as traditional temporal interplay ceases. Kramer's intuition that vertical time is evoked in the visual arts is apt, though his mark is slightly off.

Tellingly, the example of the aforementioned blue canvas can be expanded to introduce a temporal progression (as is heard in the canons of *Lux aeterna*). Instead of perceiving only uniform blue, imagine the canvas contains a shoreline with a consistent blue ocean. One is able to perceive the blue ocean with the same tunnel vision with which he perceived the blue canvas, but a potential for change has been introduced. One can now switch back and forth between the vertical time of the ocean and the more defined, linear time of the shoreline. In doing this, he is switching between two moments. This is how humans perceive their visual world on a daily basis. Consider that the human eye can only process high resolution images that hit the fovea (represented by the size of a thumb nail at arm's length). With such a small "active" visual field, the mind compensates through saccades (quick movements of the eyes). One's eyes are almost constantly moving, and these saccades give the mind anchor points needed to fill in the visual gap. Stripped of higher-level consciousness, visual perception becomes a random assortment of images compiled as a series of moments.

An example of this is seen in Pablo Picasso's *Guernica* (1937). *Guernica* is a collection of images that do not represent an *a priori* temporal direction. Instead, the painting is perceived

as a series of demarcated moments that happen to occur on the same canvas. To perceive *Guernica* is to perceive in Kramer's *moment time*. Where vertical time is defined by its lack of goal-directedness, moment time is experienced as a series of self-contained moments succeeding one another with no linear transitions. Moment time differentiates itself from vertical time through its clear demarcations between segments (or moments), each of which may or may not contain a linear temporal progression. Kramer discusses Barney Childs's *Music for Cello* (1964) as an example of moment time. In this work, the performer is presented with a number of musical fragments to be played in any order. The moments themselves may or may not contain linear progressions, but the progression between moments remains arbitrary. Referencing Drott's hearing of *Atmosphères,* one notices relationships with moment time as well. The connection between Drott's hearing and one's perception of *Guernica* is readily apparent as the eye and ear jump between different aspects of a fixed object. In essence, hearing in moment time is to perceive a non-uniform visual artwork.

The interesting aspect of moment time is that it can operate within more than one temporality. Referencing the fictional painting with a uniform blue ocean, one can perceive a moment in vertical time, and another in linear time. These temporalities occur while still perceiving the meta-artwork in moment time, and possibly through the linear time of one's extended consciousness. Herein is the key to a novel hearing of *Lux aeterna*: a work of art can simultaneously operate on multiple temporal levels. One can see an example of this in Tintoretto's *Crucifixión* (1565). *Crucifixión* easily escapes one's ability to observe "in a single glance" since it expands across forty feet in a room that is only ten feet deep; it is physically impossible to experience the work as a simultaneous composite (much like a musical

composition). Given no choice, one's consciousness begins to perceive the work in moment time as visual "chunks" strike the retina.

As one views these moments, a clear progression emerges from the canvas. As David Rosand outlines (and shown in Example 2.4), *Crucifixión* suggests a linear progression highlighting the different stages of the crucifixion. The negative space at the bottom-right of the painting aims to draw the viewer's attention to where a hole is being dug for a cross. From here, the viewer might pick up on the pieces of wood sitting above the huddled group of three people, and further up still to the bad thief being tied to his cross (his back already turned on Christ). From here, Rosand notes that our eye is naturally drawn through a counterclockwise path (once again, through the use of negative space) to the good thief, who is being raised on his own cross. The linear direction of the cross and ladder below draw the eye back to the bottom of the painting, where a robed figure in red is sure to catch the eye and draw one's attention to the bottom center. Here, the viewer sees a mass huddled together in sorrow, with some looking up (and drawing the viewer's gaze) to the fully raised and bound Christ. All told, the linear progression Rosand suggests outlines every stage of the crucifixion: from the hole being dug, to the wood used to make the cross, to a figure being bound, to another being raised, and finally ending on Christ fully bound and hanging for all to see.[56]

Rosand's suggested progression defines a temporal layer in Tintoretto's *Crucifixión*, but it does not define the entire temporality of the painting. Rosand's progression is a single, extended moment of one's experience, and may be arbitrarily separated from other moments through random saccades. For instance, after reaching Christ, one might notice the robed figure

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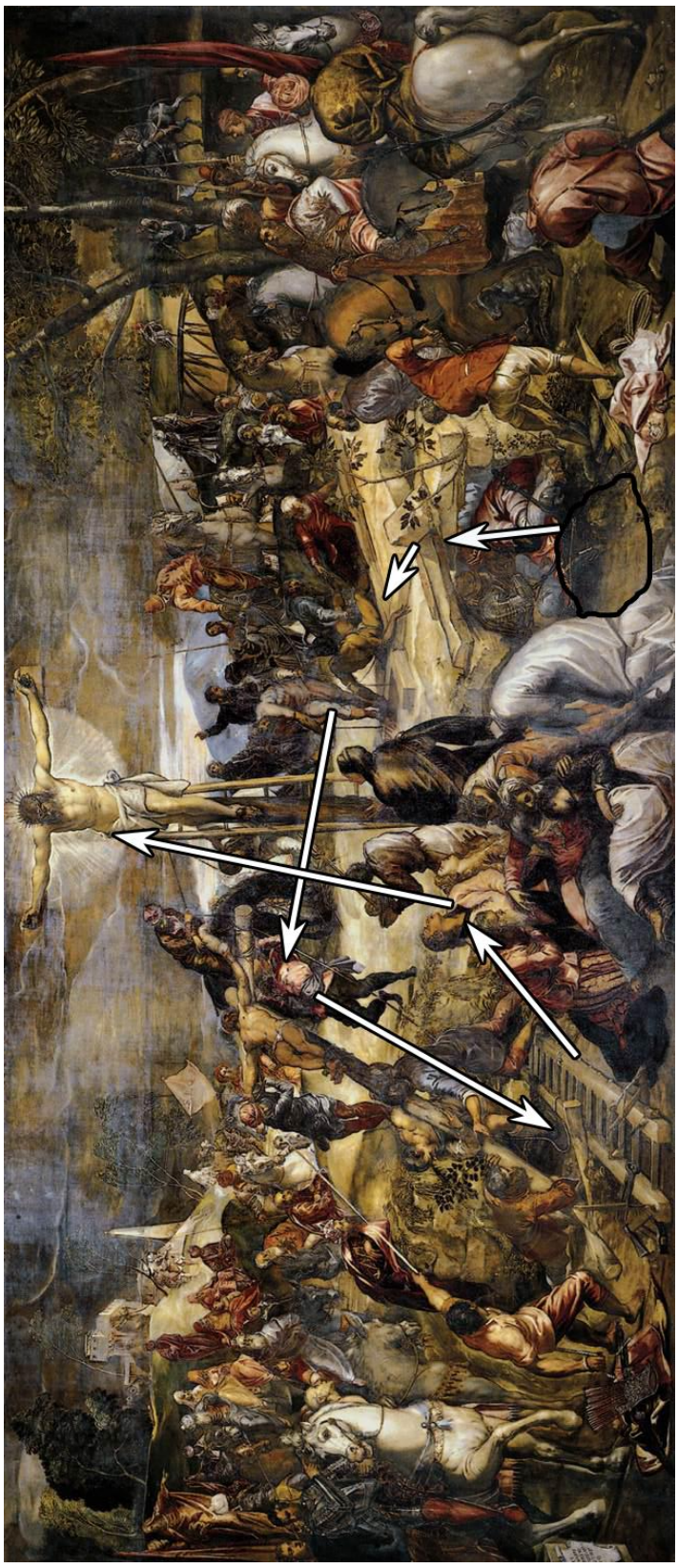
[56] David Rosand, *Painting in Sixteenth-Century Venice* (New York: Cambridge University Press, 1997), 145-153.



Example 2.4: *Crucifixion* by Tintoretto (1565)

down and to the left of Christ and start to wonder whether he is riding a mule or a horse.[57] This thought and visual path clearly has no relationship to the linear temporality just outlined, yet it is still considered an experience within the overarching observation of *Crucifixión* in moment time as one's extended consciousness classifies both moments as related.

Returning to *Lux aeterna*, one can start to unravel the paradoxical temporal interplay. On the most local level, the listener is operating within her core consciousness, as both future and past have been cast aside during the extended temporal expanses. But there is simultaneously a linear temporal progression being played out within the composition. As the listener hears in vertical time, the *cantus firmus* drives forward along its predetermined linear path. This linear progression represents a second, more advanced level of temporality in *Lux aeterna*. Consider that it is one's ability to notice moments as connected and goal-directed that grants a sense of temporal progression. Here, the voices have been given a clear temporal goal/directedness (to sound out the *cantus firmi*), and the musical automata executes this higher level temporal activity while the listener remains in her core consciousness. This draws a clear contrast between how one perceives the linear temporality in *Crucifixión* and *Lux aeterna*. In the static painting, the progression is *suggested* through negative space and visual indicators. The painting does not enact a temporality, the viewer enacts the linear progression based on the painting's suggestion. Music offers a different experience as the listener is not able to saccade his ears to a different part of the structure; music dominates the situation. In this way, music forces the listener to hear what it wants, when it wants. This presents a second situation for music to subsume a traditionally cognitive role.

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[57] He is riding a mule.

Recall that Ligeti considers works like *Lux aeterna* to be "simultaneously present in all [their] moments." Taking this at face value, one can consider all the notes of the opening canon to be present throughout the first section of *Lux aeterna*. This sonic wall represents a fixed object for the listener, but one that has different aspects to it. It has a top and a bottom, an inside and an outside, and the listener is able to hear these different aspects. However, the listener does not control the temporal progression of these aspects as the music guides her through the sonic object. Put another way, the voices filter which aspects of the fixed object will be experienced at any moment; the linear progression *pays attention to the fixed object for the listener*.

Consider if *Crucifixión* was represented on a screen that only shows the starting negative space outlined by Rosand. The screen has cameras on it and monitors eye movement, and once it detects a viewer looking at the negative space it starts to unfurl more of the artwork along the linear progression previously outlined. In this scenario, the screen is forcing a certain perception of the fixed painting by actively controlling the observer's attention along a linear path. The difference between this viewing and a more traditional one is where the seat of temporality exists. In a normal situation, the observer maintains all the power by being able to cast her gaze wherever she pleases; the observer is in control of her own attention. In the screen scenario, control is wrested away as the screen enforces a strict viewing progression; the screen controls the temporal interplay. To be clear, temporality is lacking in the former viewing, while it is encased in the latter. The normal viewing raises Clifton and Adorno's claims, the observer needing to add temporality to the static artwork. The situation with the screen (representing the listening experience in *Lux aeterna*) creates a situation where one needs to abandon internal temporal interplay as the exogram executes this cognitive process. By offloading temporal interplay to the screen/music, it is allowed to unfold in front of the static observer and control the

temporal experience of the artwork. Thus, temporality is not abandoned while listening to *Lux aeterna*, it is subsumed into the music.

And yet there is still a higher temporal level operating in *Lux aeterna*: the three canonic expanses outline a clear example of moment time. Each section is demarcated by Ligeti signals and each has a self-contained linear progression. The novelty of *Lux aeterna* is that it operates on three temporal levels: in vertical time for the listener, linear time for the voices, and moment time for the framework of the composition. Note that not all static works can be heard like this. Returning to *Atmosphères*, the opening forty-eight seconds of the work contains a static structure *without* an underlying *cantus firmus*. Lacking a simulacrum of the temporal progression in *Lux aeterna, Atmosphères* only operates on two temporal levels: vertical time contained within moment time. *Atmosphères* presents a truly static expanse.

It is the linear progression that makes *Lux aeterna* so unique, and such an apt work in relation to the extended mind theory. Since *Lux aeterna* contains a linear progression on a middle level, it is literally holding an extension of consciousness within itself, begging to take over the functions of retention and attention for the listener. This view may seem radical in the abstract, but the listening experience being outlined here is merely an extension of a well-defined field. Kramer and Clifton both discuss how works can operate in different temporalities, and Schenkarian theory implies that music operates on multiple temporal levels as well. In reality, the only difference in the listening experience outlined here is the idea that music can act as part of one's consciousness. Even this is not a leap as the listening experience discussed here evokes mental states that are similar to those in well-defined theories of musical experience.

Adorno states that static music is a "parasite of painting," since temporality has to be introduced to give the work a sense of directedness. In contrast, hearing certain static works as

outlined here defines this music as the only art form that does not need an imposed temporality, as the composition itself critiques temporality. While paintings need the consciousness of the observer to add duration, works like *Lux aeterna* already contain their own imbedded consciousness, and work in concert with a listener to imply a temporal progression. *Lux aeterna* is a paradox, but a paradox that should be understood as a complex phenomenological experience under the guise of a simple canonic construction.

Chapter 3

Potential and Comparison in *Piano Phase*

Section 3a: Rigging the Process

Though the two have completely different sonic lives, *Lux aeterna* and Steve Reich's *Piano Phase* (1967) are tethered through their compositional processes and phenomenological interactions. As *Lux aeterna* is heard as a product of manipulated serialism, *Piano Phase* is heard as a rigged musical outcome with concealed structural depth—despite the composer's claims to the contrary[1]—which in turn evokes a sense of consciousness embedded in the music. *Piano Phase* can also be understood a level beyond this as an extended mental process within a global compositional process being executed by Reich over the span of several compositions. Setting aside extended mind arguments for the moment, though, one can understand how *Piano Phase* came into being through an analytic process similar to the one applied to *Lux aeterna*.

Composed the year before *Lux aeterna*, *Piano Phase* was created in the same music historical context as Ligeti's piece, as a reaction against the "wallpaper-pattern" sound of total serialism. However, Reich approached the impersonal nature of total serialism from a different vantage. Recall that Ligeti pre-devised certain aural qualities of the work (such as the opposition between half and whole steps) before it was "processed" through the automata of his serial foundation. He additionally manipulated the work after the results of this process came to fruition. The sounding outcome was a micropolyphonic composition where the traditionally serial processes that governed the work remained hidden behind a sonic wall of eternal pitches.

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[1] "The use of hidden structural devices in music never appealed to me." Steve Reich, "Music as Gradual Process," in *Writings on Music 1965-2000*, ed. Paul Hillier (Oxford: Oxford University Press, 2002), 35.

Reich claims in his writings to take the exact opposite approach, making his serial compositional processes as audibly transparent as possible. By exposing the compositional process behind his music, Reich sought to counteract the opaque randomness he heard in total serial pieces. For instance, the problem Reich heard in John Cage's automated music was a disconnect between the compositional process and the sounding life of the work.[2] This comment could apply to Ligeti's micropolyphonic compositions as well.

This ideology is audible in Reich's phasing music, where the central process of phasing is readily heard throughout the performed work. This creates an audible simulacrum of an exposed phasing machine, whose gears are easily perceived by the listener; there is no densely woven cobweb here. Thus, Reich claims he does not "know any hidden structures you can't hear" in this music as "the compositional process and… sounding music [are] one and the same thing."[3] For example, in *Piano Phase,* one pianist opens the work with the twelve-beat pattern shown in Example 3.1, with a second performer joining in unison after four-to-eight repetitions. After performing this unit in unison twelve-to-eighteen times, one of the performers increases her tempo until she is exactly one-beat "out-of-phase" with the other performer. Once the two performers are exactly one beat out of phase (with one performer playing the excerpt in Example 3.1 starting on the downbeat, while the other plays the excerpt starting on the second beat), the out-of-phase performer matches her counterpart's tempo again until she has performed her new, out-of-phase melody sixteen-to-twenty-four times. At this point, the process is repeated and she

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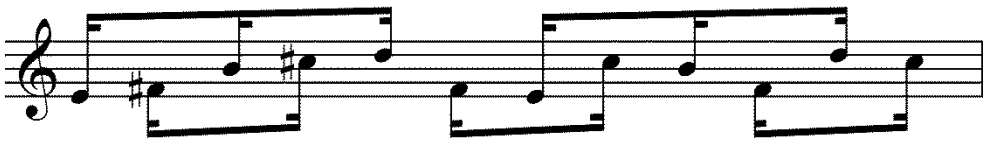
[2] Steve Reich, "Excerpts from an Interview in Art Forum," in *Writings on Music 1965-2000,* ed. Paul Hillier (Oxford: Oxford University Press, 2002), 33.

[3] Reich, "Music as Gradual Process," 35.

speeds up until she is another beat out-of-phase with her counterpart and so on. The process of phasing is easily heard.

Example 3.1: Prime configuration (C_0) in *Piano Phase*.



And while Reich's sonic exposure of the compositional process stands in stark contrast to Ligeti's aural submersion of serial devices, he parallels Ligeti's desire to make his serially-based works more personal. In essence, Reich does not allow the notes of the basic unit to be chosen through serial processes or at random through improvisation. Reich claims that he "wanted to… come up with a piece of music that [he] loved intensely, that was completely personal, exactly what [he] wanted in every detail, but that was arrived at by impersonal means. [He] compose[s] the material, decide[s] the process it is going to be run through—but once these initial choices have been made, it runs by itself."[4] Reich stands apart from Ligeti here as he claims to "accept all that results without changes."[5] Reich's response to total serialism aligns itself with the personal control Ligeti sought in its pre-process stage, but is different in its post-process stage

Reich's stance is more ideological than actual, though, as the music his phasing process creates (such as *Piano Phase*) often shows inaudible structures to which the naïve listener is not privy. With an eye towards these structures, one can start to understand the full process of *Piano*

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[4] Reich, "Excerpts from an Interview in Art Forum," 33.

[5] Reich, "Music as Gradual Process," 35.

Phase and the abstract ways it defines its micrometrical nature (as opposed to Ligeti's micropolyphonic nature).

The basic twelve-beat unit in *Piano Phase* (referred to here as the prime configuration, or C_0) is a simple melodic hocket of two sonorities: E-B-D and F♯-C♯. The unit opens with the first note from the E-B-D sonority (E), followed by the first note in the second sonority (F♯), before sliding to the first sonority's second note (B), then moving to the second note in the second sonority (C♯) and so on. As seen in Example 3.1, the twelve-beat nature of C_0 causes the F♯-C♯ dyad to occur three times, while the E-B-D triad occurs twice.

As the two performers move out of phase with one another, the cardinality of these two sonorities becomes a defining feature within each new configuration. Drawing from Richard Cohn, one isolates three parameters within each configuration to unveil a deeper, inaudible structure: the cardinality of each melodic sonority, the cardinality of harmonic dyads and the beat-class sets of each sonority.[6] For instance, the E-B-D sonority has a cardinality of two in C_0, while the F♯-C♯ sonority has a cardinality of three. The harmonic dyads are easy to define in this configuration since there are only unisons, so C_0 contains twelve [00].

The *beat-class set* (bc-set) for these two sonorities is equally simple and determined by considering the twelve-beat rhythmic space in *Piano Phase* as indicative of the twelve-pitch aural space defined by the equal-temperament keyboard.[7] The beginning of each sonority defines which beat-class that sonority is "on," with each beat designated as numeral zero through eleven in ascending order. Thus, with E landing on beat zero and six, the bc-set for the E-B-D sonority

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[6] Richard Cohn, "Transpositional Combination of Beat-Class Sets in Steve Reich's Phase Shifting Music," *Perspectives of New Music* 30, no. 2 (Summer 1992), 146-177.

[7] Cohn, "Transpositional Combination of Beat-Class Sets in Steve Reich's Phase Shifting Music," 149.

is [06]. With the F♯-C♯ dyad starting on beat one, five and nine, the bc-set for the F♯-C♯ sonority is {159}, with a prime form of [048]. These three qualities of C_0 are outlined in Table 3.1, which will be referenced throughout this section.

Table 3.1: Qualities of *Piano Phase*.

Sonorities	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
E-B-D	2	4	4	4	4	4	2	4	4	4	4	4
F♯-C♯	3	6	6	6	3	6	6	6	3	6	6	6

Pitch Dyads	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
[00]	12				6		6		6			
[01]		2		2		2		2		2		2
[02]		4	2	4	2	4		4	2	4	2	4
[03]		2	2	2	2	2		2	2	2	2	2
[04]		2		2		2		2		2		2
[05]		2	8	2	2	2	6	2	2	2	8	2
[06]												

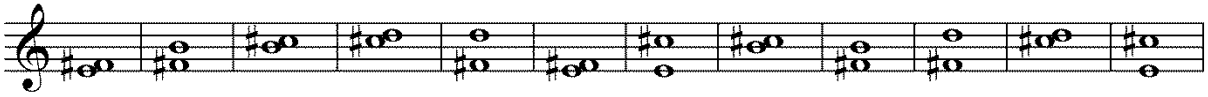
Beat-Class Sets	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
[06]	x						x					
[0167]		x				x		x				x
[0268]			x		x				x		x	
[0369]				x						x		
[048]	x				x				x			
[014589]		x		x		x		x		x		x
[0268T]			x				x				x	

Form	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**F**	**E**	**D**	**C**	**B**

With the starting point for a traditional analysis set, one moves forward to C_1. With the second performer now playing the original set one-beat ahead of the first, a clear trail of echoes is heard throughout C_1. Naturally, this split causes the cardinality of each melodic sonority to double: where one hears E-B-D twice and F♯-C♯ thrice, she now hears E-B-D four times and F♯-C♯ six times. Further, one is no longer presented with only unisons in C_1 as a plethora of harmonic dyads emerge. As shown in Table 3.1 and Example 3.2, the twelve beats in C_1 contain

no unisons, two minor seconds, four major seconds, two minor thirds, two major thirds, two perfect fourths and no augmented fourths. This can also be understood as the interval vector <0242220>.

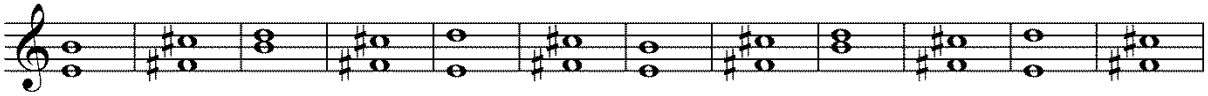
Example 3.2: Dyads in C_1 in *Piano Phase*.



The aforementioned echoes in C_1 play havoc on the beat-class sets of the two melodic sonorities as well. E-B-D outlines a {056E} bc-set, with a prime form of [0167], while F♯-C♯ outlines a [014589] bc-set. The relationship between these bc-sets and the ones in C_0 should be clear as the process of phasing has expanded [06] out to [0167] and [048] to [014589].

Continuing along this abstract line of analysis, C_2 presents a new configuration where the second performer is two beats ahead of the first. As shown in Table 3.1, C_2 also contains four instances of the E-B-D melodic sonority and six instances of the F♯-C♯ melodic sonority. While this parameter of C_1 and C_2 reflect one another, C_2 defines itself as a more traditionally consonant configuration with an interval vector of <022080>. Shown in Example 3.3, the eight perfect fourth/fifths blossoming from this texture arise from the configuration of the two melodic sonorities. With E and B separated by two beats in C_0, and F♯ and C♯ separated by two beats as well, this consonant outcome is a foregone conclusion once the second performer shifts two beats ahead of the first. In other words, Reich rigged the process of phasing in *Piano Phase* to elicit a consonant musical outcome in C_2, just as Ligeti rigged his *cantus firmi* in *Lux aeterna*.

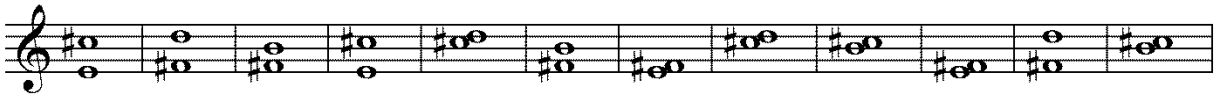
Example 3.3: Dyads in C_2 in *Piano Phase*.



The two-beat offset of the second performer naturally expands the bc-sets in C_2. E-B-D is now heard as bc-set {046T}, with a prime form of [0268]. While F♯-C♯ is heard as bc-set {13579E}, with a prime form of [02468T]. As in C_1, the progressive phasing of the second performer is directly conveyed through the bc-sets of C_2, which are now off from those in C_0 by two beats.

While C_2 shows an example of Reich rigging the process in *Piano Phase*, C_3 sheds light on the supposedly non-existent hidden structure that binds the isolated configurations. While the presence of six F♯-C♯ dyads and four E-B-D triads remains consistent through C_1, C_2 and C_3, C_3 also mimics the interval vector of C_1 (<0242220>). Its dyads shown in Example 3.4, C_3 creates this parallel interval vector despite lacking the prominent echo of the E-B-D sonority in C_1. However, this echo is still heard in the F♯-C♯ dyad as the beat-class set of this dyad is the same in both C_3 and C_1. Starting on the *second* beat, the bc-set for F♯-C♯ in C_3 is {12569T}, with a prime form of [014589]. Referencing Table 3.1, this is the same bc-set heard for the F♯-C♯ dyad in C_1 and it seems the presence of this bc-set alone is enough to create parallel interval vectors between C_1 and C_3.

Example 3.4: Dyads in C_3 in *Piano Phase*.



In fact, referencing Table 3.1 again, every odd-numbered configuration shares the interval-vector <0242220> and the beat-class set [014589]. The recurring beat-class set is easily explained by the four-beat separation of the F♯-C♯ dyad in C_0. This four-beat separation creates a pattern where a single-beat shift will offset the structure by one ([014589]), a two-beat shift will offset the structure by two ([02468T]), a three-beat shift will return it to an offset of one (i.e.,

since there are only two notes in this looping pattern, being offset by one beat or three beats is equivalent in the prime form), and a four-beat shift will return it to the starting unison. This cycling nature of the F♯-C♯ dyad is attributed to Reich's admitted pre-process alterations. But the recurring <0242220> interval vector shows the true measure of compositional intent in *Piano Phase*. With C_3 only referencing C_1 through its shared abstract beat-class set, the idea of the same interval vector occurring here (as well as in C_5, C_7, C_9 and C_{11}) cannot be described as a happenstance occurrence where Reich accepted "all that results without changes."[8] Rather, what is hinted on this level is a structure that Reich was either fully aware of before running his process, or sought after through running multiple C_0 units through the phasing machine. The same conclusion was made by Cohn in his study on *Phase Patterns* and *Violin Phase*, where he found that "the properties of the attack-point designs resulted from careful planning, requiring more than basic common sense on the part of the composer."[9]

Reich's hand guides the outcome of *Piano Phase* further in the overarching palindromic form outlined at the bottom of Table 3.1.[10] The reconstruction of each configuration on the other side of the fulcrum occurs when prime form bc-sets coincide for a second time. Note that each configuration's palindromic partner is the only one with a matching bc-set.

The palindromic form of the opening section in *Piano Phase* is a direct result of staggering the two melodic sonorities described earlier, and these sonorities display a palindromic form as well. As discussed earlier, the metric and tonal construction of the F♯-C♯

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[8] Reich, "Music as Gradual Process," 35.

[9] Cohn, "Transpositional Combination of Beat-Class Sets in Steve Reich's Phase Shifting Music," 164.

[10] Originally noted in Paul Epstein, "Pattern Structure and Process in Steve Reich's *Piano Phase*," *The Musical Quarterly* 72, no. 4 (1986), 494-502.

sonority in *Piano Phase* creates a pattern of cycling bc-sets that ascends from [048] to [014589] and [02468T], before retracing its path through [014589] to its starting point of [048]. With this cycle occurring every four configurations, F♯-C♯ defines itself as three palindromic units within the larger scale palindrome of the overall form. Further referencing Table 3.1, the E-B-D sonority creates another micro-palindromic structure which cycles through twice within the overarching form of this opening section (or every six configurations). Taken in totality, this abstract level of analysis shows that *Piano Phase* represents a work based on the nesting of palindromes, with a time ratio of 2:3:6. There is clearly a hidden structure in *Piano Phase* embodied by the multi-speed palindromes defined by the bc-sets in each configuration.

Section 3b: Hearing the Process

The idea of *Piano Phase* operating at three temporal levels should sound familiar since *Lux aeterna* was described similarly in the previous chapter. However, *Lux aeterna* showed variation on its three levels (vertical time in the moment, linear time in the middle-ground and moment time in the background), while the three temporal levels in *Piano Phase* are all in linear time (a palindrome is, after all, a teleological progression). The reason these palindromes are assigned to three temporal levels is because of their 2:3:6 relationship, which points to the quicker nature of the two micro-palindromes within the larger palindromic form. In other words, while the F♯-C♯ and E-B-D sonorities represent smaller gears within the phasing machine of *Piano Phase*, they are nonetheless still spinning gears, as is the overall process.

But this conclusion only takes the abstract analysis of *Piano Phase* into consideration. An initial hearing of the work informs the listener that the three palindromes operating at a 2:3:6

time ratio is one of the last things heard. Rather, a hearing of *Piano Phase* evokes the same sense of timelessness as in *Lux aeterna*.[11] The supposedly infinite loop of C_0 during the sixteen to twenty-six repeats at the opening of *Piano Phase* (twenty-six to forty-three seconds) establishes a familiar sense of normalizing the past, present and future into an eternal "now" moment. Recall that the typical "now" moment lasts two-point-four seconds, meaning the opening repetition of C_0 could contain up to seventeen "nows." Also, recall that a listener may accept the past, present and future as equal when presented with an unchanging stimulus for an extended period of time. These two factors evoked the sense of timelessness discussed in Chapter 2 and are applicable to the repeating configurations heard in *Piano Phase* as well.

Unsurprisingly, the extended mind arguments applied to *Lux aeterna* also apply to *Piano Phase*. Where one hears *Lux aeterna* holding the past in the present through temporal extension, one hears *Piano Phase* holding onto the past through concrete repetition. The listener does not need to remember how C_0 sounds while it is being repeated because it is held in auditory stasis. And while *Lux aeterna* and *Piano Phase* are clearly similar in this attribute, they are also clearly different. In *Lux aeterna*, it was the reintroduction of the paradoxical event that evoked a sense of the music retaining the past. There is nothing paradoxical about the opening of *Piano Phase*; it is simply an event stuck in a loop for a predetermined amount of time.

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[11] Although only the first section of *Piano Phase* is discussed here, it should be noted that *Piano Phase* contains two additional phasing processes. With these three sections defined, Reich has created a structure eerily similar to that of *Lux aeterna* on a temporal level. As in *Lux aeterna*, the listener may abandon the past and future to hear the present in a more core, timeless manner. Further, the overall structure of the work defines a sense of moment time with the three phasing entities defining three separated moments. Finally, the middle-ground teleological progression of *Lux aeterna* can be heard in *Piano Phase* through the audible palindrome discussed later in this section. Thus, *Piano Phase does* reflect the three temporal levels heard in *Lux aeterna*.

That said, the basic task at hand is still similar between *Lux aeterna* and *Piano Phase*: with the compositions holding the past in the present—thus hindering one's ability to predict and anticipate the future—both compositions are designed to force one's focus on what he is hearing in his core consciousness. And while *Piano Phase* clearly evokes this core sense of listening, the phasing machine begs the listener to assume another task that was merely optional in *Lux aeterna*: comparison. The act of comparison is evoked through the simple nature of the machine which pits a basic unit against itself or another similar unit. In exposing the phasing machine as the central dynamic behind *Piano Phase,* Reich defines the nature of this work as a focus on the attributes of and differences between its configurations. As Reich notes, this makes works such as *Piano Phase* "processes as opposed to compositions,"[12] and the process of phasing here solicits the listener to undertake the additional task of comparison, to hear outside the phasing machine, to hear its products.

Comparison, as it relates to phasing, can also be understood as the *exploration of potential*. For instance, if presented with a limited amount of resources (five pitches) and a defined space (twelve-beats), what could one create? This type of mental potential exploration and comparison is enacted in the game Tetris, where players are given shapes (or *zoids*) they need to fit into a preexisting structure. The goal of Tetris is to place a falling zoid into the given structure so that it creates a complete horizontal row, causing that row to disappear. To do this, the player can rotate the zoid or move it left, right or down. The challenge is that there are four types of zoids which fall at a faster rate as the structure grows taller (i.e., when the player is not able to complete enough horizontal rows) and the player becomes more pressed for time as he

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[12] Steve Reich, "Excerpts from an Interview in Art Forum," 33.

gets closer to the top of the screen. If the player's structure reaches the top of the screen, the game is over and he has to start from the beginning.

The traditionally brain-bound processes involved in playing Tetris seem fairly straightforward: the player will create a mental representation of the falling zoid, find where it fits best in the structure through mental projection and rotation, and finally calculate the moves needed to achieve this goal.[13] However, in studying players with varying degrees of skill level, David Kirsh and Paul Maglio noted that this process model was not enacted. Instead, the player references the zoid and structure in their plane of vision and *physically* rotates the zoid until it visually matches a hole in the structure. Kirsh and Maglio conclude that players adopt a more external version of processing the potential for each zoid because it creates a more efficient process. By processing the potential for each zoid externally, Kirsh and Maglio calculate that players spent about 300 milliseconds determining the potential use for each zoid, whereas exploring the same potential only "in the head" takes 800-1200 milliseconds.[14]

In a game like Tetris, where every second counts, shaving half-a-second off a process like exploring potential has clear benefits. However, Kirsh and Maglio also deduced side-benefits from using an epistemic process, or a "physical process that makes mental computation easier."[15] In addition to the reduction in time complexity (or the number of steps involved in mental computation), using external processes results in a reduction of brain-space complexity (or the amount of brain-bound memory used for processing) and a reduction in the dependence on one's

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[13] David Kirsh and Paul Maglio, "On Distinguishing Epistemic from Pragmatic Action," *Cognitive Science* 18, 519.

[14] Kirsh and Maglio, "On Distinguishing Epistemic from Pragmatic Action," 530-532.

[15] Kirsh and Maglio, "On Distinguishing Epistemic from Pragmatic Action," 513.

unreliable brain-bound memory system.[16] Not only is relying on external symbols more time efficient, it also reduces the amount of energy dedicated to memory and attention for task completion. These qualities line up perfectly with the extended mind theory of manipulating the external world to make cognitive processes less physically taxing.

Returning to *Piano Phase*, one hears a bit of Tetris within the phasing process. As the second performer moves more out of phase (and eventually back into phase) with the first performer, the listener is presented with a rotation of one object against the fixed background of another object (i.e., the first performer is the preexisting structure and the second performer is the zoid). The main difference between these two examples is the consistency of the materials: in Tetris, one is presented with the comparison of one of four different zoids being rotated against any given structure; in *Piano Phase*, one is presented with the comparison of a structure rotating against itself. This difference is not limiting, since the idea of internally (in the-head) rotating C_0 against itself to create the different configurations in *Piano Phase* is mind-numbingly complex, and probably impossible. As with Tetris, the external rotation of these objects is far easier than a brain-bound rotation, so the use of two performers to rotate the melodic unit makes the most sense (i.e., it is the most efficient way to explore the potential C_0 holds within its limited structure). In this way, *Piano Phase* explores potential configurations for the listener, leaving her to focus on what is occurring in the moment without the mental burden of rotating C_0 to complete the task of comparison solicited by the music.

An extended mind hearing of *Piano Phase* clearly centers on the process of comparison. For the purposes of this analysis, consider that you are asked to create the "best" twelve-beat musical segment you can using only C_0. With the basic twelve-beat unit in hand, you consider

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[16] Kirsh and Maglio, "On Distinguishing Epistemic from Pragmatic Action," 514.

your possibilities and decide setting C_0 against itself through phasing is the best way to create a more diverse musical segment. At this point, you might have two people perform the process of phasing C_0, since you recognize your mind's inability to realize the potential configurations relying solely on the processing power of the brain. In addition, the idea of limiting yourself to an abstract representation on paper does not suit your needs.[17] As the performers sound the phasing process and the music holds each configuration for close inspection through repeats, you might extend your mind to a piece of paper and take notes on what you hear so you can conclude which configuration creates the sound you desire without relying on your fickle memory. Thus, one starts the process of hearing *Piano Phase* with a clear goal in mind.[18]

With the repetition of C_0 initiated, the mind turns towards an aural analysis of the configurations being held in stasis. As the prime configuration repeats, one might notice an audible separation of two lines: one focused on E-F♯, and the other focused on B-C♯-D. This grouping, shown here in Example 3.5, reflects a Gestalt approach to perception. While the focus of Gestalt psychology is often placed on grouping objects in vision, Gestalt studies also allude to the cross-modal application of these visual rules to a sense of hearing, as outlined by Fred

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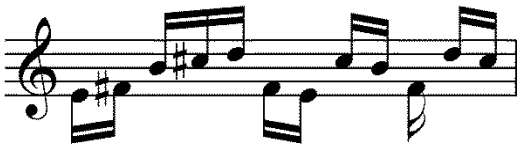
[17] One can imagine a modern composer could execute these processes differently due to technological advances since 1967. As Heinrich Taube shows, the phasing process in *Piano Phase* is easily defined in computer programming terms and an extension of the mind to a computer for phase simulation may be a more efficient use of time. Instead of writing out possible basic units to be phased, as well as executing their abstract realization on paper before finally hearing the resulting process, a computer program could carry out these tasks and inform the composer of any abstract outcomes from phasing any given basic unit. Further, the computer would be able to audibly perform the phasing of said unit upon request. Either way, the idea of phasing a single unit against itself is realized as an extended mental process carried out through physical or virtual manipulation. Heinrich Taube, *Notes from the Metalevel: Introduction to Algorithmic Music Composition* (New York: Taylor & Francis Group, 2004), 130-136.

[18] "Why" one would want to undertake this goal is discussed in section 3c.

Lehrdal and Ray Jackendoff.[19] For example, consider the shape in Figure 3.1. While viewing this shape, you will most likely see an unknown total pattern, and you might unconsciously use the principles of Gestalt psychology to decipher its basic structure. You may see three groups of shapes within the total pattern, with the first consisting of three heart-shaped entities, the second consisting of a single rabbit-head shape, and the final consisting of two more heart-shaped entities. In this case, you are applying the Gestalt principles of proximity (the three hearts at the front are closer together, so they must be a single unit), similarity (all of the shapes here resemble a heart in some way, so they must form an aggregate pattern) and simplicity as this perception of Figure 3.1 probably makes the most sense (again, efficiency rules the mind). Applying these Gestalt principles to C_0, one might note that the registral split previously mentioned occurs because one separates F♯ and B due to their lack of registral proximity, while simultaneously grouping F♯ with E and B with C♯ and D due to their heard proximal similarities. All said, this also represents the simplest explanation of what is heard in C_0.[20]

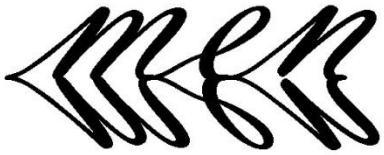
Example 3.5: Registral split of C_0.



[19] Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music*, 303-307.

[20] For instance, perceiving C_0 as an oscillation between two harmonies representing a micro-palindromic form (as outlined in section 3a) is much more complicated.

Figure 3.1: Unknown pattern.[21]



One hears the upper line in this registral split enacting a passing motion (B-C♯-D) followed by a double-neighbor motion around C♯.[22] The lower melody takes on a much simpler life, creating a trill between E and F♯. The only variation heard in this trill comes from the metrical locations of the F♯ in relation to the previous E. While E remains separated by six beats throughout C_0, F♯ occurs on either the subsequent beat, or the third beat of the trill pattern. Thus, the lower line defines its first and second halves as enacting a fast ascending trill, followed by an equal-measured trill.

However, there is another way to hear C_0 based on historical contexts. As shown in Figure 3.2, C_0 can also be heard as being "in" B minor.[23] This hearing creates a new grouping based on the historical implications of C_0 being in a given key. This is immediately noticeable in the metrical shift shown in Figure 3.2. With tonal implications in play, the initial B and its strong tonal resonance naturally defines the strongest downbeat in C_0, which did not have a theoretical downbeat in the registral split hearing. This heard downbeat is further emphasized by the salient V to I motion from F♯ to B. The tonal hearing maintains the presence of the opening B-C♯-D

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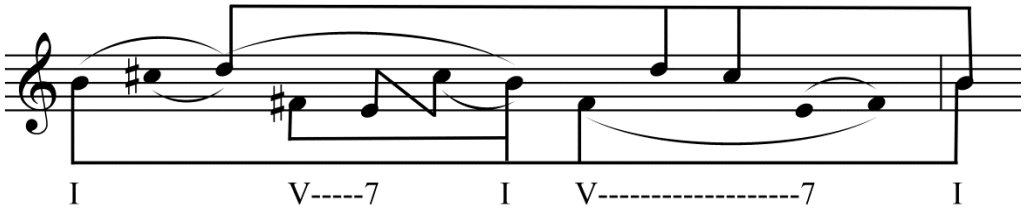
[21] Based on Figure 6 in Wolfgang Köhler, *The Task of Gestalt Psychology* (Princeton, New Jersey: Princeton University Press, 1969), 52.

[22] Chances are the B-C♯-D motion will be heard as the "beginning" of this melody since it was the first heard part of the upper melody, even though there is technically not a downbeat during the repeat of C_0.

[23] Reich thought of *Piano Phase* as in B minor. Steve Reich, "Early Works (1965-1968)," in *Writings on Music 1965-2000*, ed. Paul Hillier (Oxford: Oxford University Press, 2002), 24.

passing motion from the reistral hearing, but other aspects of C_0 become distorted. The upper melody is now heard as a three-progression with an inner descent, while the lower voice is no longer heard in isolation, but rather, as ultimately "leading to" the upper line. The melodic implications of this hearing further emphasize the original B as the main note in this progression, as both upper and lower lines drive to this point. C_0 is given a focal point in the tonal hearing where the registral split did not offer one.

Figure 3.2: Tonal reconstruction of C_0.



But this tonal hearing could be a moot point as its aural conception seems far-fetched. In fact, while this tonal grouping makes sense in the abstract, the only true implication of this grouping is the F♯ to B ($\hat{5}$-$\hat{1}$) motion. This is because, as Wolfgang Köhler would say, one's "enormous experience" with tonality would not come into play while perceiving this clearly non-traditionally tonal work.[24] We can perceive a visual facsimile of this argument by noticing the historical structure within Figure 3.1: the word "men" and its reflection. While this historical perception of Figure 3.1 is technically more valid than the Gestalt perception outlined earlier, this perception most likely did not materialize until it was pointed out. This is because one's "enormous experience" with letters does not play a role while perceiving Figure 3.1 removed from any context. Simply put, it is simpler to naïvely perceive the Gestalt groupings in Figure

[24] Wolfgang Köhler, *Gestalt Psychology* (New York: Liveright Publishing, 1947), 195.

3.1 than to somehow intuit that letters and their historical context play any role. The same can be argued for *Piano Phase* and the historical context of tonality.

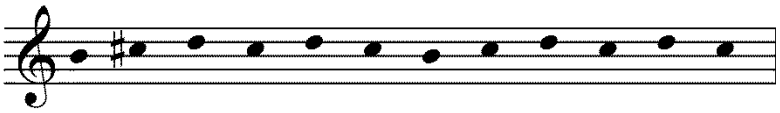
However, now that the word "men" has been realized within Figure 3.1, you can most likely perceive it with ease (if you are able to stop perceiving it in the first place). Again, this can translate to the audible as tonal aspects of C_0 can be entertained as well, giving audible validity to the abstract theory. However, aside from the strong F♯-B motion, the tonal aspects of C_0 are not as well defined as the semantic aspects of Figure 3.1. As one hears C_0, the $\hat{5}$-$\hat{1}$ motion remains prominent, with a metrical downbeat defined on the initial B. Outside of this motion, the listener is more likely to switch to the more Gestalt hearing defined by the registral split by changing his focus. Again, Figure 3.1 visually represents this as one can focus on the upper-middle section of the Figure to perceive the word "men," while focusing on the middle-left section will reveal the Gestalt groupings originally discussed. In audibly exploring C_0, one switches back and forth between hearing the contested F♯ as either part of the lower registral melody or part of a cadential motion.

Eventually the stasis of C_0 gives way to the fuzzy transition between C_0 and C_1. For the purposes of this study, these transitions will not be discussed in detail as they do not add to the task of hearing the best configuration possible. However, it should be noted that one perceives a sense of disorientation during these transitions that subsides once the performers sync up again. In the case of the transition from C_0, the arrival of C_1 defines an aural landscape that is only slightly more stable than the previously heard transition. C_1 is where the clear echo between the two voices offset by only one beat is heard. This echo holds a vestige of disorientation from the transition, but hearing this echo as an echo (not as a fuzzy transition) alludes to the prominence of the registral split melodic motions in C_1. These motions are heard being stretched out over an

additional beat as the second performer plays a beat ahead of the first. Yet the stability of the configuration belies the activeness of the "stretching-out." Thus, C_1 presents the listener with an audible mix of instability and control; transition and melody.

After another transition, the two-beat offset structure of C_2 brings a truncated version of the originally inaudible tonal melody to the forefront of perception. As seen in Example 3.6, the upper melody in C_2 highlights a rising passing motion from B to D, followed by a complete lower neighbor-note and ending with a downwards passing motion in the upper line before repeating this six-beat pattern. This line is almost identical to the tonal melody outlined in Figure 3.2, with the only change being the obvious time difference (twelve-to-six beats) and the lack of an internal return to B (instead, B emphasizes the first D as a dyad). Note that a truncated version of the lower Gestalt line from C_0 is also heard in C_2 as a quick ascent to F♯ marks a four-beat elongated trill followed by a quick beat-by-beat trill figure. All told, C_2 is heard as a diminution of C_0 with a double-time feel.[25]

Example 3.6: Upper melody in C_2 in *Piano Phase*.

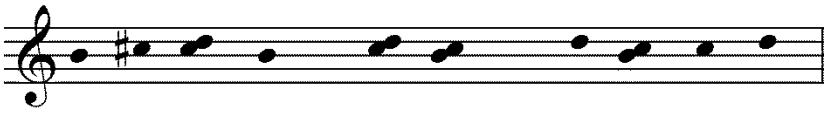


C_3 reflects its abstract pitch dyad and beat-class set relationships with C_1 (see Table 3.1) by creating another configuration where melodic vestiges and disorienting figures merge. With the upper melody shown here in Example 3.7, C_3 appears to contain the familiar B-C♯-D passing motion, but the simultaneous presence of D and C♯ casts a discordant overtone onto the resolution of this motion. Further, the previously defined upper line is vacated for a jump to B,

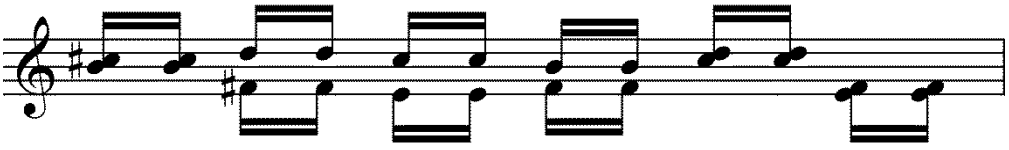
[25] It should be noted that any tonal harmonic implications are not heard at this point (or anywhere) other than the F♯ to B motion in C_0.

followed by silence, and eventually settling on consecutive dissonant dyads. The trilling E to F♯ motion is also obscured by dyads in the lower melody as one hears C_3 as a much different character than C_0 or C_2. In fact, all the odd configurations are a bit (sorry to say) odd. As shown in Example 3.8, C_5 demonstrates another version of this odd quality as repeating dyads hop across the aural tableau. This configuration has almost no audible relationship with C_0, aside from using the same pitches, and this lack of connection subsequently punctuates an overall move away from the registral split melodic motions in C_0 through the odd configurations. In C_1, one hears the echoed visage of C_0, which is replaced by the mutated hearing of C_3, and eventually becomes the unrecognizable aural landscape of C_5. The odd configurations in *Piano Phase* define an aural palindrome of moving "away from" and "back towards" C_0 as they move from C_1 to C_5, only to repeat the trip from C_7 (the palindromic partner of C_5) to C_{11} (the palindromic partner of C_1).

Example 3.7: Upper melody in C_3 in *Piano Phase*.[26]



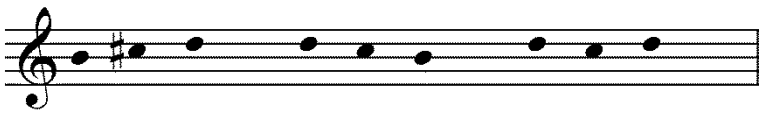
Example 3.8: C_5 in *Piano Phase*.



[26] All of the following examples will be metrically reoriented to mark the salience of the B-C♯-D passing motion.

A palindromic relationship is heard in the even configurations as well, only it is executed in a different manner. Instead of working to create an aural *de*construction of the inaudible tonal motive in C_0, as the odd configurations do with the registral split melody, the even configurations work to create an aural *re*construction of this figure. In C_2, one hears the truncation of this melody into a more economical six-beat segment, and C_4 follows with a reorganization of the basic components in C_2. Shown here in Example 3.9, the upper melody in C_4 contains the three components heard in C_2—the ascending passing motion, the lower neighbor-note, and the descending passing motion—but the progression is altered as the components are stretched across the entire twelve-beat unit (as in C_0). Instead of hearing an ascent, followed by a lower neighbor and closing with a descent, one hears an ascent followed by a descent, with the lower neighbor motion hanging by itself outside the other aural phenomena. The quick ascent of the trill at the beginning of C_0 and C_2 is also replaced by a two-beat delay of F♯ in the lower line, which still outlines three upper neighbor motions. All said, the clear melodic motions in C_0 and C_2 are undoubtedly heard in C_4, the elements have just been rearranged.

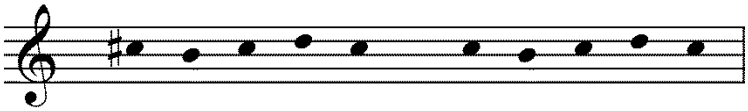
Example 3.9: Upper melody in C_4 in *Piano Phase*.



The fulcrum of the palindrome (C_6) fulfills its promise of completely rescripting the narrative of these motions. As with C_2, C_6 presents a six-beat repeating pattern, but the emphasized notes have shifted here. As shown in Example 3.10, the upper melody in C_6 still outlines simple three-note melodic motions, but the prominent passing motions in C_0, C_2 and C_4 have been abandoned for neighbor-note motions. Further, the accented pitch has switched from B or D in the opening even configurations to C♯ in C_6, highlighting a clear shift in tonal focus.

This change is underlined in the lower line as well, where the previously reliant F♯ becomes the focal point of a steady eighth-note pattern. This shift highlights a global audible palindrome in *Piano Phase* (as opposed to the inaudible palindrome discussed in the previous section). This also defines the last audible configuration.

Example 3.10: Upper melody in C_6 in *Piano Phase*.



Section 3c: Enacting the Process

With the seven configurations in hand, one is able to decide which twelve-beat configuration she enjoys the most (recall this is the task being pursued). Is it the echoes of C_1? The double-time of C_2? The mutation of C_3? Regardless of preference, it is not off-base to assume one prefers certain configurations in *Piano Phase* over others. Hypothetically, this preference might lead one to abandon the disorienting transitions in *Piano Phase*—possibly by editing a recording or live performance—to focus on the configurations as the main audible aspect of the phasing machine. Further, one might discard configurations she does not find audibly desirable to create a version of *Piano Phase* that is more aesthetically pleasing in her opinion. The resulting manipulated composition represents the completion of the listening task discussed here, and this extended mind approach ultimately defines the original version of *Piano Phase* as nothing more than a process towards an end.

At this point, the question of "why" one might pursue the task of comparison in *Piano Phase* should be answered, but the reality of this task may still seem murky. Again, one might

ask "why" one would want to create a *new work* out of the potential from *Piano Phase*. But this is precisely what happens in reality. This work initiates a global compositional process, one in which Reich builds upon *Piano Phase* and future compositions to create *Music for Eighteen Musicians* (1976): "the culmination of Reich's achievements in the works composed between 1965 and 1976. A summation of a decade's efforts..." [27] Reich's global process involves using compositions to explore the musical potential stemming from setting a basic unit against itself or similar units. The end goal of this process is the creation of a comprehensive musical composition that reflects what he learned and desired from earlier experiments/compositions. The way Reich enacted this process is through extended mental experimentation in the works leading up to *Music for Eighteen Musicians,* most of which might not be considered "compositions" at all. Recall that Reich himself called his early phase pieces "processes as opposed to compositions."[28] Similarly, I am arguing that these works should not be heard as compositions, but rather, as extended mental processes that Reich decided to publicly execute instead of enacting inside his head.[29]

Keith Potter pursues a similar argument. As previously quoted, Potter describes *Music for Eighteen Musicians* as a "culmination" of Reich's earlier compositions, specifically noting several technical and structural processes that carry over from Reich's earlier works. There is a difference between what Potter argues and what I am arguing here, though. It is clear that works

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[27] Keith Potter, *Four Musical Minimalists: La Monte Young, Terry Riley, Steve Reich, Philip Glass* (New York: Cambridge University Press, 2000), 231.

[28] Steve Reich, "Excerpts from an Interview in Art Forum," 33.

[29] Subsequently, by extending his mind to these works and making his mental musings publicly available, one is able to access and share in Reich's traditionally brain-bound compositional process, thus making it "ours" as much as "his."

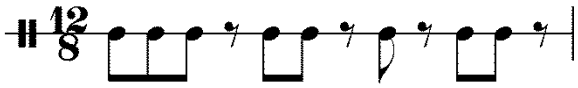
such as *Piano Phase* are still considered complete musical compositions to Potter (and, most likely, to anyone else who discusses this piece), but I maintain that an understanding of *Piano Phase* as nothing more than a process within a process (i.e., not an end in itself) is equally valid and perhaps even more productive. In other words, we might hear each work as having a specific task in mind (comparison), one accomplished through a mimesis of previously brain-bound potential exploration enacted through the phasing machine. To read Reich's compositional trajectory this way is to allow the listener to be an active force in the immediate comparison process of *Piano Phase* and similar works, while simultaneously enacting the global compositional process that branches out from these earlier works.

Thus, this understanding of *Piano Phase* ties it directly to subsequent works not because they were "composed by Reich," but because they can all be considered one continuous stream of thought terminating with the completion of *Music for Eighteen Musicians*. The structure of this thought process reflects the listening task just effected on *Piano Phase*. With the construction of the audible phasing machine, one explores the abstract potential of a given basic unit by ignoring the transitions and focusing perceptions on the configurations themselves. After this stage, one chooses which configurations one wants to keep (maybe only the even configurations) and manipulates their order to create a desired narrative (in this case, *Piano Phase* comes preloaded with the narrative of rearranging the dual melodic motions defined in C_0).

This process of comparison and cropping is realized in the actual works of Reich. For instance, Reich discards the "fuzzy transitions" of *Piano Phase* in *Clapping Music* (1972) by

adopting a process where the second performer simply "jump[s] from 'notch' to 'notch.'"[30] The resulting process, whose basic unit is shown here in Example 3.11, still carries out the *idea* of the phasing process, while discarding the time-consuming aesthetics of transitioning from one configuration to the next. *Clapping Music* represents a change in the design of the phasing machine. Where the machine was originally configured to slowly accelerate some gears until they were exactly one beat out of phase, the new model shifts gears from one configuration to the next. We can experience an analogy to this process in the difference between a continuously variable transmission, which smoothly accelerates without shifting gears, and a more traditional multi-speed gearbox.

Example 3.11: *Clapping Music*.



The mechanism in *Clapping Music* represents a new aesthetic in the phasing machine as transitions are discarded and the configurations themselves are highlighted as the most important component of phasing. This is a clear move away from Reich's desire to expose the process behind the composition, as the phasing process is subverted here for aesthetic reasons. *Clapping Music* thus reflects the first step of the global compositional process by focusing the listener on the configurations phasing begets rather than the process of phasing itself.

With *Clapping Music* defined as the act of exposing the greater aesthetic appeal within musical phasing, Reich's *Six Pianos* (1973) can be understood as an incarnation of manipulating a process to reflect one's personal preference (the second stage in the global compositional process). While it is true that *Six Pianos* is not considered one of Reich's "phase" works (he

[30] Potter, *Four Musical Minimalists*, 225.

purportedly abandoned the process of phasing after *Clapping Music*),[31] the phenomenological experience provided by *Six Pianos* is a "composing out" of the phasing process, or another aesthetic adaption to the phasing machine. As with *Piano Phase* and *Clapping Music*, each section in *Six Pianos* opens with a basic unit presented by itself and held in stasis through six-to-ten repeats. Thus, the opening of *Six Pianos* aligns itself phenomenologically with the aesthetics defined in *Piano Phase* and *Clapping Music*. Further underlining the aesthetics of the phasing machine in this work, every section in *Six Pianos* closes with an offset of the basic unit set against itself. In other words, the opening and closing of each section in *Six Pianos* function as did the "notches" defined in *Clapping Music*, where the absence of the phase shift made for a greater efficiency in comparison.

However, the abrupt jump from "notch to notch" in *Clapping Music* is replaced in *Six Pianos* by the "process of substituting beats for rests."[32] As shown in Example 3.12, this process is enacted by introducing a single note from the offset performers during each consecutive figure until the entire offset unit is audible (i.e., the offset performers are the equivalent of the second performer in *Piano Phase*).[33] So while *Six Pianos* remains based on the act of phasing that is so audible in *Piano Phase* and *Clapping Music*, a markedly different phenomenological experience is developed. Instead of hearing a unit set against itself and allowing certain melodic motions to naturally come to the forefront through Gestalt grouping principals, the listener is presented with

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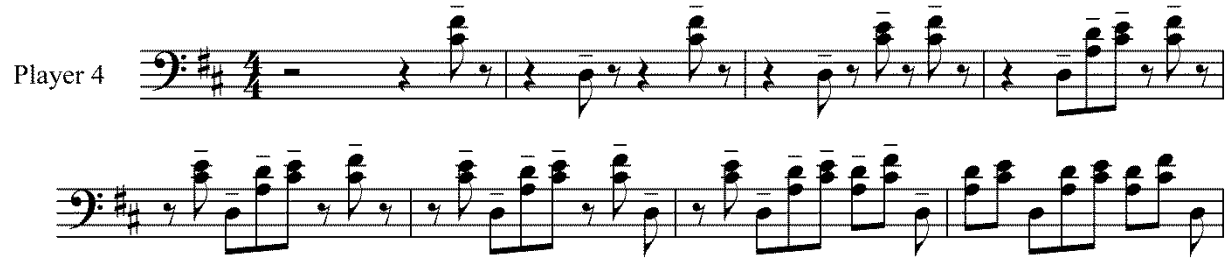
[31] Steve Reich, "*Clapping Music* (1972)" in *Writings on Music 1965-2000*, ed. Paul Hillier (Oxford: Oxford University Press, 2002), 68.

[32] Steve Reich, "*Six Pianos* (1973)" in *Writings on Music 1965-2000*, ed. Paul Hillier (Oxford: Oxford University Press, 2002), 73.

[33] Drawing from the context of creating a macro compositional process, the process of rest substitution was originally implemented in *Drumming* (1971).

an interpolation of forced accents on certain beat-classes, which impose a preferred hearing of the offset unit. For instance, with the way the offset unit is introduced in figures 1-9, the listener will undoubtedly hear a prominent passing motion from D_4 through $F\sharp_4$ during figure 5. However, this motion will be quickly replaced by a lower-neighbor motion from E_4, followed by a hanging upper-neighbor motion to $F\sharp_4$ in figures 6 and 7. This perceived motion continues to be consciously transmuted by Reich's choice of beat substitution until the full offset unit is in place at figure 9. At this point, the next "notch" is heard. From this standpoint, the notches at the beginning and end of each section act as the pillars of phasing defined by *Clapping Music*, with the intermediate substitution process heard as ornamentation on this more fundamental movement. As one can trace counterpoint being ornamented in a tonal work, one hears here a slowing down and elaboration.

Example 3.12: Figures 2-9 in *Six Pianos*.



Returning to the global compositional process, the substitution heard in *Six Pianos* and its subsequent imposed hearing reflect the idea of Reich's personal preference coming to the forefront of the heard music. As previously noted, the melodic lines in the offset unit no longer appear of their own accord; they are unequivocally placed before the listener's ears. Reich's personal preference is further reflected in the unique narrative of the offset configurations. The initial phasing of the basic unit is offset by six beats rather than one, exposing the use of desired

configurations as opposed to trusting the output of the phasing machine. Why Reich chose to use C_6 here instead of C_1 can be understood by shifting the focus from the melodic to the harmonic.

In a manner similar to how *Piano Phase* constructs a multifaceted aural world from limited pitch materials, *Six Pianos* constructs a new soundscape from a limited number of sonorities. Referencing the score, the prime configuration in *Six Pianos* is constructed from four different sonorities on eight beat-classes: beat-classes 0 and 5 are B minor triads; beat-classes 1, 3 and 6 are E minor seventh chords with an added fourth; beat-classes 2 and 7 are F♯ minor seventh chords; and beat-class 4 is a stacking of perfect fifths from B to C♯. For the purposes of clarity, we will reassign these chords as A (B minor triad), B (E minor seventh), C (F♯ minor seventh) and D (B-F♯-C♯). With these labels defined, the prime configuration has a progression of ABC-BD-ABC.

As with *Piano Phase*, though, the metrical emphasis in the basic unit does not coincide with the traditional metrical definitions of the barline. With the opening held for the listener through repeats, a natural grouping arises where beat-class 5 is heard as the phenomenological downbeat of the basic unit. Following Gestalt grouping principles, this metrical emphasis arises because of the simpler pattern of sonorities (ABC-ABC-BD) starting from beat-class 5, where the two groups of ABC are heard as a repeat before, rather than being separated by, BD. With the basic unit always present, this pattern defines the meter in *Six Pianos* as 3+3+2, as opposed to the common-time meter shown.[34]

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[34] As with *Piano Phase*, *Six Pianos* has three different basic units, but all three reflect this 3+3+2 metrical structure.

This 3+3+2 metrical structure can be considered a defining feature of *Six Pianos*, just as the B-C♯-D passing motion was a prominent feature in *Piano Phase*. For instance, one can see that C_6 (figure 9) constructs a 3+3+2 structure starting on beat-class 5 with new sonorities: beat-classes 0 and 5 are B minor seventh chords; beat-classes 1 and 6 are tone clusters (G→F♯ and G→E respectively); beat-classes 2 and 7 are D major seventh chords with an added ninth; beat-class 3 is a an E minor seventh chord; and beat-class 4 is a stacking of perfect fifths from E to C♯. As with the previous chords, these are assigned as E (B minor seventh), F (octave cluster) and G (D major ninth), with the E minor seventh already defined as B and a staking of fifths already defined as D.[35] With these chords defined, C_6 outlines a EFG-EFG-BD progression starting from beat-class 5.

Not surprisingly, this metrical relationship between C_0 and C_6 is not unique. Table 3.2 shows a matrix illustrating the different progressions that arise through each offset configuration in *Six Pianos*. As previously noted, the basic unit Reich incorporates only creates a limited number of sonorities: eight total to fill in sixty-four potential slots.[36] This outcome can easily be understood as Reich once again rigging the process of phasing by using a progression that naturally synchronizes with itself. That said, four of the seven offset configurations reflect the 3+3+2 metrical structure heard in the basic unit: C_1, C_2, C_6 and C_7, with these configurations highlighted by asterisks.

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[35] The two clusters are labeled together since it is unlikely that someone will hear the difference between a full octave cluster from G to F♯ and a cluster of a sixth between G and E. The same logic applies to the stacking of fifths since this would be heard as a quintile harmony either way, as opposed to two different sonorities.

[36] A fifth cluster is either a cluster from B to F♯ or a sonority containing B, C♯, E and F♯, which would be heard as similar (see footnote 214).

Table 3.2: Possible configurations of the basic units in *Six Pianos*.[37]

Beats→ Offset↓	**5-7**	**0-2**	**3-4**
0*	ABC	ABC	BD
1*	EFG	EFG	FH
2*	HBC	HBC	BH
3	ABC	EFG	BD
4	EFG	HBG	FH
5	HBC	ABC	BH
6*	EFG	EFG	BD
7*	HBG	HBG	FH

	Sonorities
A	B minor triad
B	E minor seventh
C	F♯ minor seventh
D	Stacking of fifths
E	B minor seventh
F	Octave cluster
G	D major ninth
H	Fifth cluster

Switching to a more global view of *Six Pianos*, and ignoring the substitution process used to assimilate each new configuration for the moment, the opening notch is heard as C_0, while the next notch is clearly C_6 at figure 9. After C_6 is heard, it is pushed aside, and another substitution process starts anew. As previously noted, this substitution process also starts with C_0, but the listener hears C_0 as more of a background than a primary unit at this point. In other words, the start of a new phasing process is heard more as a *lack* of an offset unit rather than the foreground presence of the basic unit; a true resolution to C_0 is not heard after C_6 is removed since C_0 has

[37] All three basic units show this same relationship only with different sonorities.

become the background metrical grid against which one hears movement. As active listeners, we attach ourselves to the movement, not the grid.

The next notch in *Six Pianos* is C_2. As shown in Table 3.2, C_2 reflects the 3+3+2 metrical structure heard in C_0 with a progression of HBC-HBC-BH. Moving from C_6 to C_2, a clear preference for configurations containing this 3+3+2 metrical is heard as a narrative starts to develop. Starting with the opening C_0, C_6 is created by a movement two beats to the right. In other words, if all the lines were looped spatially, players four and five would shift two beats to the right to create C_6. As a possible play of physics, this movement is counteracted by an equal movement in the opposite direction to C_2, offset two beats to the left of C_0.

Following this physical movement, and Reich's preference for the 3+3+2 metrical structure, the next notch in *Six Pianos* is at C_7, one beat offset to the right of C_0. Thus, one hears a movement started as a band pulled two beats in one direction, only to snap back two beats in the opposite direction and subsequently dissipate to only one beat offset in the original direction. Unsurprisingly, once C_7 is removed from the aural structure, the band reacts in an opposite way and swings to C_1. Overall, this abstract movement represents C_0 as a grounded focal point to which the configurations are tethered, with movement away from C_0 counteracted by movement in the opposite direction, and dissipation being defined as natural resistance. This understanding of the movement from notch to notch in *Six Pianos* allows the prediction that the work would end at a state of equilibrium on C_0.

This abstract pattern is also heard in the music. As with *Piano Phase,* one can hear a "coming towards" taking place. By opening with a repetition of the equilibrium defining C_0, the 3+3+2 metrical structure comes to the forefront of the listener's mind. Following this with C_6 further reifies the idea of this metrical structure being an important aspect of the music, and the

arrival of C_2 (the closest configuration to C_0 with five shared sonorities and a 3+3+2 structure) drives the point home: one is hearing a prime configuration set against its closest offset configurations. And while the move to C_7 and C_1 can be heard as "further" from C_0 in context, recall it is the disorienting echo of $C_{1/11}$ in *Piano Phase* that marks a move away from and subsequently back towards $C_{0/12}$. Thus, with the clear 3+3+2 structure maintained alongside the audible grating of sonorities in C_1 and C_7, a similar arrival at $C_{0/8}$ can be predicted in the context of *Six Pianos*. Simply put, all of these moves reveal Reich's intent to draw the listener towards the equilibrium of the basic unit.

With one offset unit left, though, the listener perceives a split resolution between union and separation, as the final basic unit is set against C_4. Similar to the fulcrum in *Piano Phase*, C_4 can be understood as the configuration "furthest away" from C_0, both audibly and in the abstract. Not only does C_4 not reflect the 3+3+2 structure that has been prominent to this point, it shares only one chord with the basic unit, marking it as the configuration most unlike C_0.[38] The reason this creates such a troubled resolution is not solely because C_4 is so far removed from C_0, though. As with the other configurations in *Six Pianos*, C_4 is introduced through the process of substituting beats for rests, which means C_0 is heard by itself before the listener is aware that another configuration will be infilled. Unlike the other arrivals at C_0, this arrival marks a moment both abstract and audible for potential resolution. When C_0 is left unadorned after C_1 is removed, the listener and analyst realistically expect this to be a point of resolution. However, the substitution of C_4 slowly undercuts this supposed equilibrium.

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[38] Referring back to Table 3.2, we can see that C_3 and C_5 also do not reflect the 3+3+2 structure, but share five and six sonorities with C_0 respectively.

To better understand the true discord of this passage, one must return to more local concerns, and consider the phenomenological impact of the substitution process used in *Six Pianos*. Recall that one beat is substituted for a rest in each figure of *Six Pianos* while transitioning to a new notch. What is heard is a fundamental change in how the phasing machine transitions from one configuration to the next, as transitions are once again readily audible. But the accelerating and slowing gears of *Piano Phase* are replaced by the process of adding new pieces on top of the original ones. In other words, instead of hearing a slow move to the next configuration and aurally perceiving this shift, sonorities are covered by a new sonority, audibly assembling the new offset configuration part by part.

Referring back to Example 3.12, this substitution process creates a narrative of its own within each configuration. With the introduction of a new sonority on beat-class 6 of figure 2, the progression of C_0 is adapted from ABC-ABC-BD to AFC-ABC-BD. The subsequent addition of beat-class 2 from C_6 alters the progression to AFC-ABG-BD and the prominent 3+3+2 metrical structure is no longer heard. At this moment, the listener may question the global concept behind *Six Pianos*. The addition of beat-classes 4 and 3 do little to assuage this feeling in figures 5 and 6, as they simply repeat the 2-progression of BD at the end of the metrical structure. However, the substitution of beat-class 1 in figure 6 creates the progression AFC-AFG-BD, and parts of the 3+3+2 structure start to show through again. The subsequent substitution of beat-class 7 builds on this intuition as the progression AFG-AFG-BD is created, showing a clear 3+3+2 structure. The introduction of beat-classes 5 and 0 in the following figures further guide the return to the 3+3+2 structure, and a local narrative of moving away from and coming back towards a known point of equilibrium is heard. As C_6 starts to overlay itself on C_0, a muddying of the 3+3+2 structure is prominent. However, as more parts of C_6 are added, the 3+3+2 structure becomes

more audible, with the full realization of this structure coming to the forefront as C_6 sinks into the background structure in figure 9.

All of the configurations that reflect the 3+3+2 structure go through a similar process of muddying and cleansing. However, the substitution of C_4 has a different affect. As previously mentioned, the initial return to C_0 in the final section takes on a different phenomenological meaning as an expected resolution both audible and abstract to the equilibrium. Referencing outside theoretical terms, this is considered the Essential Structural Closure of *Six Pianos*. However, as with many sonatas, this is not the end of the piece and the substitution of C_4 represents a type of coda. As with the other offset configurations, the substitution of C_4 initially breaks apart the audibility of the 3+3+2 metric structure. But as C_4 starts to come into focus, the reemergence of the 3+3+2 structure is not heard. Rather, C_4 works to create chaos within the perceived meter of *Six Pianos*. Thus, Reich uses the coda to expose phasing's inherent chaos, rather than the confirmation of an equilibrium foreshadowed throughout the work.

In sum, *Six Pianos* defines itself as the most "composition-like" work by Reich covered to this point. Recall that *Piano Phase* is touted as nothing more than the phasing machine executing its program with no composer interference (though the process was rigged from the start). Along the same line, *Clapping Music* can be understood as a modification to the phasing machine where the transitions have been audibly removed, confirming the structural notches as the most aesthetically pleasing aspect of phasing. However, the machine itself is still audible in *Clapping Music*, as the jumps from notch to notch clearly highlight the phasing of the basic unit against itself. In addition to this, *Clapping Music* maintains the supposed unaltered presentation of progressing through successive configurations, the most prominent feature of *Piano Phase*. This stance is forgone in *Six Pianos*, as the phasing machine recedes into the background.

Instead of hearing the gears at work, Reich masks the basic mechanism of phasing through his substitution process, which becomes an aesthetic façade for the machine. Of course, the basic function of phasing is still present. The machine continues with its *modus operandi*. But something more pleasing is heard as Reich obscures the compositional process. While *Six Pianos* is clearly an expansion of the phasing machine, the process of phasing is not audibly marked. Reich's alteration sets a new aesthetic baseline.

Section 3d: Completing the Process

Music for Eighteen Musicians takes the global compositional process discussed here to its natural conclusion by ornamenting the façade of the phasing machine almost beyond recognition. In fact, if one were to hear *Music for Eighteen Musicians* in isolation, the idea of phasing might never come to mind. Previously we heard *Piano Phase* exposing the bare compositional process to the listener. There are no dynamics in *Piano Phase* to distract the listener from the basic machine; the work is a simple process with no basis in music-historical constructs. *Music for Eighteen Musicians* sheds this skin and introduces dynamics that serve "an expressive, as well as structural, role."[39] In fact, the opening sections of *Music for Eighteen Musicians* easily differentiates this composition from the other works discussed here by grounding motions in natural breathing. Set against the mechanical hammering of the pianos and marimbas, one hears voices with repeating notes fading in and out in the opening thirty seconds. Once the voices begin to fade out, one hears bass clarinets coming to the forefront of the structure, which themselves subsequently fade out for the entrance of the violoncello. All said, the opening eight

[39] Potter, *Four Musical Minimalists*, 233.

figures in *Music for Eighteen Musicians* (anywhere between twenty and forty-eight seconds) expresses a more traditional musical aesthetic than the three previous works, as voices and instruments move in and out of the aural structure rather than being permanently placed before the listener. And while this is not a remarkable affect in the history of music, for Reich it is an overt move away from the unadorned phasing machine.

Further disassociating itself from the phasing machine, *Music for Eighteen Musicians* is composed as a twentieth-century organum, with the eleven chords shown in Example 3.13 acting as a cantus. This cantus is heard at the beginning and the end of the work, with short pieces being composed out from each chord during the intermediate sections (following the guidelines of a traditional organum).[40] This marks another clear move away from the idea of the exposed phasing machine as Reich conceives *Music for Eighteen Musicians* within the context of a music history: something alien to the a-historicism of *Piano Phase*. Again, the latter does not evoke strong tonal relationships, and the exposed phasing process almost defines itself as something other than music (i.e., there is nothing inherently musical about phasing). What is heard in *Piano Phase* is the act of comparison, rather than the workings of a traditional musical line. However, in *Music for Eighteen Musicians,* one hears organized pitches with a clear musical structure grounded in a historical context. *Music for Eighteen Musicians* is more likely to be considered a musical composition, whereas *Piano Phase* constitutes something less refined.

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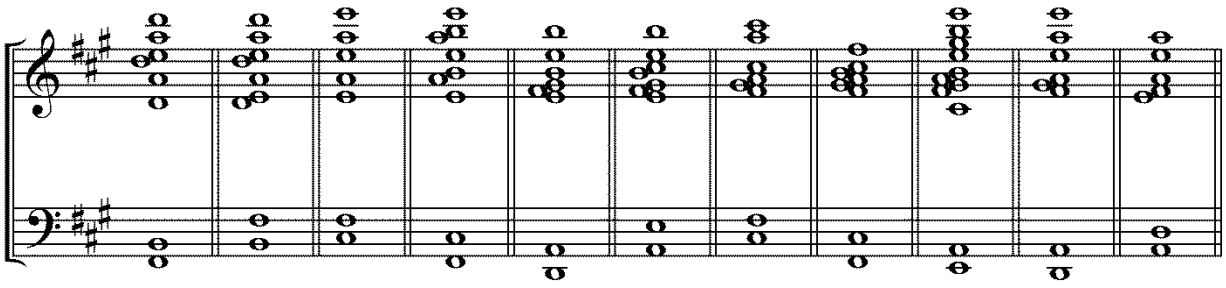
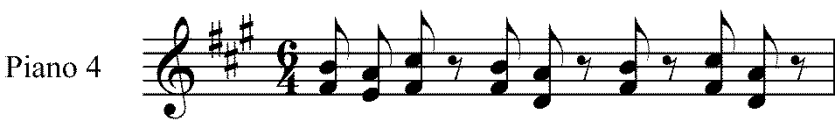
[40] The third chord has two small pieces built from it.

Example 3.13: *Cantus* from *Music for Eighteen Musicians*.



That said, the hammering of the machine is still audible in *Music for Eighteen Musicians*. Only the function of phasing has been obscured. For instance, the hammering of the marimbas and pianos heard at the opening constitute a clear allusion to the mechanism. The first and second marimba and first and second piano lines also display a machine-like quality at the opening of the small work based on the second chord in the cantus. These lines repeatedly attack the second chord on steady eighth-notes. Interestingly, the supposedly more independent third marimba and fourth piano (shown here in Example 3.14) take on this machine-like quality as well. In context, the listener has heard the third marimba performing this rhythmic pattern since figure 97 (around four minutes before the start of this small work), with the fourth piano joining the marimba shortly thereafter. With this in mind, the totality of the marimbas and pianos creates a background metric structure, giving the sense of the basic unit of the machine (as previously discussed with *Six Pianos*).

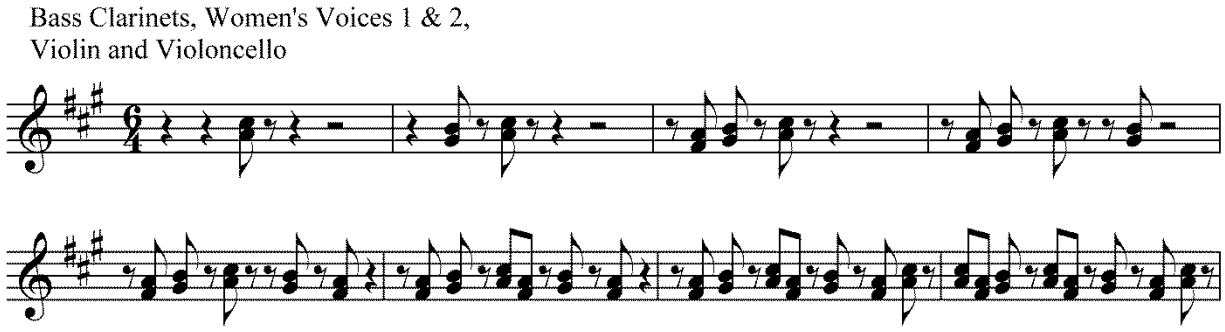
Example 3.14: *Music for Eighteen Musicians*, figure 166.



As previously stated, though, one does not hear this background machine as engaged in executing a phasing process, the *modus operandi* of *Piano Phase* and *Clapping Music*. Despite the rhythm in the third marimba and fourth piano re-executing the rhythmic structure in *Clapping Music* (see Example 3.11), the consistent eighth-note presence of the second chord in the remaining parts leaves the listener without a fundamental layer to be phased. While it is true that the basic unit in the third marimba and fourth piano *could* be phased against itself, the more basic rhythm at work here has no such possibility, as phasing of the steady chord on eighth-notes would result in the same structure every time. The most audible unit in *Music for Eighteen Musicians* does not define itself as something to be phased; rather, it defines itself as something on which to build.

The introduction of the two bass clarinets, first and second voices, violin and violoncello in figures 168-175 further reinforce the idea that one is hearing a machine to be built upon rather than phased. As shown in Example 3.15, these musicians mimic the substitution process heard in *Six Pianos*, but the configuration they introduce is not offset. Rather, they introduce a tonal variation of the sounding line in the fourth piano, while still aligning themselves metrically with the basic unit heard here and in the third marimba. With this metrical alignment, the newly introduced musicians present themselves as an augmentation of an already sounding structure rather than as an instance of setting the structure against itself.

Example 3.15: *Music for Eighteen Musicians*, figures 168-175.



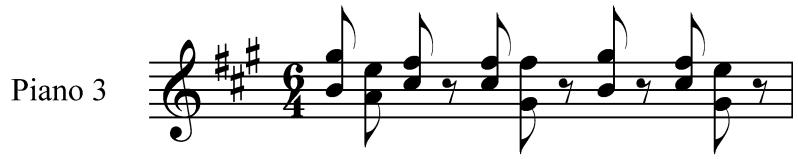
This aesthetic recalls that heard in *Six Pianos*, where completed offset configurations do not create new patterns of accents as they did in *Piano Phase* and *Clapping Music*. In *Six Pianos* and *Music for Eighteen Musicians*, the offset configurations highlight what is already present through an enrichment of the harmonic language, allowing the basic metrical structure to survive.[41] *Six Pianos* stands apart from Reich's phase works by virtue of this aesthetic. The same holds true to this point for *Music for Eighteen Musicians*, as existing structures are accented by new materials instead of transformed into something new using existing materials.

The third section of the second work (figures 176-180) continues in this vein, introducing the third piano with the same substitution process heard in the previous section (figures 168-175). As shown in Example 3.16, the configuration the third piano introduces here is not offset, and works to accent the existing metrical structure by expanding the harmonic language, as did the configuration in the previous section. In addition to this substitution, the third section also introduces the bass of the second chord in the violoncello and bass clarinets. This is done through the same fade-in/fade-out arc used in the voices, bass clarinets and violoncello at the

[41] This applies to the substitutions of C_1, C_2, C_6 and C_7 in *Six Pianos*, but not to C_4 as it destroyed the metrical structure.

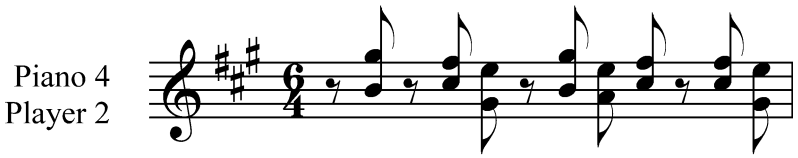
opening of the work, and these dynamic surges add another layer to the steady eighth-note structure.

Example 3.16: *Music for Eighteen Musicians*, figure 180.



In combination, these factors work against the intuition that a phasing machine is operating in this work (as it did in *Piano Phase*, *Clapping Music* and *Six Pianos*). However, the phasing process returns audibly in the fourth section of the second work (figures 181-185). In this section, the second player on the fourth piano abandons the lower treble section of the second chord and begins to substitute a new configuration. As shown in Example 3.17, the completed configuration heard in figure 184 is an offset at C_6 compared to the synchronized configuration heard in the third piano at figure 180 (Example 3.16).

Example 3.17: *Music for Eighteen Musicians*, figure 184.



The appearance of this offset configuration could further an argument that *Music for Eighteen Musicians* is nothing more than an elaboration on the phasing machine originally defined by *Piano Phase*. Yet, while it is true that this offset configuration serves to define *Music for Eighteen Musicians* as a work that incorporates phasing, this does not mean that the presence of phasing defines *Music for Eighteen Musicians* as a work based on the phasing machine. This is because the phasing machine is not defined as "a machine that sets a basic unit against itself

through phasing." Within the broader context of the global compositional process being discussed here, the phasing machine is a device used to compare different musical configurations to aid the task of deciding which configurations the composer/listener prefers. In this light, the phasing machine is merely a tool for comparison that can *use* the process of phasing, *but is not defined by it*. We must see it as a mechanism for comparison that only happened to originally use the process of phasing to this end.

So when one hears a work such as *Six Pianos*, it is not the presence of offset configurations that binds it to the phasing machine, but rather the mechanical nature of comparison that is central to the composition. As previously mentioned, the diverse harmonic language in *Six Pianos* clearly adds a new aesthetic quality to our sense of how the machine works, but the act of comparison remains the same. Along the same line, it is not the entrance of the offset configuration in the second work in *Music for Eighteen Musicians* that connects this composition to the phasing machine. Rather, it is the active act of comparison, the building upon existing structures, that pulls *Music for Eighteen Musicians* into a continuum with *Piano Phase*, *Clapping Music* and *Six Pianos*.

Of course, as the end of the global compositional process, the act of comparison taking place in *Music for Eighteen Musicians* is not the same task as in the previous works. *Music for Eighteen Musicians* is heard as a completed composition, an end in itself. Thus, when listening to *Music for Eighteen Musicians*, one no longer hears the act of comparison—the act of stacking structures against similar structures—as leading to a decision. *Music for Eighteen Musicians* presents its structures built with no teleological end in mind. The only thought entertained when listening to *Music to Eighteen Musicians* is whether one enjoys the composition or not.

In this way, *Music for Eighteen Musicians* is heard more passively, as is *Lux aeterna*, with the music working to guide one's attention through the aesthetic construction and dismantling of aural structures. Yet we do not hear *Music for Eighteen Musicians* as we hear *Lux aeterna*. The background presence of the phasing machine dictates a different narrative. Rather than slowly exposing an aural structure that is considered always be present, *Music for Eighteen Musicians* is predicated on the idea that the structure is *not* always present, but rather constructed before the listener's ears. This is what gives *Music for Eighteen Musicians* the sense of ornamenting the phasing machine: one can literally hear parts being constructed on top of the basic unit to create a more, elaborate mechanism. Along the same line, the clear distinction of the different parts implies an aesthetic where one can aurally dismantle the structures being built to create smaller, simpler phasing machines. In this sense, the listener can direct her attention to the third and fourth piano lines in the fourth section of the second work to hear the literal act of phasing as a distinct structure, a separate part of the aural whole. This is not the case in *Lux aeterna*, where the sonic web of eternal light cannot be untangled. This is the unique beauty of *Music for Eighteen Musicians*. Listening to Reich's work is akin to watching a master mechanic assemble a visually pleasing machine, only to tear it down and build a new one off the same basic structure.

With this in mind, the works leading to *Music for Eighteen Musicians* need be understood as a series of external thought experiments, attempts to figure out how to create new, aesthetically pleasing mechanisms based on the basic phasing machine. Each makes its presence felt in *Music for Eighteen Musicians*: the basic unit mimics the rhythmic structure of that in *Clapping Music*, the substitution process in the second work mimics the substitution process heard in *Six Pianos*, and the idea of phasing an offset unit against itself derives from *Piano*

Phase. However, these musical procedures are not borrowed from the earlier works in *Music for Eighteen Musicians*, but were "thought through" in the earlier works. Again, one does not hear the earlier works as compositions. Rather, they are heard as external explorations of potential and comparison.

Consider once again the master mechanic constructing a visual machine layer upon layer. If you were to witness this mechanic develop his techniques in private, would these developments be considered works of art on their own? Chances are they would be considered practice routines necessary to refine the final performance, not as ends in themselves. I am arguing that we hear *Piano Phase, Clapping Music* and *Six Pianos* in this same light.

This idea is odd only in the sense that Reich's compositional musings are so readily available, whereas such musings are normally discovered through archival digging and research on personal editions of scores or manuscripts for other composers. In fact, several composers, most notably Brahms, worked extremely hard to destroy their personal sketches to preserve the completed beauty of their finished works against the unrefined background of their original musings.[42] Hearing the works by Reich discussed here as one global compositional process obviously goes against this train of thought, and exposes a new, unique listening experience. Whereas one can sometimes hear composers borrow aspects of an earlier work, or make an allusion to another composer in a composition, these traditional listening experiences imply that the current work and previous work are heard as separate entities. The hearing being argued for here is that these works by Reich are *not* separate entities, but rather part of the same compositional process; one broad stroke; one train of thought externally executed through the audible for over a decade.

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[42] Jan Swafford, *Johannes Brahms: A Biography* (New York: Vintage Books, 1999), 562.

As with Ligeti's mimesis of attention, I am in no way arguing that this was an intentional move by Reich. It is clear from his writings that Reich did not consider some of his earlier works to be completed compositions, but it is not clear that he intended to have these works act as musings for an eventual, actual composition. Either way, the intentionality of these actions does not affect how Reich's earlier works can be heard as part of the compositional process for *Music for Eighteen Musicians* since they clearly act in this capacity in retrospect. With this understanding in mind, one hears *Piano Phase*, *Clapping Music* and *Six Pianos* in the same way he might understand sketches by Beethoven. In both cases, the composer has decided to externalize their compositional process by using either a pen and paper or a live ensemble to enact some musical process they could not solely execute in their head. The main difference here is that one can only study Beethoven's thought processes visually through found personal scores and sketches, whereas he can audibly study Reich's thought processes enacted through his earlier works. In this way, a work such as *Piano Phase* is heard as a public execution of what would normally be considered the "in-the-head" process of composing *Music for Eighteen Musicians*. Inversely, when we hear *Music for Eighteen Musicians*, we sense the presence of these previous works, of the machinery of composition.

Chapter 4

Apperception in Opera

Section 4a: The Cognitive Deficit and the Ineffable

Opera constitutes an unwieldy composite compared to the previous compositions. While *Lux aeterna* and *Piano Phase* present one dimension to perceive (the musical), opera presents at least three dimensions: the musical, the visual and the semantic. The two added dimensions (the visual and the semantic) are directly attributed to the characters on the stage and the concrete storyline they present. Where one catches a glimmer of semantic meaning in a work like *Lux aeterna*, where the title gives insight into the timelessness of the work, opera holds this as a central principle. One no longer simply hears the music; one incorporates it into an amalgam of sensations emanating from the fictional world.

On the surface, how one perceives an opera or play is more similar to how one perceives the real world than how one perceives a typical composition. One sees characters interacting on stage in a simulacrum of real life, and one most likely perceives these characters as one would a person in the real world. If there is an allusion to an action that happened before one gained access to this world, one naturally assumes that said action occurred (as would happen in the real world). And when the characters on stage carry out actions, one attributes intentionality to these characters and their actions. However, this would be a misconception of what is happening on the stage. Just as a person in the real world can only have intentional actions during their time on earth, what happens in the fictional world of the drama is defined by the runtime of the performance; there is no action in this world before the curtain rises, and there is no action after the final curtain falls. In reality, the world of an opera/play is more similar to a musical

composition, as the opening note defines the beginning of action in this realm and the double-barline represents the undeniable end.

This frames a different relationship between the audience and the characters on stage. As previously mentioned, while observing human forms acting in human ways on stage, one might assume he is watching normal humans carrying out normal actions and thus attribute human-like intentionality to these characters. This is a misconception. As agents in an orchestrated world, there is no mental depth to these characters other than what is presented to the audience, just as there is no depth behind a musical theme other than what is presented during the runtime of a composition. In other words, unless the characters explicitly define their mental states, *these mental states do not occur*. If unperceived mental states were occurring within the characters on stage, from where would these mental states spring? The characters are born at the beginning of the opera and are deprived of the chance to develop any sort of mental complexity. Surely, an actor can imply mental states to a character through his own intentions, and the audience can infer these mental states, but these mental states are still projections bound to the minds of the performer/observer and do not in themselves grant the characters mentality.

In this light, there is a *prima facie* doubt that characters in an opera/play carry the mark of the mental. For instance, imagine witnessing someone carrying out the same routine every day. He eats the same meals and has the same conversations every day, with no variation. Now imagine that one of his actions is to move bricks across a room. Every day, he picks up these bricks, but every day he picks up too many, causing some bricks to drop on his feet. It is clear this causes pain, yet he continues to carry out these actions every day and will not entertain the idea of doing anything different (not even acknowledging someone new trying to talk to him).

There is a fair chance one would doubt this person's mentality. In the same way, one must doubt the mentality of characters in a play or opera who would most likely miserably fail a Turing test.

Given this *prima facie* doubt about the sentience of the characters on stage, there is a deficit in the fictional world of the play or opera one does not encounter in real life. Where one projects sentience on beings that function in a manner similar to humans in real life, even though their mental states cannot be accessed/confirmed, one's doubt about the sentience of dramatic characters does not allow this grace. Rather, one projects intentions onto the characters using the best information allotted (what concretely happens in the fictional world), yet the deficit of mentality on the stage makes these efforts a futile pursuit. Simply put, one cannot project mentality onto a being that lacks mental states.

This is not to say it is impossible for a character in this situation to have mental states. It just means that the audience is not in a position to create them. Rather, the playwright/composer grants mental states to the characters on stage by allowing these mental states to be concretely shown through actions in the fictional world. For instance, if a character murders his best friend, the playwright might have the character report why he did this (e.g., "I could never forgive you for what you did to my sister"). Through this action, the playwright endows the character with concrete intentions and the audience is able to rightfully attribute these intentions/mental states to the character. Absent a clear statement, though, the audience is left to project intentions onto the character's actions. In the previous example, a character who does not give their motivations for murder is strange and frightening—a psychopath perhaps whom commits murders with a clear mind.

This creates a unique situation where the playwright/composer can either affirm the audience's projections of mentality through simple narration, or sow confusion through the

intentional omission of mental states on the stage. For instance, returning to the fictional murder scene, if the playwright declines to have an agent report his mental states, the audience is left to fill the deficit. (It is easy to imagine a play where the character's intentions are completely shrouded.) This would lead to natural confusion and debate, as individual audience members project different theories based on their personal experiences outside and within the play. If executed correctly, this can work to the advantage of the playwright/composer, as the audience is left pondering different theories about the character's actions after the final curtain falls. The playwright/composer intentionally takes advantage of the lack of mentality on the stage through clever omission.

Two works that exploit this type of omission are Maurice Maeterlinck's *Pelléas et Mélisande* (1893) and Valery Bryusov's *The Fiery Angel* (1909). In both, the observer is left in the dark as to the mental states of the principle heroine until the end of the respective work. By omitting indications of these mental states, Maeterlinck and Bryusov allow the audience to define the character's intentions as they please, based solely on the exterior actions they are witnessing on the stage or through the eyes of the narrator. The principle heroine in both presents contradictions, though, and can be perceived as either a weak character dominated by the hand of fate, or an enlightened character embracing her undeniable fate.

Maeterlinck's *Pelléas* tells the story of Mélisande's dance with fate in the kingdom of Allemonde. Wed to the prince Golaud early in the drama, Mélisande is seen as increasingly attracted to Goluad's half-brother Pelléas. Naturally, Mélisande's attraction to Pelléas eventually seals both of their fates in death, but it is the nature of Mélisande's attraction that is left in doubt for the audience. Mélisande's words often contradict the action on stage, and this misalignment leaves the audience questioning Mélisande's true intentions. Of course, Maeterlinck omits

clarifications until the end of the play, and the audience is left projecting intentions on Mélisande.

Bryusov's *The Fiery Angel*, a novel framed as a retrospective that plays itself out on the virtual stage of the reader's mind, likewise omits key information about its heroine Renata. Told through the mind of the knight Ruprecht, the reader comes to know how Renata reports being visited by a fiery angel named Madiël throughout her childhood. As a consequence of her trying to physically unite with her fiery angel, he leaves Renata. She prays for his return. One night, Madiël does return to Renata and tells her he will appear as a human to be with her. Renata shortly meets his human doppelganger, Count Heinrich. After some time with Heinrich, though, he too leaves Renata. Searching for her fiery angel once more, Renata comes across Ruprecht and they begin their journey to find Count Heinrich. Throughout their search, Renata appears to either interact with angels and demons, or be using Ruprecht for her own benefit. The difference is laid on a razor's edge. As with Mélisande, it seems the only way to truly understand Renata is by gaining access to her mental states. However, Renata's mind is concealed from the reader as much as it is concealed from Ruprecht: Renata's contradictory actions and words are the only thing by which to judge her intentions. Given only concrete perceptions, Renata's intentions fluctuate along with Ruprecht's belief in the ineffable, and one is left regarding her with either reverence or disgust.

Maeterlinck and Bryusov's works are also tied together in another way. Both works exemplify the Symbolist belief that the world we perceive is but an image of true reality, which in its infinite complexity remains ineffable. As Goethe notes, "the symbol transforms the phenomenon into an idea, and the idea into an image, but does this in such a way that the idea in the image has infinite repercussions, and remains intangible; even when expressed in every

language it will always remain unexpressed."[1] In essence, even if one feels she has a firm grip on her world, there are unseen vestiges that elude her. One of the most prominent symbols of this type is death, which Maeterlinck describes as "a form of life which we do not yet understand."[2] Another symbol that can be understood in these terms is time, "whose presence must be admitted as a brute fact but whose understanding is forever beyond [our] grasp."[3] Death and time remain ineffable: no matter how many languages in which they are spoken, there remains a surfeit of information tied to these symbols.[4]

Symbolism takes this a step further, claiming that not only are certainties such as death and time elusive, but entire portions of the world are veiled from direct perception. Symbolists sought a transcendence that would reveal the higher truth previously hidden. For Maeterlinck, death and a separation from this world was the sole way to achieve transcendence. Thus, Miroslav John Hanak writes that "Maeterlinck's dramatic conflict flows from the journey of an enlightened soul into transcendence which is… misinterpreted as the calamity of death by those who cannot transcend their empirical existence."[5] In contrast, Bryusov associated with the so-

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[1] Johann Wolfgang von Goethe, *Spruche in Prosa: Sämthliche Maximen und Reflexionen uber Natur und Wissenschaft*, 1887, quoted in Stefan Jarocinski, *Debussy: Impressionism and Symbolism*, trans. Rollo Myers (London: Ernst Eulenberg, 1976), 23.

[2] Maurice Maeterlinck, *Death* (1911), quoted in Miroslav John Hanak, *Maeterlinck's Symbolic Drama: A Leap into Transcendence* (Louvain, Belgium: E. Peeters, 1974), 29.

[3] Benjamin, "Ideas of Time in the History of Philosophy," 29.

[4] Not coincidentally, Maeterlinck echoes the cries of philosophers who feel the spatialization of time removes it from its essence when he states that "we diminish a thing as soon as we try to express it in words." In both cases, one attempts to reify the ineffable, which only acts to diminish the object of his scrutiny. Maurice Maeterlinck, "Mystic Morality," in *The Treasure of the Humble*, trans. Alfred Sutro (New York: Dodd and Mead, 1902), 111-112.

[5] Hanak, *Maeterlinck's Symbolic Drama*, 3.

called "Decadents" of Symbolism, who believed *art* was a "portal into the unmanifest and ineffable Reality behind the physical world."[6] While Maeterlinck associated transcendence with a disassociation from the physical world, Bryusov (supposedly) sought transcendence in physical sensations.[7]

Of course, their different takes on transcendence led Maeterlinck and Bryusov to symbolize the ineffable in different ways. Maeterlinck's ineffable is only glimpsed through symbols in *Pelléas*. For instance, the symbol of fate is often evoked through a circle of light, "for indeed we can never emerge from the little circle of light that destiny traces about our footsteps."[8] So, as Elliott Antokoletz notes, when Pelléas "sees the snares of destiny all around him" as he decides to meet with Mélisande for the last time in Act IV, Scene 4, he remains in the shadows, symbolizing his attempt to avoid fate. Mélisande on the other hand stays within a beam of moonlight and defines her own relationship with fate through the claim that "I want to be seen."[9] *The Fiery Angel* takes a markedly different approach than *Pelléas*, with angelic and demonic forces playing an active role in the plot. Bryusov takes the veil off the world unperceived, and the hands of fate are shown to be attached to the arms of deities. This is further

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[6] Gary Lachman, "Valery Briusov: Paradoxical Decadent," in *The Fiery Angel* (Sawtry, England: Dedalus Ltd, 2005), 399.

[7] It should be noted that Bryusov was probably not a true Decadent and merely used the popular ideology of the time to further his own historical importance. If a different ideology was seen as "the next big thing," he may have thrown his effort behind it instead. Lachman, "Valery Bryusov," 398-403.

[8] Maurice Maeterlinck, "On Women," in *The Treasure of the Humble*, trans. Alfred Sutro (New York: Dodd, Mead and Company, 1902), 94.

[9] Elliott Antokoletz, *Musical Symbolism in the Operas of Debussy and Bartok: Trauma, Gender, and the Unfolding of the Unconscious* (New York: Oxford University Press, 2004), 101.

interpreted as a realization of the Decadent ideal: fate has become physical, something that can be seen and with which one can interact.

The role of fate in both of these works is similar, though. Through the ineffable symbol of fate, Maeterlinck and Bryusov define underlying intentions in their fictional worlds for their characters to work with or against. Thus, when Mélisande refuses to stray from the moonlight towards the end of *Pelléas*, one finally glimpses her intentions to embrace her fate in death, a fact that is highly contested throughout Maeterlinck's play. In this way, the underlying presence of fate reifies Mélisande's mental states towards the end of her life, and the audience is finally given a concrete representation of mentality in Maeterlinck's fictional world; fate fills the deficit left by the characters' lack of sentience.

The symbolized presence of fate makes it a real force in these fictional worlds, and only the exposure of this hitherto unperceived force allows a glimpse at the mentality of others (another unperceived force). It is the cognizant acceptance of fate by Renata and Mélisande that defines their sentience, and this speaks to the higher truth of Symbolism (and the stage): it is only in accepting that one cannot define his role in the world that he reaches true sentience. Where we define our own sentience in our intentions and free will, it is the heroines' intentions to *not have intentions*, to accept what their world has given them, that define each as truly enlightened characters possessing mentality. Renata and Mélisande know who they are at the end of these works, and they understand their ineffable roles in their worlds. Bryusov and Maeterlinck define the sentience/intentions of the heroines by removing the veil they have systematically placed before the audience.

Interestingly, this deficit of mentality (the veil before the audience) is taken away from both works when they were set as operas. In Sergei Prokofiev's setting of *The Fiery Angel*

(1927) and, to a greater extent, in Claude Debussy's setting of *Pelléas et Mélisande* (1895), one hears the addition of music as the attribution of mental states to the characters. In other words, one hears the music acting as the minds of the characters, carrying out traditionally brain-bound tasks such as apperception, or the assimilation of new ideas with standing beliefs. Through this act of cognitive mimesis, Debussy and Prokofiev redefine the characters in Maeterlinck and Bryusov's original works, giving them concrete mental states and, subsequently, concrete intentions.

Unlike *Lux aeterna* and *Piano Phase*, the presence of the cognitive in this music can be attributed to compositional intent. Debussy's intent is perfectly clear in *Pelléas*: while the characters are left to dwell on a single note in a recitative style that conveys the charade of their earthly lives, the orchestra is alive with nuance, relating the mental states of the characters to the audience, and enlightening the audience as to how these characters are coming to understand their world and their relationships with ineffable fate. In this way, one understands the music as literally filling the mental deficit of the original work. As for the intentions of the composers, Debussy amplifies Maeterlinck's eventual exposure of Mélisande's intentions by using the music to define Mélisande as among the enlightened, accepting her fate much earlier in the opera than she did in the play. Contra Debussy, Prokofiev uses his music to recalibrate Bryusov's world and situate Renata in isolated helplessness.

Section 4b: Adding Cognitive Depth

Debussy and Prokofiev both add cognitive depth to the characters in their operas by mimicking the traditionally brain-bound process of apperception in the music. As defined here,

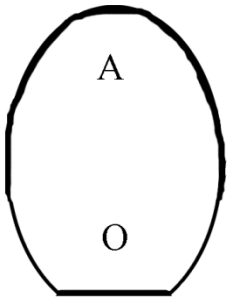
the process of apperception occurs when a new perception/memory of an object is associated with a standing memory of the same object, creating a new, multi-faceted understanding of said object. To understand this mental process, we once again turn to Henri Bergson, as his understanding of how our conscious thoughts and memories interact with objects within one's current perceptions (either physical or virtual) remains valid and enlightening.

Imagine an individual with a blank slate: although he has the ability to create memories like a normal human, he does not have any memories that relate to the interaction about to be discussed. In this sense, you can imagine him as a toddler coming to grips with his world, or as a fictitious creation for this thought experiment; either way, the outcome will be the same. We can imagine our naïve subject (we will call him Marcellus in memory of Pelléas's lost companion) coming into contact with a stapler for the first time (an object with which most people are familiar). Imagine Marcellus recently finished a paper and needs to turn it in to his professor. Since Marcellus has never encountered a stapler before, he might bind the pages with a paper clip, clip binder or, worst, not bind them at all. Needless to say, this action would most likely annoy the professor (especially if the pages were not numbered, since the chances of them getting mixed up are extremely high), and she might hand Marcellus a stapler and tell him to "staple" the pages together. As a novice with a stapler, Marcellus might ask what this means, and we can imagine the professor demonstrating how to use a stapler to bind the pages. At this moment, Marcellus creates his first stapler-related memory: staplers can be used to bind pages together.

This connection can be depicted as a simple relationship between the object (O) and the memory (A) related to the object. As defined within the boundaries of Figure 4.1, we can consider both O and A to be present together in Marcellus's conscious perception as he watches

his professor use the stapler to bind his pages. The object of the stapler has a simple definition in Marcellus's mind (a stapler can be used to bind pages together) and whenever he encounters a stapler, this memory is evoked and the past experience of the stapler as a binding tool influences his current perceptions. Hence, if Marcellus encounters a stapler again in the future, he is most likely to remember its binding properties and perceive it as a simple binding tool.

Figure 4.1: The object (O) and memory (A).[10]



As with most objects, though, the stapler eventually becomes more than a simple binding tool. We can imagine that one day Marcellus is sitting outside with a stack of blank pages that keep blowing away in the wind. He has his stapler with him, but since he does not want his pages bound until he has written on them, it sits useless next to his pile. Seeing his struggles, his friend graciously places the stapler on top of the reassembled pile of paper and Marcellus perceives a new aspect of the stapler as a paperweight. During this interaction with the stapler, the current memory A would be defined as the idea of a stapler as a paperweight, while the perceived object (O) would be the physical stapler acting as a paperweight. But the memory of a stapler as a binding tool is still present and influences Marcellus's current perception. Thus, Figure 4.2 shows a new relationship between Marcellus and the stapler where two memories and two objects replace the single memory and object from Figure 4.1. Now in perceiving the object (O),

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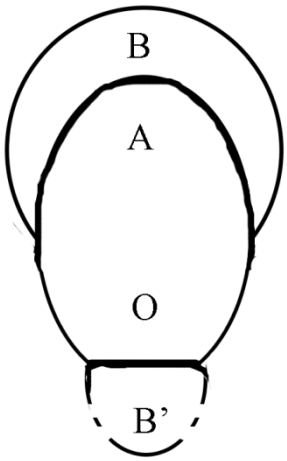
[10] These figures are a recreation of Figure 1 from Bergson, *Matter and Memory*, 128.

memories A (the stapler as a paperweight) and memory B (the stapler as a binding tool) are both present, although memory B remains a series removed from the object as it does not serve a purpose in the current situation. However, the presence of memory B still has an impact on Marcellus's current perception of the stapler and this relationship is shown as B'. The dotted outline symbolizes the virtual presence of B' in Marcellus's mind. The existence of memory B allows Marcellus to project perception B' onto the object, even though B' is not physically present at this moment.

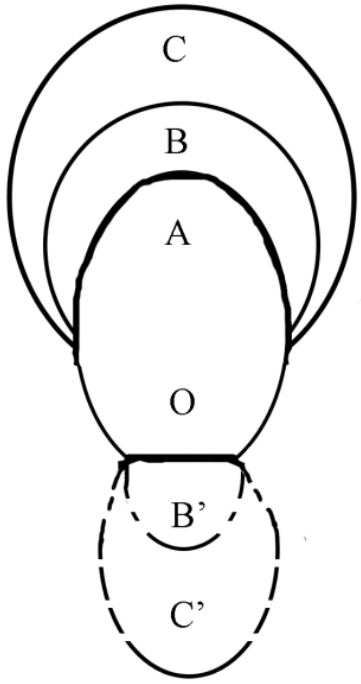
Figure 4.2: The object perceived with memories A and B.



The presence of B' adds to the perceived depth of the stapler through apperception: instead of perceiving a one-dimensional binding tool, Marcellus now perceives a multi-faceted binding and weighted tool. Of course, the relationship only gets more complicated from here as Marcellus's connection with the stapler continues to expand. For example, Marcellus may have experience working with a hammer and nail to hang artwork, however, he currently wants to put a single piece of paper on the wall without leaving the glaring marks of a nail. To this end, Marcellus tries to hang the paper on the wall with tape, but the tape will not hold to the wall for some reason. Now, say Marcellus knew about the stapler's ability to swing out but never knew why this would be necessary because of the stapler's inability to bind in this position. (I assume

it could be perceived as a longer paperweight.) At this moment, though, Marcellus has a connection in his mind between the stapler and a hammer and nail. As with a hammer and nail, a depressed stapler strikes a piece of metal that plunges into the object it is set against. And with the ability to swing the stapler out and place it flat against a surface, this action could be used to penetrate and hold materials together as a straight nail would, without leaving as large of a mark. With this perception, Marcellus adds more depth to his understanding of the stapler as he now perceives the object of the stapler as a mounting tool that leaves less of a physical mark on the wall than a nail. In Figure 4.3, Marcellus now perceives the stapler (O) as a mounting tool (A), paperweight (B) and binding tool (C), and he perceives it in more depth than ever before as the object now has the virtual properties of B' and C' projected onto it.

Figure 4.3: The object perceived with memories A, B and C.



As one can see, even this simple example has started to get out of hand. Along with the functional memories being defined here, and easily visualized in Figures 4.1-4.3, Marcellus has

clearly made other mental associations with regards to the stapler. The easiest ones to recognize are that staples can be used in a way similar to paper clips and a hammer and nail. Thus, these objects become bound with the virtual idea of a stapler in Marcellus's mind, and the endless networking of memories begins. As Bergson says, "it is true that we are here dealing with images photographed upon the object itself, and with memories following immediately upon the perception of which they are but the echo. But, behind these images, which are identical with the object, there are others, stored in memory, which merely resemble it, and others, finally, which are only more or less distinctly akin to it."[11] Thus, when Marcellus currently perceives a stapler, he is not simply perceiving how he has encountered the stapler in the past, but also how he might encounter the stapler in the future with relation to other objects with which he is already familiar. For instance, if Marcellus is aware that driving a nail into his hand would be painful, the stapler's association with a hammer and nail would lead him to create a new association of the stapler with danger. Further, Marcellus could perceive the stapler as a source of entertainment by launching staples towards a cup, with a blatant disregard for keeping the sharp pieces of metal contained.

Each new memory represents an act of apperception for Marcellus as he recognizes a new facet of the stapler and subsequently integrates it into his previous understanding, creating a deeper perception of the object with each new assimilation. As one can imagine, the depth with which Marcellus can potentially perceive the object is vast. With each act of apperception, Marcellus adds another memory to the simple diagram (which threatens to expand beyond the range of the alphabet).

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[11] Bergson, *Matter and Memory*, 125.

Imagine now the network of memories and perceptions Marcellus would create in association with another human. Unlike the stapler, whose potential is limited by its physical construction and lack of adaptability, the perceptual depth one associates with another person is unfathomable. Consider a parent whose child is now forty years of age. Over those forty years, the parent would have endowed the child with more and more depth through innumerable acts of apperception. As one can imagine, the simplicity of an expanded Figure 4.3 would not be able to capture this depth. Needless to say, the network is vast and, in some ways, ineffable.

However, the goal here is to discuss apperception with relation to an opera, which, as previously discussed, represents a specific period of time without a defined future or past. From this perspective, discussing apperception in opera becomes a more straightforward task. For the purposes of discussion, imagine the observer accepts that there is no past for the characters before the start of the opera, and there is no future after the fall of the curtain; the characters' entire existence is held within the double barlines dictated by the composer. Thus, the observer is locked into the current work and nothing else, listening with a sense of extended core consciousness that only exists within the timeline of the opera. Outside memories will naturally influence the observer's perceptions—for instance, one might have moments where Renata invokes a sense of Mélisande—but there remains a sense that the characters are bound by their operatic world. And with the music in *Pelléas* and *The Fiery Angel* defined as an indicator for the character's mental states, all of the characters' emotions are also contained within the opera.

Put another way, when one hears the music in these operas, she hears the entirety of the characters' mental lives. With this understanding in place, the audience perceives the music functioning as the minds of the characters, and one is presented with a new adaptation of the extended mind theory. Where the music in *Lux aeterna* is heard acting as a part of the listener's

extended cognitive system, and sections of Reich's mental processes are glimpsed in the progression of his phase works, the current situation exhibits music that *functions as the totality of one's hidden mental states*. The orchestra acts as the seat of cognition for the characters, replacing the brain in a typical human system. Music functions as brain-bound cognition would, and, when coupled with perceivable exterior actions and utterances, the audience is given a more complete understanding of the characters on stage. Of course, this only works as far as the music is able to mimic mental processes, and *Pelléas* and *The Fiery Angel* present two different takes on apperception.

Section 4c: Desire in Allemonde

In post-Wagnerian fashion, Debussy uses leitmotivs—a defined musical practice that conveys a concrete meaning—in *Pelléas et Mélisande* to define the mental states of Maeterlinck's characters. When one hears a specific leitmotiv, the idea behind the leitmotiv, or the idea that there *is* an idea, is rarely in doubt. This is because of the unfaltering nature of the fixed leitmotiv: while characters and events develop on stage, the leitmotivs associated to these characters, or their mental states, remain consistent. Within this definition, one can understand the orchestra as mimicking one's core sense of self as a musical symbol. The fixed leitmotiv lets the audience know that there is never any doubt that the character knows who she is.

This presents a problem for Debussy. Given an intention to expose the mental states behind the characters in *Pelléas*, conveying a fixed sense of self does not hold much appeal. Given their identity stabilized in the orchestra, a character in Wagner's operas became "a slave

of his leitmotiv,"[12] supposedly developing on stage while never developing a new sense of self in the music. This does not resonate with how one typically experiences a cognitive being, though. As a cognitive being, one notes that her sense of self constantly develops as she apperceives the world around her. The typical Wagnerian leitmotiv is useful in conveying a defined meaning to the audience, but not able to convey this nuanced development of moods. As Debussy noted, would it not "be better that music by a simple means—a chord? a curve?—endeavor to render the successive impulses and moods as they are produced, without making laborious efforts to follow a symphonic development, foreseen, and *always arbitrary*, to which one will necessarily be tempted to sacrifice the emotional development."[13] Debussy calls for the emotions of the characters to dictate the path of the symphonic development, rather than forcing the characters to fit into some sort of musical schema.

Bridging the gap between defined musical meaning and the plastic nature of one's identity, Debussy uses what I call *developing leitmotivs* to convey the ever-changing sense of self and emotions of the characters in *Pelléas*. This hybridization is enacted throughout *Pelléas* by defining a base attribute of a motive (e.g., a contour or rhythm) that remains stable throughout the opera, while the ornamentation around said base develops in accordance with the action on stage. In maintaining the fluidity of a defined idea, Debussy creates leitmotivs for abstract mental states. Thus, one can hear the changing mental states, such as those associated with the characters' desires, play out in the orchestra, which in turn is functioning as an extended mental system for the characters on stage.

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[12] Edwin Evans Jr., "Debussy's 'Pelléas et Mélisande'," *Musical Standard* 31 (June 1909), 361.

[13] Letter from Claude Debussy to Edwin Evans Jr., in "The curtain falls on Claude Debussy," *New York Times*, 5 May 1918, pt. 4, 7.

But it is not solely the dynamic character of Debussy's leitmotivs that realizes the music functioning as the characters' consciousness; it is also Debussy's ability to interweave his music into the very fabric of Allemonde. Deferring to Lawrence Gilman:

> Often [Debussy's leitmotivs] are mere sound-wraiths, intended to denote moods and nuances of emotion so impalpable and evanescent, so vague and interior, that it is more than a little difficult to mark their precise significance. Often they are mere fragments of themes, mere patches of harmonic color, evasive and intangible, designed almost wholly to translate phases of that psychic penumbra in which the characters and the action of the drama are enwrapped.[14]

Combined with his understated orchestra, recitative setting of the text and dynamic leitmotivs, Debussy's ability to "suggest rather than to describe, to reveal the unconscious rather than to announce the obvious"[15] works in sync with Maeterlinck's Symbolist ideals to link music and drama. As Maeterlinck sought to strip away the decadence of the physical world through an acceptance of death as transcendence, Debussy sought to dismantle the Wagnerian machine where the drama was "often impossible to find" due to the overstated presence of the orchestra.[16] The result is a setting where music works to support drama and add depth to the characters in Allemonde; giving them complex mental states that reflect the consciousness of the audience through developing leitmotivs and suggestions in the orchestra. [17]

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[14] Gilman, *Debussy's Pelléas et Mélisande: A Guide to the Opera* (New York: G. Schirmer, 1907), 53.

[15] Marie Rolf, "Symbolism as Compositional Agent in Act IV, Scene 4 of Debussy's *Pelléas et Mélisande*," in *Berlioz and Debussy: Sources, Contexts and Legacies*, ed. Barbara L. Kelly and Kerry Murphy (Burlington, Vermont: Ashgate, 2007), 133.

[16] Gilman, *Aspects of Modern Opera: Estimates and Inquiries* (New York: Haskell House Publishers, 1909), 121.

[17] It is interesting that Debussy works against a sense of perceived Wagnerism in *Pelléas*, since it is actually a sense of idealistic Wagnerism that drives Debussy's dynamic setting of *Pelléas*. According to Lawrence Gilman, "if there is one principle that is definite, positive, and

One developing leitmotiv in *Pelléas* is associated with the mental state of desire. As one has surely experienced, the mental state of desire is a fixed idea (leitmotiv) with nuances that can change over time (developing) depending on how situations in the environment evolve. These nuances develop through acts of apperception as one perceives new aspects in the environment, and assimilates these new perceptions with standing beliefs. In Debussy's *Pelléas*, the audience hears how Golaud and Pelléas's desires for Mélisande develop new aspects over the course of the opera. Simultaneously, the audience is able to hear how Mélisande's desire to achieve transcendence with Pelléas develops quickly in Act II, Scene 1.

Before tracing the developing leitmotiv/mental state of desire in Debussy's *Pelléas*, though, it should be noted that there are several global symbols (i.e., static aural ideas) defined in this operatic world. As shown in Table 4.1, multiple scholars have related several scales and actions with abstract ideas in Debussy's *Pelléas,* and (for our purposes) these can be considered universal truths in Debussy's operatic world.[18] This assertion goes beyond simple labeling and suggests a deeper understanding of how one hears key centers in this opera. Just as one studies the different centers of the brain activating through an fMRI, one hears different colors of cognition being played out in *Pelléas*. C♯ minor is not heard as a key center, it is heard as the character's mind being enveloped with fear. And while the global symbols in Table 4.1 might

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unmistakable in [Wagner's] theoretical position it is that, in the evolution of a true music-drama, the dramatist should be the controlling, the composer an accessory." Idealistic Wagnerism places the drama first in opera, with music supporting what the dramatist had written. We hear this same theoretical position echoed in Debussy's *Pelléas* as the music supports what is happening on stage through developing leitmotivs as an integrated aspect of Allemonde, rather than submersing the drama through a musical onslaught. Of course, the latter rings more true with Wagner's actual settings, and one once again witnesses a case of a later composer realizing an earlier's theoretical ideals. Lawrence Gilman, *Aspects of Modern Opera*,116.

[18] Wenk and Smith define the global symbols for several more keys, but they will not factor into the analysis of the desire motive.

not be taken at face value, they do complement the perceptual depth of the music throughout Debussy's world.

Table 4.1: Global symbols in Debussy's *Pelléas et Mélisande*.

Scale/Action	**Wenk**[19]	**Antokoletz**[20]	**Smith**[21]
C major	Sensation: seeing, hearing, touching	Darkness	Darkness-Death
C♯/D♭ major	Caring, solicitousness		
E major	Mélisande's beauty; truth or purpose		
F♯ major	Light, revelation, vision	Light	Light-love
C minor	Death		
C♯ minor	Fear		
D minor/dorian	Forest, darkness, incomprehension		The known forest-fixity
Diatonic		Conscious	
Whole-Tone		Unconscious	
Octatonic		Fusion of ideas	Fusion of ideas
Full Cadence	Intimacy		
Pizzicato/staccato	Conscious realization	Conscious realization	

With these universals defined, one can hear how the developing leitmotiv functioning as the mental state of desire adds depth and intention to Maeterlinck's play. Working in chronological order, the audience initially hears the desire motive as Golaud catches his first

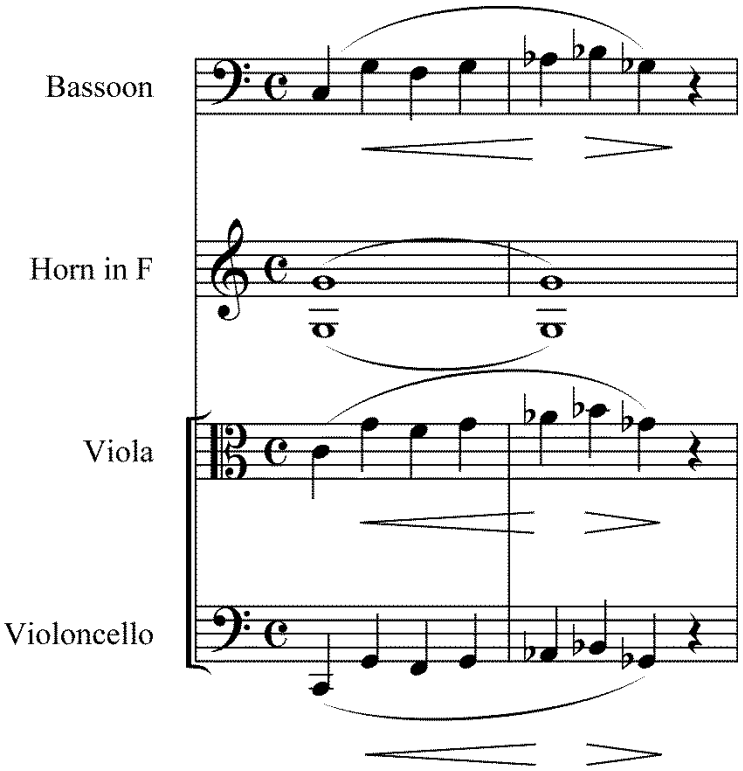
[19] Arthur B. Wenk, *Claude Debussy and Twentieth-Century Music* (Boston: Twayne Publishers, 1983), 44-46.

[20] Antokoletz, *Musical Symbolism in the Operas of Debussy and Bartok,* 57, 91, 165.

[21] Richard Langham Smith, ""Aimer ainsi": Rekindling the Lamp in *Pelléas*," in *Rethinking Debussy*, ed. Elliot Antokoletz and Marianne Wheeldon (New York: Oxford University Press, 2011), 86-87.

glimpse of Mélisande in Act I, Scene 1.[22] Shown in Example 4.1, the desire motive is defined by its steady quarter-note beat—a rarity in the opera—and arched contour heard in the last five notes of the motive (F-G-A♭-B♭-G♭). These two attributes remain stable in the desire motive, and this hearing is the initial perception in a Bergsonian model of apperception. Thus, one hears the ineffable emotion of desire as "O," while the motive in Example 4.1 acts as memory "A".

Example 4.1: Desire motive, pg. 8 ms. 7-8.[23]



The desire motive in Example 4.1 is heard in near isolation. With no vocal lines to complement, the motive's only support comes from the horns reinforcing the initial C through

[22] I will only cover the most pertinent hearings of desire here, as recounting every instance of this leitmotiv is not within the scope of this section.

[23] I will refer to examples here with page numbers, with the measure numbers starting at 1 on each page in the fashion of Antokoletz and David A. Grayson. The score I am referencing is the Petrucci Library Press Study Score (2009).

whole-notes. With its clear salience, the idea that an audience member would latch onto this leitmotiv as "important" is easily supported.

Of course, the motive by itself does not carry the weight of "desire," and it is only through the complete context of the music, visual and semantic perceptions simultaneously occurring in the operatic world that one can understand the force of this leitmotiv. Leading up to this moment of desire, the audience visually observes Golaud approaching what he describes as "a little girl crying by the water's edge" (*Une petite fille qui pleure au bord de l'eau*). The girl he is describing is Mélisande, and the audience witnesses him approaching her while noting that he "cannot see her face" (*Je ne vois pas son visage*). It is after this statement, before Mélisande is aware of Golaud's presence, that the audience hears the motive in Example 4.1. In context, one can connect (at least subconsciously) the motive heard here with the mental state of desire. Visually, the audience is presented with a male character carefully approaching a female character whose beauty, we are told, is irresistible.[24] Tellingly, the last thing the audience hears before this motive are the words "I cannot see her face:" either an innocent observation, or a question (I wonder what her face looks like?) in the form of a statement. The latter supports the idea of this leitmotiv as a symbol for desire, and this hearing is further supported by how quickly Golaud acknowledges Mélisande's beauty upon finally seeing her face (*Oh vous êtes belle!*). Golaud may be simply curious as to her identity, or worried about why she is crying. However, it is her beauty that draws his attention, and his desire.

Some scholars have previously defined the motive in Example 4.1 as a variation on the "forest" motive heard at the opening of the opera. Shown in Example 4.2, the relationship between these two motives is defined by the opening leap of a perfect fifth, followed by a whole-

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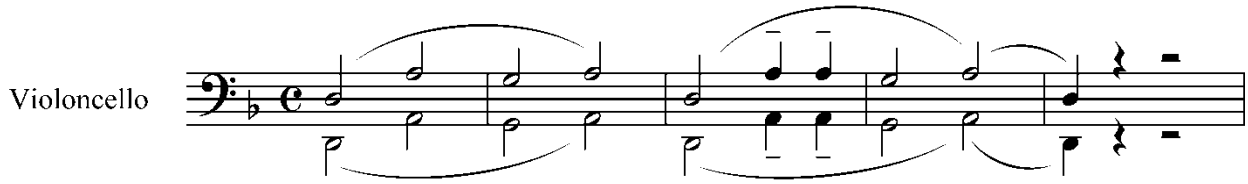
[24] Antokoletz, *Musical Symbolism in the Operas of Debussy and Bartok*, 34.

step lower neighbor-note figure. However, this aspect of the motive in Example 4.1 is not part of what I am defining here as the desire motive. That being said, I would not argue completely against hearing a vestige of the forest leitmotiv in Example 4.1 as there is a clear association.

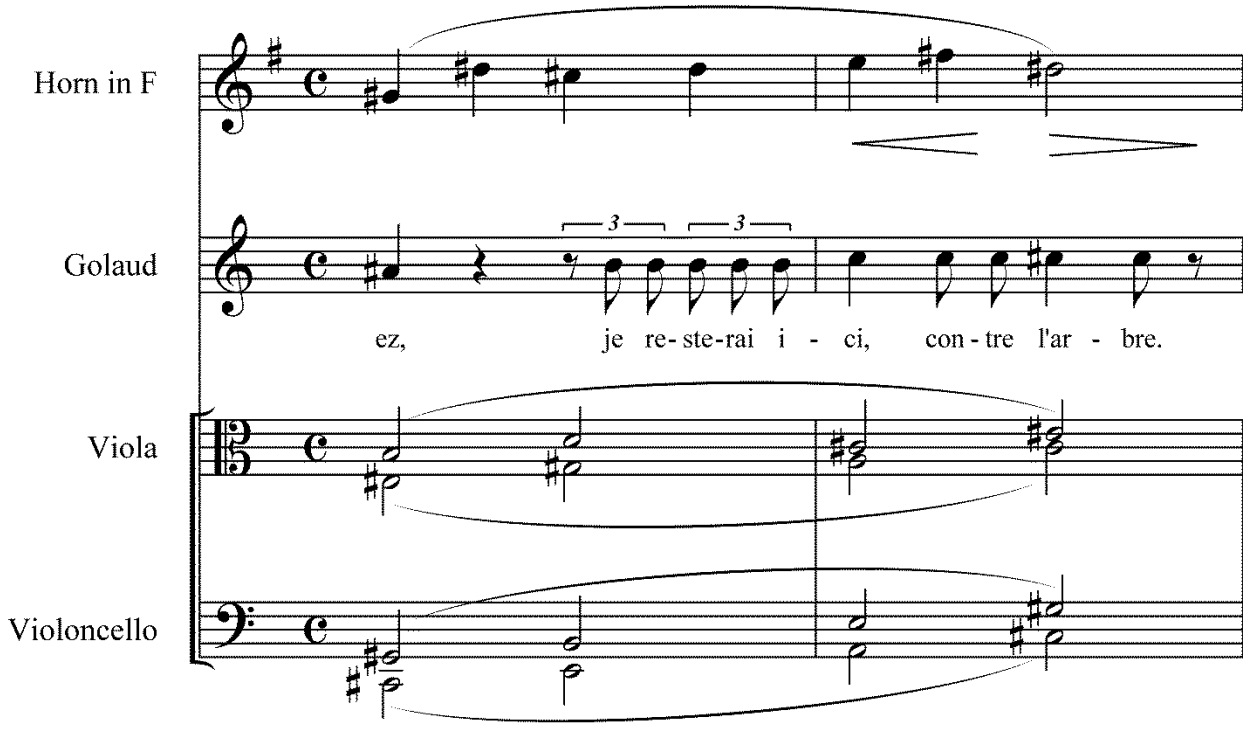
Example 4.2: Forest leitmotiv, pg. 1 ms. 1-5.



The relationship between the symbols of desire and the forest in *Pelléas* is defined more clearly by referencing the global symbols outlined in Table 4.1. For Smith and Wenk, the forest leitmotiv (and further, the key of D minor or D Dorian it is initially heard in) is heard as a symbol of darkness, or incomprehension. Casting our awareness into the predetermined future of the opera, the darkness of this moment is obvious, as Golaud's desire for Mélisande threatens to unravel his life. Returning to the present moment, the idea of incomprehension reinforces the notion that Golaud is not aware of how Mélisande looks or why she is crying. Further, the "forest" section of Example 4.1 is in C major, defined by Smith and Antokolez as a global symbol for darkness, thus unifying the idea of the symbolized darkness of the forest and Golaud's desires in this instance. Wenk has a different perspective on this key center, as he notes that C major is often associated with sensation: seeing, hearing, touching. But these ideas do not need to conflict, as Golaud is clearly interested in physical sensations at this moment (either seeing Mélisande's face or considering the potential for intimacy at a later time), and the darkness behind these desires has already been established. Thus, Debussy adds perceptual depth to Maeterlinck's world. Where in the play Golaud stumbles upon Mélisande, in the opera, one hears his desire and the darkness this sets into motion. The ineffable has become perceivable.

The same leitmotiv is heard shortly hereafter in the horns, rising a half-step to C♯, as shown in Example 4.3. Wenk defines this instance as carrying a different feeling. In moving from C to C♯, Wenk would note that the key now conveys a caring or solicitousness. This is reflected in the semantics of the moment, as Golaud responds that he will "stay where [he is] by this tree" (*Voyez, je resterai ici, contre l'arbre*) following Mélisande's declaration she would throw herself in the water (*ou je me jette à l'eau!*) if he were to touch her. Desire has transformed.

Example 4.3: Desire motive, pg. 9 ms. 10-11.



The darkness of Golaud's attraction still colors his mental state through the unremoved allusion to the forest leitmotiv. The switch in orchestration to the horn, which Wenk also associates with darkness and death, further accentuates the darkness Golaud's desires will

bring.[25] But the music has carried out an act of apperception as Golaud overlays a perception of Mélisande-as-traumatized on his earlier perception of Mélisande-as-desirable. Golaud's initial perception of Mélisande is not discarded, but persists through the music as a memory. At this stage, Golaud's understanding of Mélisande would be reflected best by Figure 4.2, with memory A being Mélisande as a traumatized woman, and memory B being Mélisande as an attractive woman; the object O defines Mélisande as someone whom Golaud desires.

One might here question the depth added to *Pelléas* by the music. Golaud verbally acknowledges Mélisande's beauty, so his desire is clear, and his actions on stage reflect that he perceives Mélisande as someone for whom care is needed. In this light, one might think that Debussy's addition of music does not accomplish much. But this would be a misunderstanding of what Debussy's music adds to the drama. Golaud has intentions projected onto him by the audience in Maeterlinck's play. In Debussy's setting, though, Golaud's intentions are substantiated as mental states, and aurally conveyed through the orchestra. The music adds depth to Maeterlinck's drama by making these assumed mental states tangible, offloading the process of understanding another as a sentient being. It simply happens that Golaud presents the easiest character to understand within the Symbolist economy of *Pelléas et Mélisande*. In this economy, a male is not as in touch with the ineffable as a female. Further, a middle-aged character is not young enough to see the ineffable with naïve eyes, nor old enough to accept the wisdom of that which is not seen. In Maeterlinck's world, the middle-aged male Golaud defines a character confined to the physical reality of the stage, unable to tap into the ineffable. Thus, it is not surprising that Debussy's music conveys what can already be assumed from Golaud's concrete actions. He is defined by the physical.

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[25] Wenk, *Claude Debussy and Twentieth-Century Music*, 44.

Characters such as Pelléas and, even more so, Mélisande have attributes secreted in the ineffable, though, and the mental states of these characters enacted in the music more overtly add perceptual depth to Maeterlinck's play. A telling example of this is heard in Act II, Scene 1, where the audience is presented with Mélisande and Pelléas talking next to a well in a park. The scene in Maeterlinck's play in ripe with the Symbolist notion that there is more at work than one can perceive, and one hears Debussy conjuring the ineffable through his understated orchestra.

The scene opens with Mélisande and Pelléas examining the Blind Man's Well, whose waters supposedly used to open the eyes of the unseeing. As they discuss the well, Mélisande leans over to touch the water, only to have her hair come undone and fall in. Just as Debussy's musical language has global symbols, so does Maeterlinck's play. As Hanak notes, the unbound hair symbol "unfolds all of the sexual and sensual overtones of self-indulgence, vanity, and lust for power… [as] an earth-bound manifestation of the lower eros."[26] It is visually associated with earthly pleasures, and her simultaneous comment that her hair "is even longer than my arms… it is even longer than I am…" (*ils sont plus longs que mes bras… Il sout plus longs qui moi*) conveys the idea that earthly pleasures have longer roots, or a longer grasp, than one can control. But no sooner does Mélisande (unconsciously?) acknowledge the presence of physical pleasures than Pelléas changes the topic to Mélisande's first meeting with Golaud.

The change in topic is abrupt. Golaud has not been mentioned to this point in the conversation, and it is clear that Mélisande's unbound hair has triggered something in Pelléas. Yet the audience is only presented with a simple back and forth between Mélisande and Pelléas. The conversation is short-lived as Mélisande herself abruptly changes the topic. But she says something odd to Pelléas before this. When asked if Golaud came close to her during their initial

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[26] Hanak, *Maeterlinck's Symbolic Drama*, 66.

meeting (*Etait-il tout près de vous?*), Mélisande asserts that not only did Golaud approach her, but he tried to embrace her (*Ouil il voulait m'embrasser*). As an encounter that happened during the runtime of the opera, the audience knows this action never occurred. Questions arise surrounding Mélisande's intentions: Is she intentionally lying about her first encounter with Golaud, or does she just not remember it correctly? If she is lying, what are the intentions behind her untruth?

These questions remain unanswered in Maeterlinck's play as the audience is not privy to Mélisande's mental states. But Debussy redefines this moment in his music. Shown in Example 4.4, the passage accompanying this exchange is sparsely orchestrated. One hears the winds functioning as the ineffable as it relates to Pelléas, and the strings acting as the ineffable as it relates to Mélisande. For instance, as Pelléas completes his initial question (*C'est au bord d'une fontaine aussi, qu'il vous a trouvée?*) one hears the fate motive in the bassoons.[27] Like the desire motive, the fate motive is defined by its general rhythm (a dotted rhythm followed by a triplet) and contour (generally steady, with the largest deviation being a major second). Debussy's evocation of the ineffable hand of fate at this moment is telling, as Pelléas's inquiry is a fateful move. Pelléas's question reifies the parallels between the current situation and the initial encounter between Mélisande and Golaud. With this parallelism acknowledged, the audience cannot help but wonder if the current situation will have a similar outcome as the previous (i.e., whether this moment will spark a romance between Pelléas and Mélisande).

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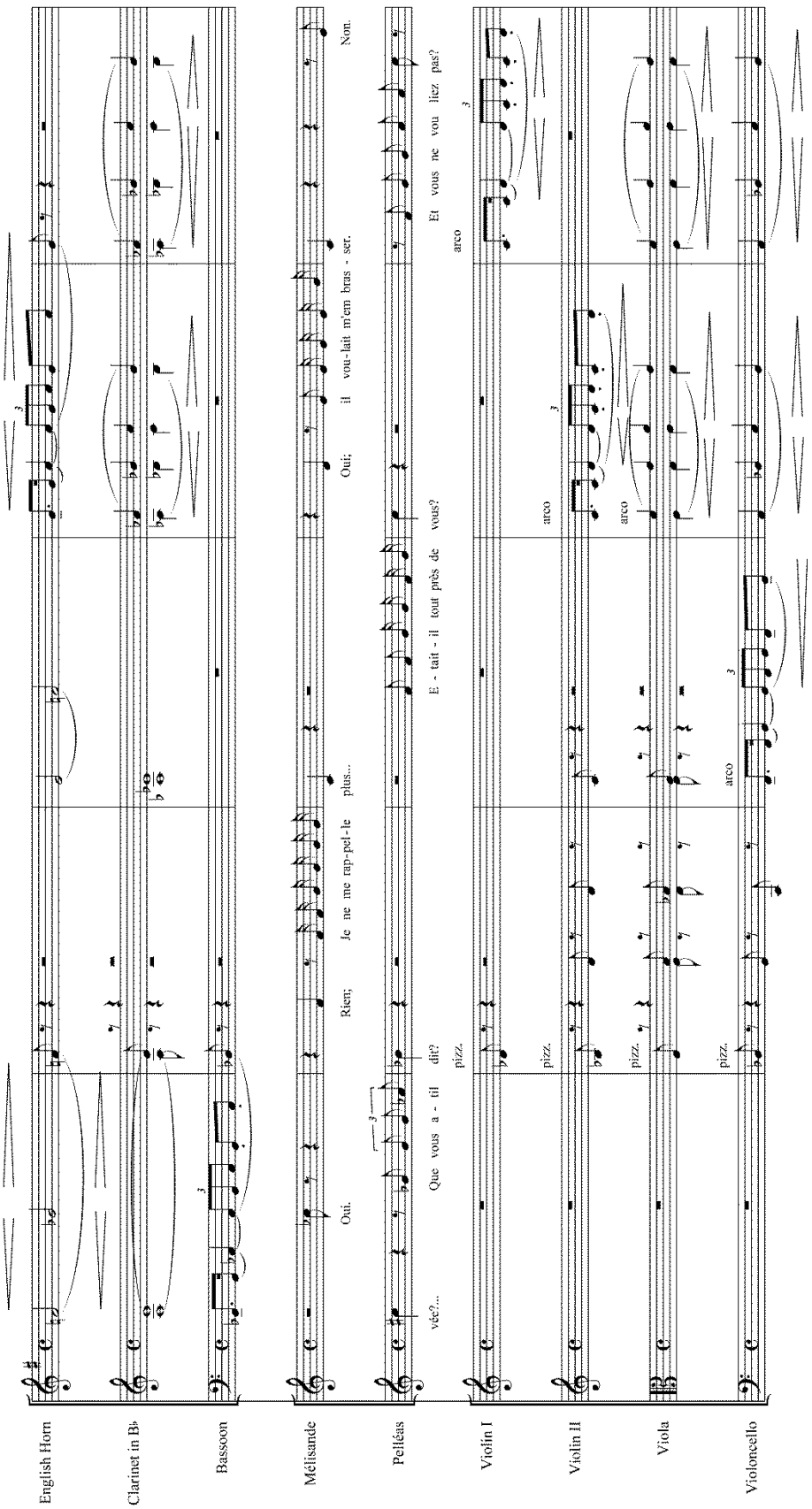
[27] What is referenced as the "fate" motive here has also been defined as the "Golaud" motive by other scholars. As a non-developing motive, though, I find the designation of this motive as "fate," which never alters, more sensible. Antokoletz and Gilman echo the designation of this motive with "fate," though Antokoletz notes that Golaud is a primary instrument of fate, wrapping him up in this motive. Antokoletz, *Musical Symbolism in the Operas of Debussy and Bartok*, 59. Gilman, *Debussy's Pelléas et Mélisande*, 58.

Mélisande responds to Pelléas's question with a simple yes, confirming the similarity of the two situations. As fate's presence fades, Pelléas asks Mélisande what Golaud said to her (*Que vous atil dit?*). Again, one might imagine Pelléas is either consciously or unconsciously trying to figure out what sparked the romance between Golaud and Mélisande in a similar situation. Debussy withholds Pelléas's mental states in this moment, though, as no global symbols or additional leitmotivs are called up. Pelléas's intentions/mental states are obscured to the audience.

Debussy takes a different tact with Mélisande's second response. With a simple "Nothing; I don't remember" (*Rien; Je ne me rappelle plus*), Mélisande appears to deflect Pelléas's question. This is where the audience starts to question Mélisande's intentions in Maeterlinck's play, and where Debussy grants insight into Mélisande's mental states through the orchestra. As heard in the second measure of Example 4.4, the strings perform a pizzicato predominant-dominant-tonic passage during Mélisande's response. Taking a cue from Wenk and Antokoletz, we can understand the pizzicato marking as representing a conscious realization for Mélisande, while the full cadence reveals that this realization is about intimacy (via Wenk). Combining global symbols, Debussy adds a new layer to Mélisande's character: she consciously realizes she is attracted to Pelléas. Mélisande's deflection of Pelléas's question can thus be understood as an evasion; while Pelléas is analytically dissecting the situation that led to Golaud and Mélisande's relationship, Mélisande is internally realizing the relationship that is destined to happen between her and Pelléas.

Example 4.4: Fate and Desire motives, pg. 82-83 ms. 7-3.



As heard in the third measure of Example 4.4, Mélisande's realization cadences into another hearing of the fate motive in the violoncello. This instance of fate should be understood differently than that at the beginning of this passage. Where one heard the bassoon referencing the *unintentional* impact of Pelléas's questions (with the whole-tone progression representing an unconscious motive on Pelléas's part), here one hears the *undeniably conscious* impact of Mélisande's realization. The difference lies in how the music is functioning in the moment: the bassoon's reference to fate adds depth to this moment for the audience, while the violoncello's reference to fate *functions as a conscious mental affirmation* of fate's presence by Mélisande. In other words, Mélisande can hear the fate motive in this moment as it is being played out in her mind, while the same motive went unnoticed by Pelléas, audible only to the audience.

This marks an important moment in the opera. As Mélisande consciously entertains what fate has in store for her, her relationship to the audience has been recast. As previously mentioned, a central attribute of Maeterlinck's play is that the audience is unaware of Mélisande's intentions due to the deficit of mentality presented on the stage. However, Debussy here grants Mélisande cognition, and reveals that she is fully aware of what she is doing: she has consciously realized that she is attracted to Pelléas and tied her attraction to her ultimate fate.

Mélisande's ability to perceive the ineffable in this light is directly related to her status as a woman bound to die young in Maeterlinck's gendered economy. As Maeterlinck notes, the pre-destined (those who are bound to die young) "know all" there is about the universe and fate.[28] As one of the pre-destined, Mélisande is blessed with this insight. More than this, Mélisande's

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[28] Maurice Maeterlinck, "The Pre-Destined," in *Treasure of the Humble*, trans. Alfred Sutro (New York: Dodd and Mead, 1902), 62.

gender defines her as one of the "veiled sisters of all the great things we do not see."[29] As Maeterlinck notes, "all women have communications with the unknown that are denied to [men]";[30] they "have a lamp that we have lost… Even in their most trifling actions, they are conscious of being upheld by the strong, unerring hands of the gods."[31] Thus, as one of the pre-destined, Mélisande realizes her connection with the ineffable. The audience is able to make this connection as well through Debussy's music.

The music continues to affirm this throughout this passage, and one can (at least intuitively) understand Mélisande's intentions when she lies about Golaud attempting to embrace her. When Mélisande tells this lie, the audience hears the fate and desire motive sounding in the strings. Functioning as her consciousness, the strings clue in the audience that Mélisande is still thinking about her desire and her fate. However, this is a new side of desire that has not been heard before. Where Golaud's desire was tied with the darkness of the forest, Mélisande's desire is free of any outside influence; it is conveyed merely by the root rhythm and contour of the desire motive. This gives a purity to Mélisande's desire, one directly related to her acknowledgment of fate. For Maeterlinck, there is no purer desire than the acceptance of fate, and Debussy reinforces this idea through his music. The intertwining of Mélisande's desires and fate is further reinforced by the tonal relationship the two leitmotivs exhibit: the fate motive starting on C completes the F major triad on the downbeat of the fourth measure in Example 4.4. Desire is pure; conscious; diatonic.

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[29] Maeterlinck, *On Women*, 108.

[30] Maeterlinck, *On Women*, 103.

[31] Maeterlinck, *On Women*, 105.

Pelléas's desires also come to the forefront of the orchestra at this time, but these are separate from those of Mélisande. While her desires rest firmly in F major, Pelléas's desires play out on a whole-tone progression of G♭-A♭-B♭. Referring back to the global symbols in Table 4.1, Antokoletz points us towards the conclusion that Pelléas's whole-tone desires are unconscious (just as fate unconsciously made an appearance earlier in this example). Pelléas remains unaware of his attraction for Mélisande. The audience is presented with another side of desire: an unconscious, pure desire for transcendence.

The distinction is subtle. It is odd that Pelléas's desires remain unconscious at this moment: given his fate in transcendence, it would seem he is one of the pre-destined along with Mélisande. However, the unconscious nature of his desire hints that maybe Pelléas is not one of the pre-destined, but, rather, a predisposed soul for whom transcendence is possible.[32] Pelléas's fate to die young has not been cemented at birth like that of Mélisande's. He instead is someone who has the *potential* to realize transcendence in death, and thus achieve ultimate truth. This being the case, Pelléas cannot see into the ineffable at this moment, he merely embodies the potential to perceive it in the future.

Putting the puzzle of this passage together, the audience hears Pelléas reenacting Mélisande's original encounter with Golaud. Mélisande notes this similarity as well, and consciously realizes that her fate is bound to that of Pelléas. She intentionally misleads Pelléas into thinking that Golaud tried to embrace her, in the realization that a similar desire in Pelléas is unavoidable. The music conveys that Mélisande's intent aims true. The audience hears Pelléas's desire come to the forefront of the orchestra, but, being only a predisposed soul and not an enlightened one, his desires remain unconscious. While one simultaneously hears Mélisande

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[32] Hanak, *Maeterlinck's Symbolic Drama*, 68.

consciously embracing her fate with Pelléas, the fate motive continues to play for Pelléas unheard.

Debussy is not done with this scene, though. Shortly after, Mélisande loses her wedding ring in the well. After she drops her ring, she and Pelléas search for it in vain. At one point, Pelléas claims he can see her ring, and Mélisande remarks that "it is so far away" (*elle est loin de nous*). However, she then quickly dismisses the idea that what they saw was her ring (*non, ce n'est pas elle*) and declares it as truly lost (*elle est perdue*). Her ring gone, the audience is left wondering whether Mélisande intentionally dropped it in the well, or if this was the accident that she claims. As with her earlier untruth, Debussy's music makes Mélisande's intentions less ambiguous.

Shown in Example 4.5, Mélisande's statement that the ring is far away is accompanied by a clear iteration of the desire motive in the strings (still conveying the ineffable as it relates to her). This iteration of desire, though, is different than Mélisande's previous, pure desire. Just as the forest leitmotiv shaded Golaud's desires with darkness at the opening of the opera, here fate is heard making its mark on Mélisande's desires as the opening oscillation recalls the oscillating property of the fate motive.[33] It would appear that Mélisande heard fate within her desire in the earlier passage, and now apperceives the two as coupled. When she notes her ring is far away, the audience hears not a statement of fact, but her desire for this to be so.

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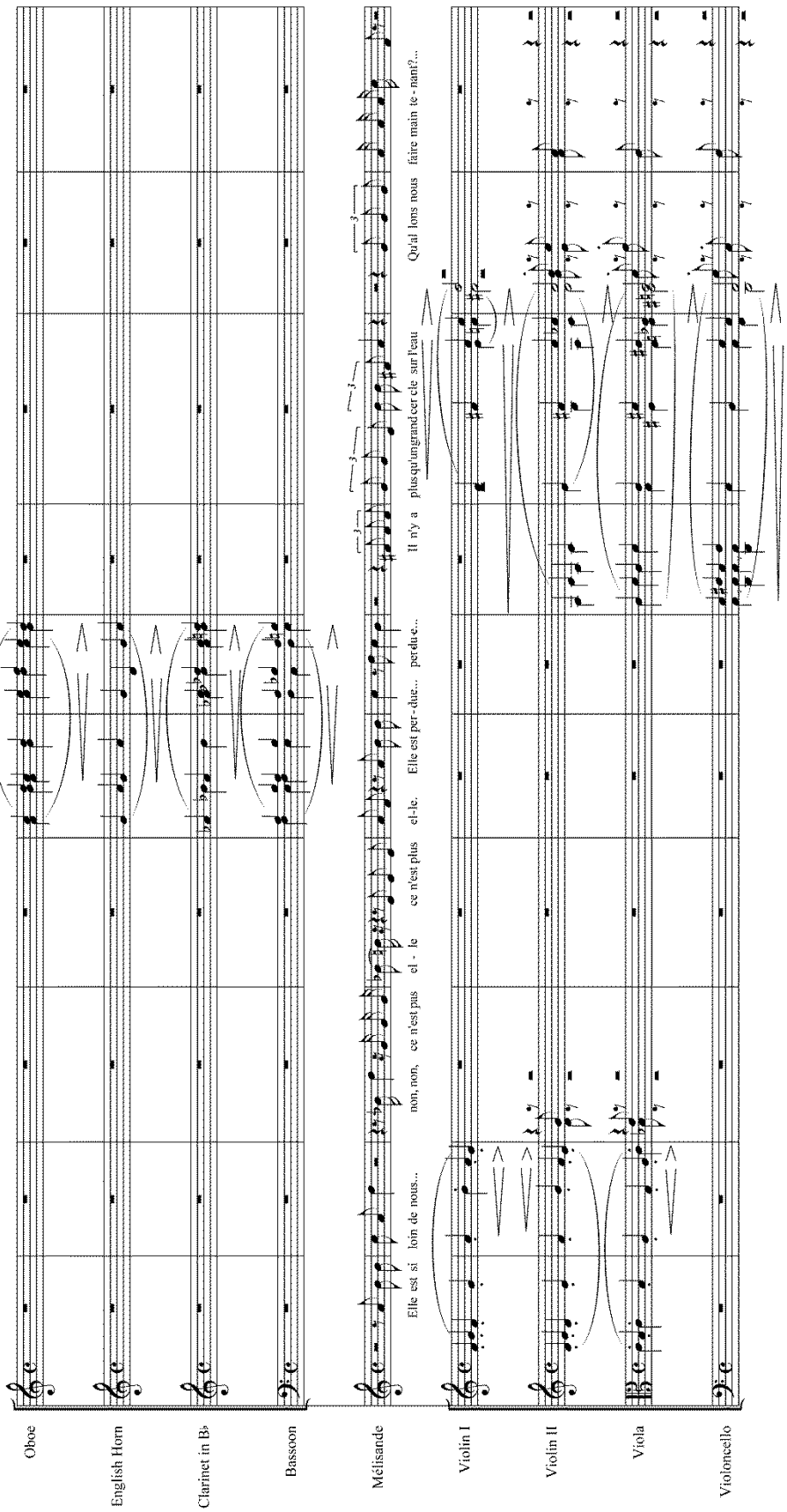
[33] Wenk calls the motive in Example 4.5 a variant on the "ring" leitmotiv, which he claims derives from the fate motive. However, lacking the prominent dotted and triplet-rhythm, it is hard to hear this as a direct variation of fate. Rather, this should be heard as fate shading Mélisande's mental states, as argued here. Wenk, *Claude Debussy and Twentieth-Century Music*, 38-39.

Example 4.5: Desire motive, pg. 88 ms. 1-10.



Debussy closes the character's minds to the audience for the next two measures, but upon her claim that the ring is lost, the audience is given a glimpse into that of Pelléas's in the winds. Heard in the fifth measure of Example 4.5, the desire motive in Pelléas's mind echoes that attributed earlier to Mélisande's mind, but with notably more chromaticism. More so, the clarinet continues the whole-tone progression from Example 4.4, with only one brief move away when D♭ sounds on the upbeat of the sixth measure. The chromaticism and the whole-tone scale suggest that Pelléas's desires remain in the subconscious, but it is telling that Debussy has these thoughts arise at this moment. There is something dynamic here. By having desire assert itself in Pelléas's mind when Mélisande notes that her wedding ring is lost, the audience senses that Mélisande has once again prompted feelings of desire in Pelléas. Given her intent to join with Pelléas in transcendence, and the way her conscious desires have intertwined with fate here, the audience is left with no doubt that she dropped her ring into the well intentionally, hoping that this will spark something in Pelléas. It clearly does, though these feelings remain under Pelléas's conscious threshold: the music is still inaudible to him.

After hearing Pelléas's unconscious desire, the audience hears Mélisande state that "all it has left is a great circle on the water" (*Il n'y a plus qu'un grand cercle sur l'eau*). Mélisande's statement is replete with symbolism, as water symbolizes an idea of renewal, and the circle alludes to fate.[34] With the loss of her ring, Mélisande is reborn as an enlightened soul on the path to transcendence. Heard simultaneously is a variation on the desire motive, enacted through leaps instead of steps. The expansion in range relates an expansion in Mélisande's felt emotions, while

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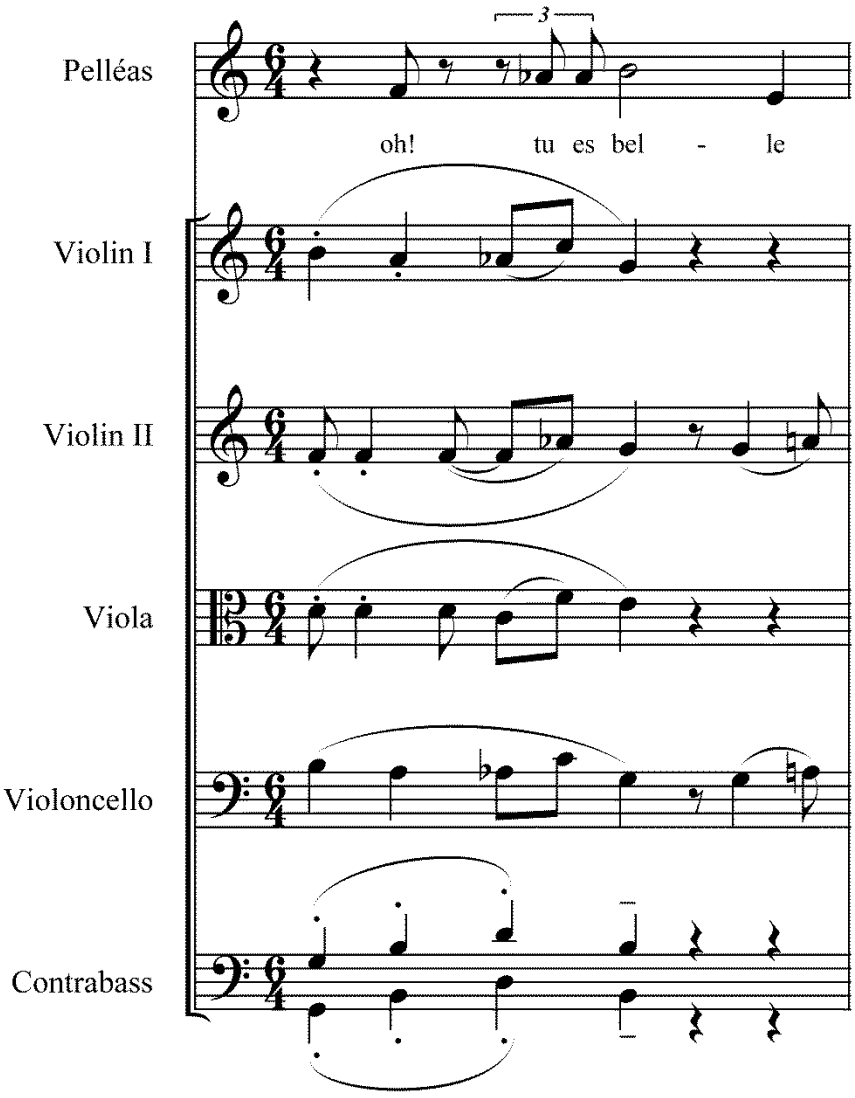
[34] Wenk, *Claude Debussy and Twentieth-Century Music*, 44.

the slight chromaticism hints that she is experiencing this mental state both consciously and unconsciously. In her rush towards transcendence, Mélisande is overwhelmed with desire.

The music gives another insight into the mind of Mélisande at the end of this passage. As Mélisande asks "what are we going to do now" (*Qu'allons-nous faire maintenant?*), the audience hears a predominant-dominant-tonic progression in the strings. In a way, Mélisande answers her own question through the global symbols. This encounter need end in intimacy.

The audience is able to hear Pelléas start to consciously recognize his desires for Mélisande in Act III, Scene 1. This scene opens with Mélisande singing out a window about her long, unbound hair. Pelléas happens upon her and, with the visual symbol of earthly desires on full display, soon finds himself enraptured. The attraction between the two is easily perceived on the stage at this point, with Pelléas outwardly stating that Mélisande is beautiful (*tu es belle*). It is at this moment that the audience hears the desire motive in the orchestra, although its meaning has once again changed. As shown in Example 4.6, it is heard in the contrabass, with the other strings supporting it harmonically. This is a marked change in orchestration, as one hears Pelléas's mental states conveyed through the strings rather than the winds. It is implied that Pelléas's mental states are starting to take on the chroma of Mélisande's; Pelléas is moving towards enlightenment.

Example 4.6: Desire motive, pg. 158 ms. 2.



The articulation informs the audience that Pelléas's desire is being consciously realized (staccato), and the melodic motion shows he is experiencing a heightened emotion (leaps rather than steps), similar to that of Mélisande sensing her renewal. Considering more global symbols, the passage confines itself mainly to C major, starting on the dominant before shifting to a half-diminished-seventh on vii followed by another half-diminished-seventh on ii (borrowed from the minor), and passing to a mediant on iii. If this harmonic motion were to continue another beat,

one can easily imagine a return to V, and this assumption is confirmed melodically as the second violin and violoncello perform G, followed by a step up to A and ultimately B.[35] Recall that Wenk posits C major as the global symbol for sensation, which fits perfectly in this moment. Contra Wenk, Antokoletz and Smith tie this key to darkness and death. This again might argue against the notion of global key-symbols, but Wenk's global symbol for C minor (from which this passage borrows a chord) is also death. This suggests a different hearing. On the surface, Pelléas realizes his unbound emotional ties to Mélisande, yet death defines the undertones. Pelléas cements his path towards transcendence with the freeing of his emotions.

As the scene continues, Mélisande's hair completely engulfs Pelléas. As Hanak notes, "there is something choking, binding, catching, and betraying in its luscious sway… It tends to throttle the very life-line it affirms through its unbridled sensual spontaneity."[36] This is the moment in both opera and the play when Pelléas gives himself over to Mélisande.

This binding of two souls is confirmed as Golaud happens upon Pelléas still caught in Mélisande's unbound hair. Golaud's mistrust of Pelléas and Mélisande is clear in Maeterlinck's play, but Debussy adds another layer of nuance. In Act III, Scene 2, the audience finds Golaud and Pelléas alone in the castle vaults, where the stench of death (*l'odeur de mort*) lingers. As they walk, Golaud encourages Pelléas to lean over the edge of a chasm to get a better view of the abyss, and a more pungent whiff of the death that rests there. As Pelléas begins to lean out, Golaud offers to hold onto Pelléas's arm. Golaud notes that Pelléas should not give him only his hand, since it might slip (*elle pourrait glisser*), and the music once again adds cognitive depth through the desire motive. As shown in Example 4.7, this iteration of desire is dominated by

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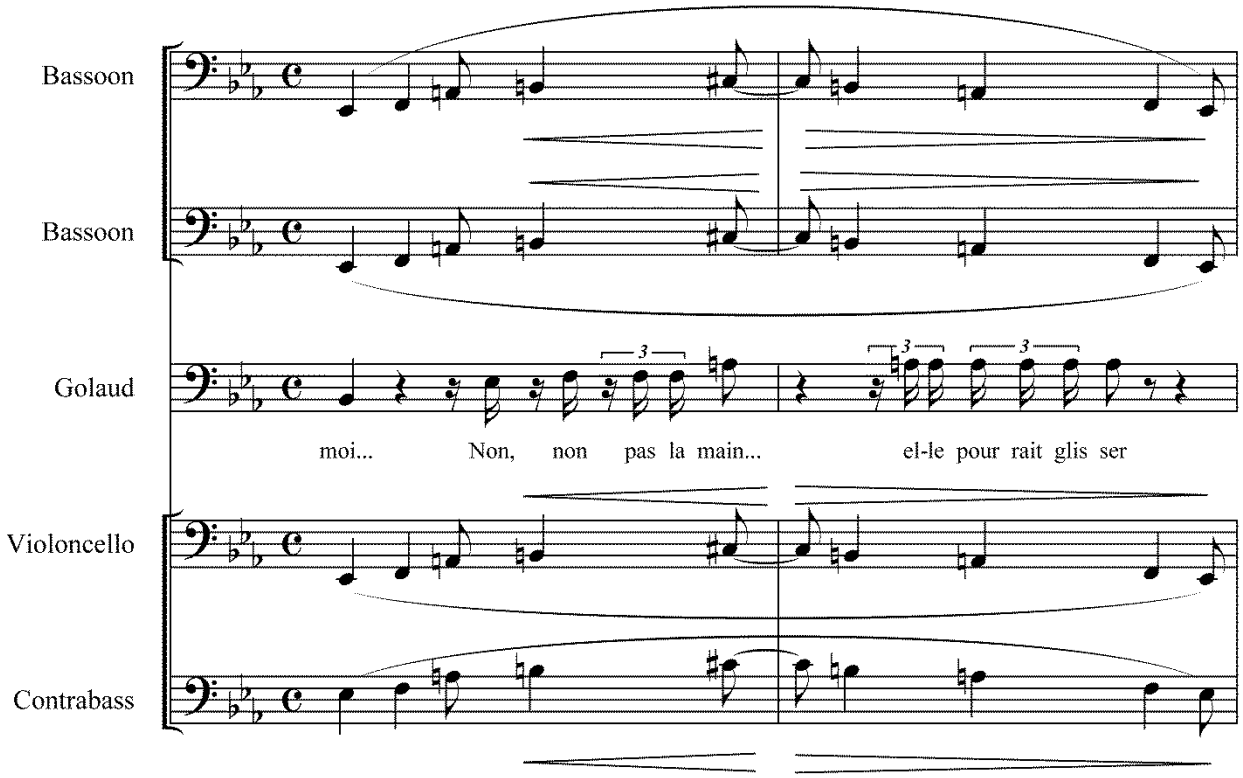
[35] The cadence on C is thwarted by a C♯ after the B.

[36] Hanak, *Maeterlinck's Symbolic Drama*, 65-66.

quarter-notes, and defines the classic arched contour of previous iterations. As with other iterations, the motive here starts with a step, but it uniquely breaks this pattern and leaps to an eighth-note, quickly creating a syncopated version of the desire motive with added accidentals: Golaud's desires are somehow mutated in this passage.

Example 4.7: Desire motive, pg. 190 ms. 7-8.



This change in the motive can be understood as a moment of extreme ill-will towards Pelléas, though one of which Golaud himself might not be aware. Note that the syncopated chromaticism occurs right before Golaud tells Pelléas not to give him his hand (*Non, non, pas la main*) and the original, diatonic notes return after he mentions that they might slip. It is only when he refers to Pelléas slipping (which would result in his death) that Golaud experiences this internal change. Perhaps, having come upon Pelléas enraptured in Mélisande's hair, Golaud initially desires to scare the younger Pelléas, to send a not-so-subtle warning signal to the

younger prince to stay away from Mélisande. But during the moment when Golaud seems most helpful in the play (offering to firmly take Pelléas's arm instead of his hand), the music, and the mentality it conveys, gives something subtle. Golaud moves from trying to scare Pelléas to actually desiring his death. In this way, the audience is clued into the internal struggle between Golaud's love for his half-brother and the mistrust he must feel. Further, with the diatonic and chromatic notes combining to make a whole-tone scale, one hears Golaud's internal struggle as more felt (unconscious) than realized. He is torn between diatonic and chromatic desires.

Debussy continues to add depth to the otherwise flat character of Golaud in Act III, Scene 3. Golaud and Pelléas leave the castle vaults, with Pelléas immediately noting that he can "finally breathe" (*je respire enfin!*). His breath is short lived, though, as Golaud quickly confronts him about his relationship with Mélisande. Golaud's mistrust is confirmed as he tells Pelléas that he must stop his childish games with Mélisande. Golaud mentions that this is not the first time he has noticed something between Pelléas and Mélisande (*Ce n'est pas la première fois que je remarque qu'il pourrait y avoir quelque chose entre vous*) and demands that Pelléas, as Mélisande's elder, avoid her as much as possible (*evitez-la autant que possible*). The reason Golaud gives for wanting Pelléas to avoid Mélisande is that she is going to be a mother soon, and the slightest emotion could have an unfortunate effect (*Elle est très delicate, et il faut qu'on la ménage d'autant plus qu'elle sera peutètre bientôt mere, et la moindre émotion pourait amener un malheur*). Golaud's ostensible intentions are defined as protecting the mother of his unborn child. Yet once again, the music adds more depth to this scene.

As shown in Example 4.8, Golaud's argument is accompanied by a new version of the desire motive in the flute and strings. Like earlier statements of this leitmotiv, steady quarter-notes dominant the rhythm; there are no conflicting thoughts for Golaud at this moment. With a

few steps and a few leaps in the higher voices (and all leaps in the lower voices), the audience hears Golaud's emotions becoming heightened, as when Pelléas was engulfed in Mélisande's hair. Clearly, this is an emotional moment for Golaud. But Golaud's mental state is more complex. The most telling change one hears comes on the final note of the leitmotiv, which ends a second or third lower than where the motive started depending on the instrument. To this point in the opera, the desire motive has always ended slightly above the starting pitch, except when Golaud had his unconscious thought to let Pelléas slip in the vaults, which ended on the same note as the starting pitch.[37]

In the previous instances of this leitmotiv, one is given the sense that desire was to some extent positive. When Golaud finds Mélisande, he has the positive desire to see her face, and later take her into his care. When Pelléas and Mélisande are at the Blind Man's Well, Mélisande finds joy in following her fate, and Pelléas unconsciously finds joy in her. These feelings then erupt when Pelléas consciously recognizes his desire for Mélisande while caught in her hair and this iteration of desire ends a third above its starting pitch. However, with the move to the castle vaults, Golaud occasions a flat-lined version of desire, as he unconsciously wrestles with his desire to have Pelléas slip. This is taken further in in this scene, as one hears Golaud's desires take a literal downward turn. The motive ending lower than it began, one understands that Golaud feels his desires slipping away. So while the audience is told Golaud wants to protect the pregnant Mélisande, this is undercut by the negative emotions taken on by the motive.

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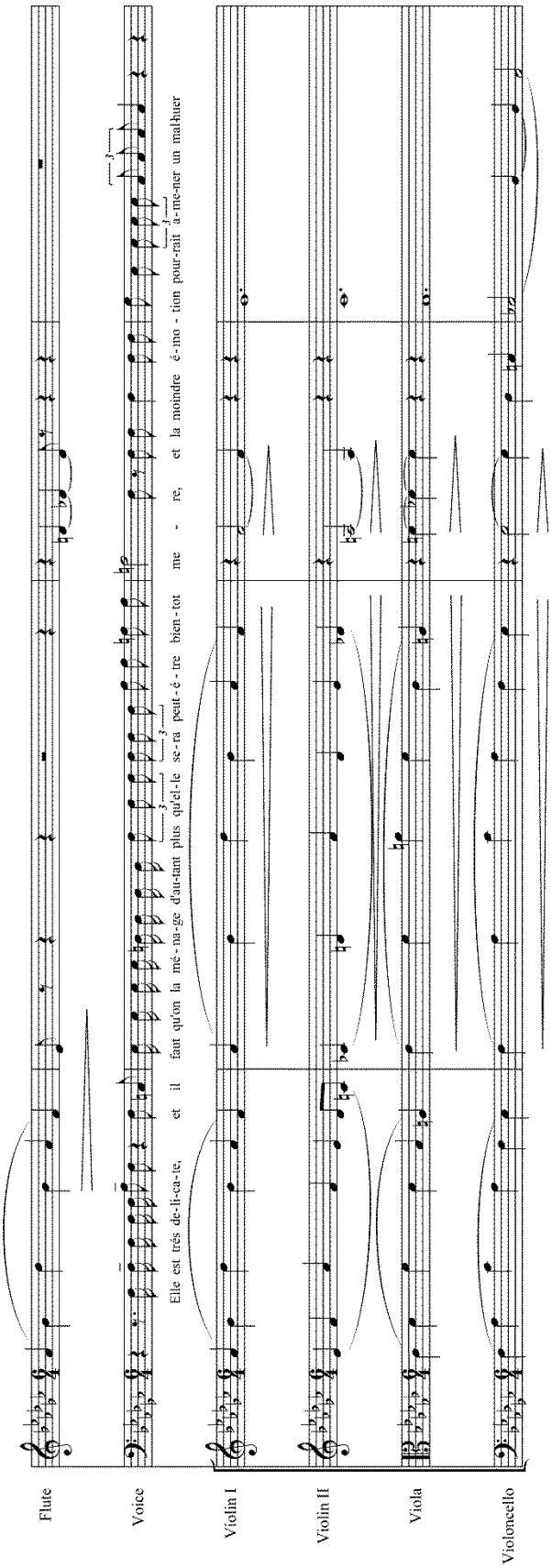
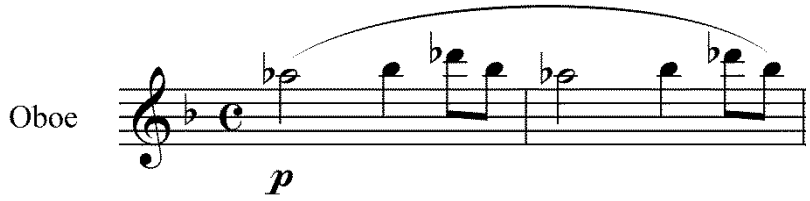
[37] I do not consider the opening leap to be part of the first two examples of the desire motive as this motion is not part of the arched contour and clearly reflects the forest leitmotiv.

Example 4.8: Desire motive, pg. 213-214 ms. 6-3.



These negative emotions are also bound to the pitches in this iteration of desire, which reflect the pitches heard when Mélisande originally realizes her sense of self in Act I, Scene 1. Shown in Example 4.9, the leitmotiv associated with Mélisande's sense of self is heard as an A♭-B♭-D♭ arch. So too is Golaud's desire in Example 4.8. It could be argued that the two leitmotivs play out on the same pitches since Golaud is referencing Mélisande. However, this is too simple of a view given the dynamic nature of Debussy's evocation of mental states. More telling, the sense of self shown in Example 4.9 is heard when Mélisande discards a crown into a small pond in the forest where Golaud will shortly stumble across her. It is never mentioned where the crown came from, and Mélisande resists discussing it with Golaud, but there is a sense the crown represents something Mélisande previously desired, but desires no more. The crown works as another symbol in Allemonde, the tie to earthly possessions (i.e., the opposite of what a Symbolist woman should be seeking). Thus, when Mélisande discards her crown, her sense of self becomes bound to the relinquishing of something she once cherished. Crown discarded, her true desire is for transcendence.

Example 4.9: Mélisande's leitmotiv, pg.2 ms. 7-8.



Returning to Golaud's conversation with Pelléas (Example 4.8), something similar happens here: Golaud must discard something he previously valued to achieve a core desire. In this case, he senses he must discard Pelléas to possess Mélisande. This does not mean he feels he must kill Pelléas at this moment. His clearly conflicting desires in the castle vaults preclude this. Rather, Golaud consciously—diatonically—feels Pelléas and Mélisande must be separated

forever so he can realize his desire to solely possess her. As before, Golaud defines himself as the character most removed from the ineffable (i.e., the character who does not realize what is really going on in his own world).

Golaud's mental states once again take control of the music during Act III, Scene 4. This is the pivotal scene where Mélisande and Pelléas catch a glimpse of transcendence in the light of the lamp, sealing their fate in the process. As Hanak notes, "the two lovers have already embarked on a journey into the beyond; transfixed by the purifying presence of transcendence, they are standing far apart, motionless, absorbing each other with looks and unspoken words."[38] What is most important is that this encounter between Pelléas and Mélisande is related to Golaud, and hence to the audience, through the mouth of Golaud's son, Yinold, as he stands on Goalud's shoulders to spy on Pelléas and Mélisande. Throughout, Golaud questions Yinold about what the two are doing, and Yinold's responses prompt Golaud to lose control of his mental states.

As shown in Example 4.10, the audience hears another transformation of the desire motive in the clarinet and bassoon as Golaud asks Yinold "are they speaking" (*Est-ce qu'ils parlent?*)? This iteration alters (and obscures) the motive's surface-level rhythm by starting on a half-note and adding an ornamentation on two eighth-notes. Yet the base arch is still heard in quarter-notes (referencing the bassoon: B-C♯-D-F-E-B-A). The more telling alteration in the arch comes in the third measure of Example 4.10, where there is a sudden jump from the apex down to the starting pitch. This jump occurs immediately after Yinold responds with a "no" and Golaud's emotions slow alongside this drop. The orchestra has returned to a baseline emotion. Yet Golaud's train of thought does not stop here. As Yinold relays that Pelléas and Mélisande

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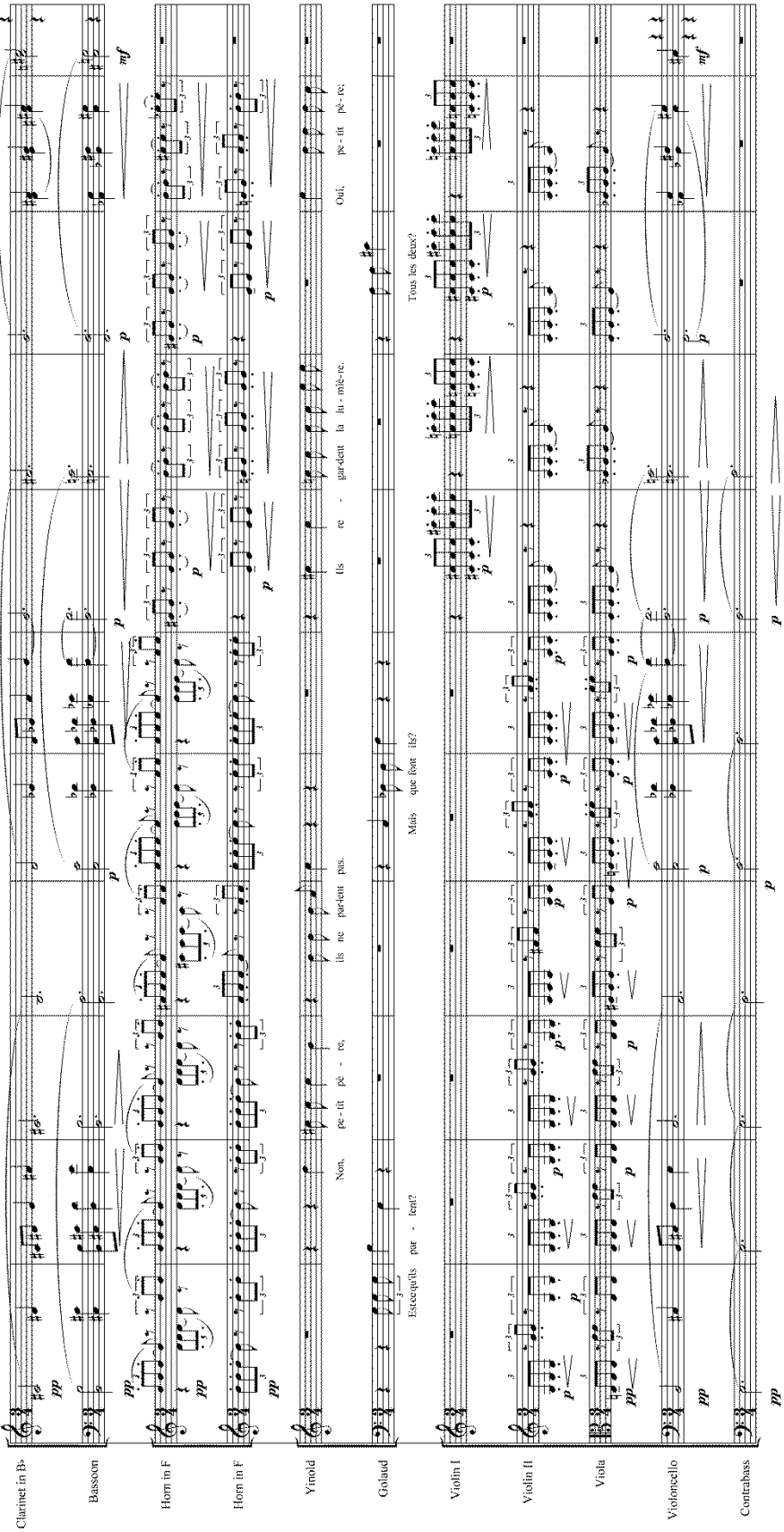
[38] Hanak, *Maeterlinck's Symbolic Drama*, 14.

Example 4.10: Fate and desire motives, pg. 244-245 ms. 1-5.



are not speaking (*ils ne parlent pas*), the audience hears Golaud's sobering disappointment as the rhythm slows and the line drops below the starting pitch.

The same progression of mental states occurs after Yinold negatively responds to Golaud's second question (*Sont-ils près l'un de l'autre?*) and one paradoxically hears through Golaud's negative emotions that he *desires Pelléas and Mélisande to be close to each other*. With his relationship to Mélisande clearly failing in his mind, an overt physical action linking Pelléas and Mélisande as lovers would give a clear course of action: Golaud need no longer feel conflicted about whether or not to kill Pelléas (as he did in the vaults).

Golaud is not down for long, though, immediately asking Yinold what the two are doing (*Mais que don't-ils?*). The audience once again hears Golaud's desires overtake his state of mind. Yinold takes longer to respond to this question, and the audience can hear Golaud's mental processes stop as he waits for a response from his son at the end of the sixth measure. When Yinold does respond that they are looking at the light (*Ils regardent la lumière*), it catches Golaud off-guard: the clarinet drops a perfect fourth, in the bassoon but a half-step. Lacking a sense of the ineffable, Golaud does not know what to make of a scene that is so far removed from his defined, physical reality. He quickly recovers and asks if they are looking at the light together (*Tous les deux?*), and when Yinold responds with a "yes," Golaud's emotions erupt in the form of planing augmented chords. In Golaud's mind, it appears that the two of them staring at the same light is all the evidence needed to condemn. Further in the scene, beyond Example 4.10, Golaud continues to question Yinold and his emotional states become more frenzied. This is the culmination of Golaud's desires, as the object switches from caring for a beautiful woman to killing his half-brother to maintain a relationship he does not realize never existed. Golaud continuously apperceives his role in Allemonde through the orchestra. However, without a

connection to the ineffable, he misperceives and comes to the conclusion that Pelléas must die to keep his destined relationship with Mélisande alive.

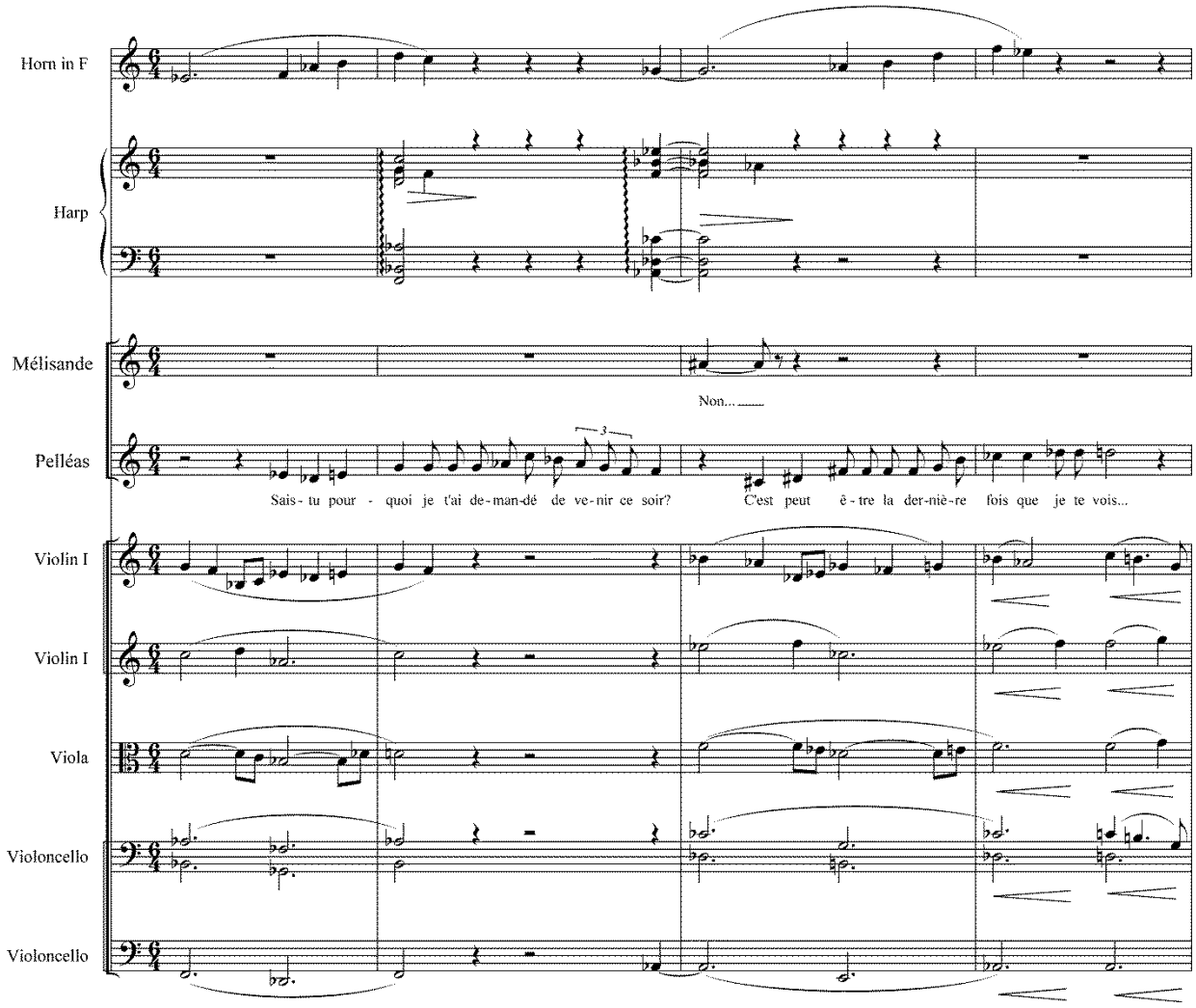
Of course, Pelléas and Mélisande's fixation on the light is only negative in Golaud's mind. It conveys transcendence to Mélisande, and will shortly be perceived similarly by Pelléas. This apperception of desire is heard in Act IV, Scene 4, wherein Pelléas achieves transcendence by Golaud's sword. The scene opens with Pelléas awaiting Mélisande by the Blind Man's Well, with Mélisande arriving after a few tense moments. Upon her arrival, Pelléas asks her to come into the shadows. As previously mentioned, Mélisande claims that she wants to stay in the light (*Laissez-moi dans claret*) where she can be seen. Alluding to Maeterlinck's global symbols, this represents the moment where Mélisande outwardly embraces the circle of light fate has cast in front of her in Maeterlinck's play—an act that happened long ago in Debussy's opera—while Pelléas still avoids its glare.

As their conversation continues, Pelléas asks Mélisande if she knows why he asked her to meet him at the well (*Sais-tu porquoi je t'ai demande de venir ce soir?*). Mélisande responds that she does not, and Pelléas informs her that this might be the last time they see each other (*C'est peut-être la dernière fois que je te vois*). Pelléas explains that he must go away forever (*Il faut que je m'en aille pour toujours*). After some prodding, the truth is revealed: Pelléas must leave because he loves Mélisande, who reciprocates his affection.

Before the truth of their love is confirmed in the dialogue, though, Debussy unveils Pelléas's emotions in the orchestra. As shown in Example 4.11, the desire motive is heard in the horn when Pelléas asks if Mélisande knows why he asked her to the well, and also when he explains this might be the last time they see each other. The motive uniquely starts on a dotted half-note. With Pelléas still resisting fate in the shadows, there is a sense of inertia, a resistance

to starting down this path. As this gives way, the audience hears the desire motive move by steps and leaps. Pelléas's emotions become unbound, and the leitmotiv ends a step below the apex; Pelléas's desire is positive. The second iteration of the desire motive in Example 4.11 starts slightly higher than the first, and one hears Pelléas's emotions building as Golaud's built to an apex while he spied on the young lovers. While Pelléas states that he must leave, it is clear that an underlying desire for Mélisande is heavy on his mind.

Example 4.11: Desire motive, pg. 330-331 ms. 4-1.



The way Pelléas's desire structures itself melodically gives the audience an even deeper understanding of this scene. Realized within an octatonic scale, global symbols fuse Pelléas's

mind. Antokoletz and Smith note the presence of the octatonic scale starting on C-C♯ that pits F♯ major (light) against C major (darkness) in this scene, but Pelléas enacts a different fusion of ideas at this moment. Played out on the octatonic scale C♯-D-E-F-G-A♭-B♭-B, Pelléas combines care for Mélisande (C♯ major), her beauty (E major) and fear (C♯ minor). With these global symbols in mind, the audience hears Pelléas's conflicting motivations, his desire for Mélisande and her beauty, and his fear of the retribution from Golaud that is sure to come. However, the uplifting contour of the desire motive tells the audience that the former outweighs the latter, motivating Pelléas to kiss Mélisande. The action on stage is preceded by the fusion of thoughts and Debussy once again adds mental depth to Allemonde.[39]

Pelléas's mental development is completed shortly. Once the two embrace, Pelléas and Mélisande hear the sound of the gates locking them inside the park. With the locking of the gate, Pelléas cannot escape Mélisande's presence, and the two are sure to be caught together. Seeking transcendence, Mélisande takes this as another step towards fate, claiming this as something good (*Tant mieux!*). Pelléas has a different reaction. Upon hearing the gates locking, he notes that it is too late. Yet this statement is followed by a moment of insight into the ineffable: "You see, you see… It is no longer within our power" (*Violà, violà… Ce n'est plus nous qui le voulons!*). This marks Pelléas first true glimpse of fate. His love realized, Pelléas finally seeks the transcendence that awaits.

This insight by Pelléas is accompanied by one last evocation of desire. As shown in Example 4.12, the desire motive is heard in the English horn, bassoons and horns as Pelléas

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[39] It is interesting to note that after Pelléas declares his love for Mélisande, he tells Mélisande to come into the light (*Viens dans la lumière*) so they can see how happy they are. The symbolization should be obvious as Pelléas now wants to see his fate, as Mélisande had earlier coaxed him.

claims "it is no longer within our power." It is debatable where the leitmotiv ends, but reasonable to suggest that it is complete on the second beat of the second measure, with the final beat acting as a precursor to the downbeat of the third measure (which is definitely not part of the desire motive). Further, the second beat of the second measure marks the completion of the arch, while the third beat would add an additional upward motion. This border defined, the audience hears the desire motive played on a pentatonic scale (G-A-B-C♯-E), and thus one hears a transposition of Mélisande's original sense of self (shown in Example 4.9) in the arched contour of the English horn.

As with Golaud's echoing of Mélisande's original sense of self, the audience hears Pelléas realizing that he must discard something he held valuable to achieve his true desire. Pelléas knows he must discard his life to be with Mélisande, whom he can now perceive as one of the pre-destined. One hears the desire motive transposed up a major second two measures later as Pelléas declares that "all has been won tonight" (*Tout est sauvé ce soir!*), and, combining the two instances of desire, it appears Pelléas's transformation from predisposed to enlightened soul is complete. Pelléas is now thinking as did Mélisande when she discarded her crown, and he finally glimpses the ineffable, something that will always remain barred from Golaud.

With this act of cognition, the music completes its mapping of Pelléas's transformation. From the unconscious desire of the whole-tone scale when he first met Mélisande at the Blind Man's Well, a renewed Pelléas delves into the ineffable.[40] As in all these scenes, music fills a cognitive deficit found in Maeterlinck's drama. Golaud's implied intentions are verified,

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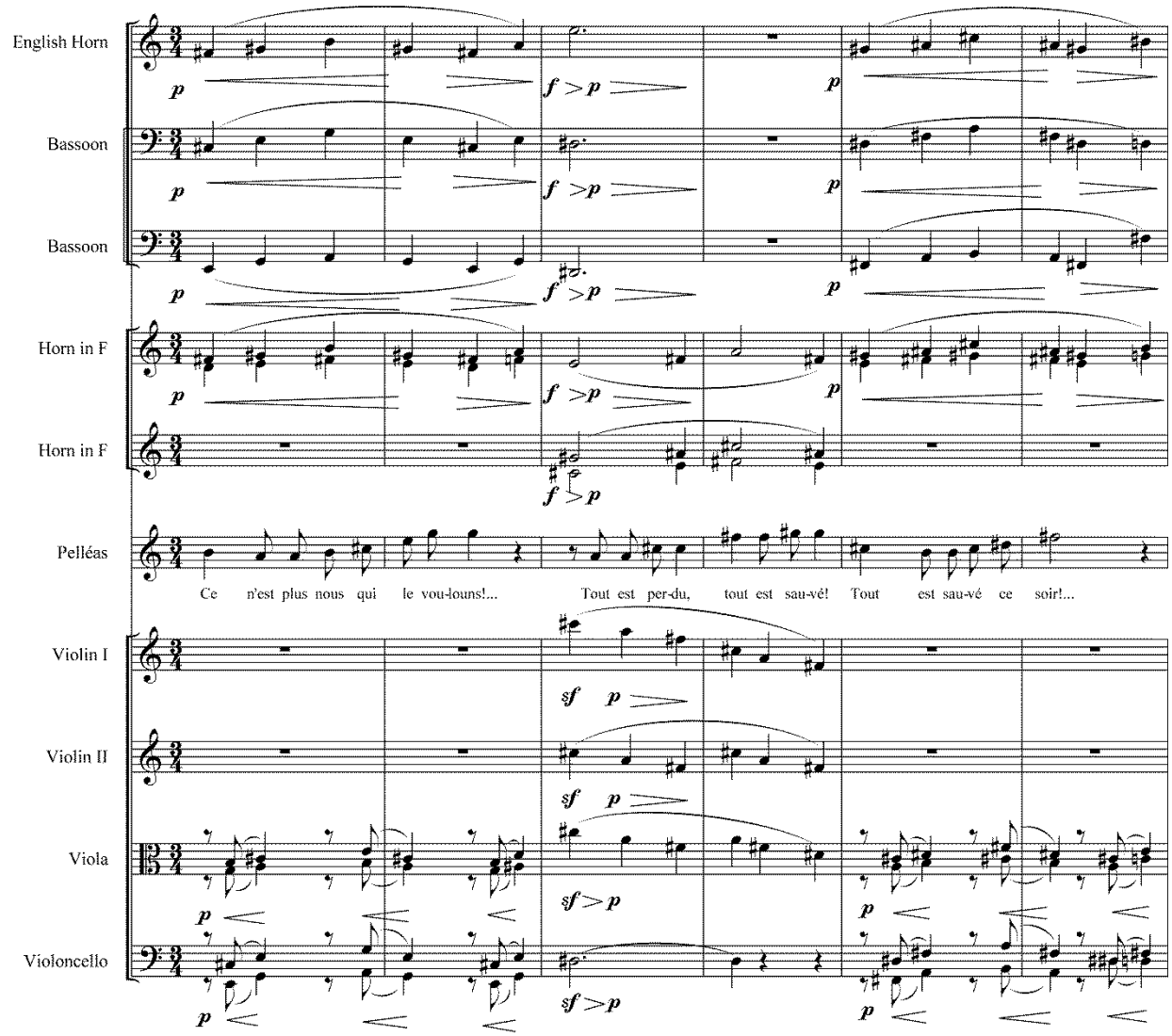
[40] It is fitting that Mélisande and Pelléas both realize their renewal at the Blind Man's Well, as it has once again allowed those who were blind to truly see.

Mélisande's intentions of fate are realized far earlier, and Pelléas's intentions move from unconscious (predisposed) to conscious (enlightened).

Example 4.12: Desire motive, pg. 349 ms. 2-7.



Section 4d: Redefining Renata

> In a room as cheerless as my own and also lit brightly by the moonlight, there stood, in shaking terror, a woman stretched against the wall, her hair loose and flowing. No other human being was there, for all the corners of the room were clearly lit and the shadows lying on the floor were clear-cut and distinct; and yet, shielding herself, she thrust out her arms in front of her as if someone were

> advancing towards her. In this moment there was something terrifying in the extreme, for one could not fail to understand that she was threatened by some invisible apparition.[41]

Renata's paradox in *The Fiery Angel* is defined in this opening glance: either she is able to interact with ineffable forces, or she is acting out a charade for some other purpose. Ruprecht and the reader are both presented with this problem, and it defines the novel. Through Ruprecht's voice, the reader understands his hesitance in accepting the ineffable. Implicit is the assumption that the reader has never had any interactions with the ineffable. Thus, there is an initial sense of misbelief: Ruprecht and the reader try to discern the true cause of the calamity. If nothing else, Renata catches Ruprecht and the reader off-guard, and this is amplified when Renata calls Ruprecht by name. Ruprecht informs the reader that he has never met Renata, and has no idea how she knows him. Thus the paradox. She either overheard his name earlier, or was informed by some divine intuition. Again, the lack of concrete proof of the ineffable makes the former more believable.

With this in mind, Ruprecht wards off the demon accosting her (even he is not sure how). Renata then tells her life story without prompting. When she was eight years of age, Renata claims she was visited by a fiery angel named Madiël. Madiël set Renata on the path to sainthood; she was able to perform miracles. However, as she grew older, she noticed women getting married and longed to physically unite with Madiël. Madiël rejected her, so she attempted to trap him. Breaking from her embrace, Madiël vanished from Renata's life. He eventually returned after her endless prayers, and promised to assume a human form to unite with her in two months. After these two months, Renata encountered Count Heinrich, a doppelganger of Madiël,

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[41] Valery Bryusov, *The Fiery Angel*, trans. Ivor Montagu and Sergei Nalbandov (Sawtry, England: Dedalus Ltd, 2005), 32.

and the two began a romance. However, after two years, Renata observed that Heinrich became possessed by dark thoughts. He suddenly left. Without her protector, she claims she was accosted by dark spirits, and so too left the castle she and Heinrich called home. The dark spirits continued to follow her until that night's encounter with Ruprecht. Renata's life story is quite a tale, and reinforces Ruprecht's suspicions. Either this woman was shunned by an angel, only to be embraced and shunned again, or she has other intentions. To accept her claims would require a belief in the ineffable, something neither Ruprecht nor the reader is prepared to grant.

The following morning, the innkeeper informs Ruprecht that she should not have given Renata lodging since Renata seduced the beloved Count Heinrich from a holy life, introducing him to demons and magic. With this second report of the ineffable, Renata's story becomes more plausible. However, Ruprecht's mistrust has not abated. The innkeeper notes that Renata and Heinrich lived along the Rhine in Germany (where the story is set and from where Ruprecht originated), while Renata claimed she lived with Heinrich in Austria. This detail reawakens Ruprecht's mistrust, and he openly wonders if Renata thinks him an easy mark. Assuming her sanity, either this woman has been assaulted by demons and needs a protector, or she is concocting a tale so as to abuse Ruprecht's good nature. The differentiation rests on the existence of the ineffable.

Regardless, Ruprecht helps Renata search for Heinrich (most likely because he is attracted to her). While searching for Heinrich, Renata is more than willing to have Ruprecht shoulder the expense of her food and housing. Sometimes she allows him to sleep in the same bed. She claims she wants Ruprecht nearby in case any demons attack her at night. But with no sight of Heinrich—and no evidence of the ineffable—Ruprecht cannot but mistrust her motives.

This changes when they move to Köln. In Köln, Ruprecht and Renata communicate with demons through knocking. In this manner, they learn that Count Heinrich will soon be coming to Köln. This episode marks the first time Ruprecht has a direct interaction with the ineffable, and the experience (transmitted as fact through Ruprecht's report) seems to justify Renata's claims. Ruprecht is caught in the excitement of conversing with demons, and the ineffable seems all too real. But Renata wants to learn more about when Heinrich will be coming, so she covers Ruprecht in a lotion-like concoction that allows him to travel to the witch's Sabbath. Conveyed by a flying black goat to the Sabbath, Ruprecht has a discussion with Master Leonard (i.e., the Devil). The ineffable becomes real in his world. Renata's intentions are beyond doubt.

Despite the Devil's assertion that Heinrich is coming to Köln, he does not arrive. Becoming impatient, Ruprecht and Renata attempt to control a demon to discover Heinrich's whereabouts. However, their magic is ill prepared. Accosted by the demon, Renata falls into a deep depression. Fearing for Renata, Ruprecht heads off to see Agrippa of Nettesheim, a famous magus and supposed master of several demons in the guise of dogs.[42] Surprisingly, the existence of the ineffable is flatly denied by Agrippa. Claiming he is no magus, and calling the idea of demons in the guise of dogs absurd, Agrippa asserts that his earlier writings on magic and the occult were acts of youthful naivety. Agrippa points out that all of Ruprecht's encounters with the ineffable happened in isolation with Renata, and she could have easily been deceiving him. Most likely, it was Renata knocking (as the demon) in response to their questions. Further, he asserts that she was only pretending to be depressed after being supposedly accosted. Ruprecht tells Agrippa of his trip to the witch's Sabbath and his meeting with Master Leonard, but

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[42] Agrippa of Nettesheim was an actual person who published books on the occult. His presence in *The Fiery Angel* is an attempt to root the story in reality.

Agrippa posits that the lotion he used was a narcotic and hallucinogen; Ruprecht's trip was nothing more than a drug induced dream. Ruprecht's interactions with the ineffable appear to be staged by Renata. Suspiciously, these interactions occurred as his belief in Renata and his desire to continue supporting her financially waned.

Agrippa's logic is the tipping point for Ruprecht. Renata intends only to deceive, to use the knight until he has nothing left. Determined to leave her, Ruprecht returns to Köln to find that Renata has not been depressed for days. This further condemns her. Yet Ruprecht's determination is undermined when Renata tells him that, guided by demons, she came across Count Heinrich in Köln. After she threw herself at his feet, Heinrich dismissed her, saying she was an emissary of the Devil sent to rob him of his place in Heaven. This dismissal changes something in Renata. She no longer believes Heinrich is an avatar of her fiery angel. Her statement that Heinrich is *not* Madiël places Renata in a new light. By unbinding Heinrich and Madiël, Renata denies the ineffable. Thus, the existence of the ineffable is no longer needed to understand—or correctly project—Renata's intentions. Whether it is really a force in this world or not, Renata's reaction to this revelation about Heinrich shifts the ground: with her search concluded, she can either stop using Ruprecht (defining her intentions as tied to *her* belief in the ineffable), or find a new reason to string him along.

Her denial of the ineffable takes a violent turn, though. She insists that Ruprecht kill Heinrich for deceiving her, and she offers in return to be his wife. Her intentions are once again suspect. Either she is again using Ruprecht, or she is honestly so upset with Heinrich that she wants him dead (thus placing herself in Ruprecht's debt). The upside of this offer seems worth the risk to Ruprecht, and he sets a duel with Heinrich. However, right before their duel, Renata has a change of heart. She tells Ruprecht not to harm Heinrich since it was she that "like a

blade… cut through all his hopes."[43] This is another moment of sanity for Renata, as her perception of her history aligns with that of others. Recall that the innkeeper claimed Renata seduced Heinrich and took him away from his quest for a holy and chaste life. Now, Renata acknowledges this reality.

But her intentions once again become obscure. Renata directs Ruprecht to continue with the duel, but not to harm Heinrich. Her disregard for Ruprecht's safety conflicts with her earlier offer of marriage, and Ruprecht once again feels as if left in the dark. Again he carries out her wishes, and goes to the duel with no intent of harming Heinrich. Not surprisingly, Heinrich injures Ruprecht while remaining unscathed himself. But Heinrich does not finish the job. Not being able to live with Ruprecht's blood on his hands, Heinrich helps Ruprecht back to town, where he can heal.

Returned to Köln, a changed Renata tends to Ruprecht. She informs Ruprecht that she sent him to the duel because she had prayed to God; if they were meant to be together, he would live. She saw the duel as a trial of their love. Her belief in the ineffable returned, and thus her undying commitment to it, she came to see the duel as a metaphysical test. Upon his blessed return, Renata takes care of the injured Ruprecht as would a wife, asking nothing in recompense. Renata's actions once again tether her to the ineffable: it is only a perceived act of God that commits her to Ruprecht. Her original tie to Madiël is inverted, and now her belief in the ineffable benefits Ruprecht, who gladly accepts what he is given.

But this stasis too is eventually broken. Renata and Ruprecht grow further apart and Renata claims Madiël has visited her once again. Madiël informs her that he never returned to claim he would appear in human form. If she thought she had talked to him, she was actually

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[43] Bryusov, *The Fiery Angel*, 198.

talking to the Devil disguised as Madiël. To atone for her sins, Madiël orders Renata to immediately leave Ruprecht and join a convent. True to form, Renata's need to atone is convenient: she leaves Ruprecht as she feels there is nothing else to gain from him.[44] Once again, Renata's true intentions are bound to the suspect presence of the ineffable: either she is honestly atoning for what she did to Heinrich, or she is making an excuse to leave Ruprecht. Either way, she leaves.

Through a series of events, Ruprecht rejoins her at a convent, but accompanying an inquisitor sent to investigate supposed demonic hauntings.[45] The head sister tells the inquisitor their convent has been assailed by demons since Renata's arrival. Renata is subsequently put on trial, charged with working with the Devil. When asked if she has had dealings with the Devil, Renata volunteers that she has. This claim is resisted by Ruprecht, who still questions the reality of the ineffable and Renata's intentions. Nevertheless, Renata answers all of the inquisitor's questions without delay, condemning herself to death with each word.

The night after her trial, Ruprecht breaks into Renata's cell to free her. What happens after defines her, but leaves Ruprecht in the dark. She first tells him he revolts her, and does not understand her. She claims Heinrich would understand and kill her on the spot if she asked, but Ruprecht is too much a knight to see what must be done. Dismissing her protests, Ruprecht tries to free Renata, who immediately calls for Madiël to protect her. Eventually, Renata is pushed beyond the brink and dies. Yet, just prior, Ruprecht is caught off-guard by her claim that she is

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[44] When Ruprecht asks Renata to leave Germany with him and start a new life in America, she aptly points out that she only said she would marry him if he killed Heinrich, which he did not.

[45] Ruprecht was unaware Renata was at the convent when he got there. In fact, he had no idea where she went after she left.

so happy to be with him at the end. With her death, her true intentions die also. Without access to her mind and lacking confirmation of the ineffable, all questions remain unanswered.

The Fiery Angel does not end with Renata's death, though. Ruprecht recounts how later he came across a dying Agrippa of Nettesheim. On his death bed, he is still attended by his loyal dog, who he had denied was a demon under his control. But in his dying moments, Agrippa removes the collar from the dog and says "begone, Accursed One! From you are all my misfortunes!"[46] The dog quickly runs out of the house and kills itself by jumping into a rushing river. No explanation is given for the dog's actions, yet it is suggested that Agrippa's companion was truly a demonic manifestation. Most importantly, the dog's suicide redeems Renata. In the dog's death, Ruprecht perceives an unmistakable sign of the ineffable. If Agrippa kept a demon as a dog, it is plausible that Renata had interactions with angels and demons.

The existence of the ineffable confirmed, Renata's story becomes clear. She betrayed Madiël by desiring a physical relationship. The Devil took this chance to trick her into believing Heinrich to be her beloved. In doing so, he condemns both souls to a life of sin. Heinrich realizes this before Renata, and leaves. Upon finding Ruprecht, a confused Renata is obsessed with finding Heinrich/Madiël again. With the return of Madiël after the duel, Renata realizes how she has been deceived. Realizing the damnation of her position, Renata attempts to rectify the situation by joining a convent. But the Devil has too firm of a grip on her. With the inquisitor at her doorstep, Renata cedes control of her life. She realizes that the only way to find true happiness is through death and the possibility of a reunion with Madiël in Heaven. She is happy to be with Ruprecht at the end, as he granted her this transcendence.

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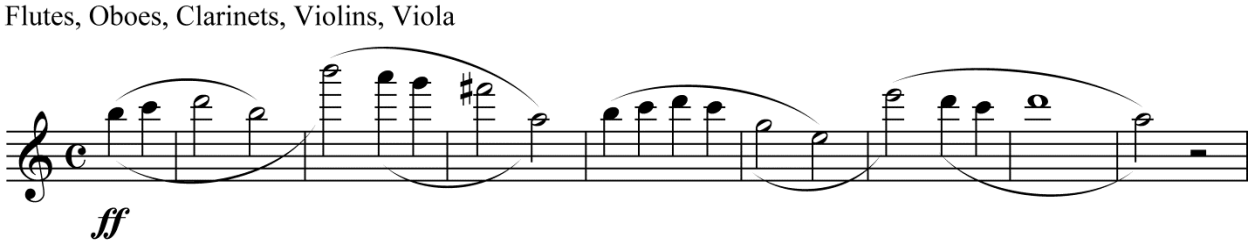
[46] Bryusov, *The Fiery Angel*, 389.

In the end, Bryusov reveals Renata as an enlightened soul. Her intentions are only confusing because she is living in a different reality than Ruprecht (and the reader). Until the hysteria of the convent, all of Ruprecht's encounters with the ineffable were in isolation with Renata, and her motives and veracity were always in question. But the ineffable was always very real to Renata. A pawn of forces much stronger than herself, she could not but seem as untrustworthy to a skeptical world. Her acceptance of transcendence in death is the testament of her veracity. The suicide of the dog confirms this.

As previously stated, Prokofiev recasts the character of Renata in his opera. In the opera, the audience never doubts her intentions. Her belief in the ineffable is reified in the music throughout (not simply confirmed after her death). The ineffable is captured by the leitmotiv shown in Example 4.13. This leitmotiv is heard whenever Renata references Count Heinrich *or* Madiël—i.e., her mental state in the orchestra is the same when discussing either character. Renata *believes* the two individuals are the same person. Thus, she believes in the ineffable.

Example 4.13: Count Heinrich/Madiël's leitmotiv, Act III entr'acte, rehearsal number 370.[47]



This is not to say the presence of the ineffable is not questioned in Prokofiev's opera. In an attempt to mock the Symbolists, Prokofiev sought to remove any visual references to the

[47] The slurs in this example are taken from the flute.

ineffable.[48] Instead, he shifts the ineffable into the orchestra. When Renata and Ruprecht converse with demons in Köln in Act II, Scene 1, the audience experiences the demons through the audible, not the visual. These constitute markedly different realms: the visual conveys everything that is confirmed as true (such as Renata and Ruprecht going on a search for Heinrich); the audible defines what should be questioned.

This might be a step too far, though. One cannot question the mental states of the characters offloaded to the orchestra. For instance, when the leitmotiv from Example 4.13 is heard, one does not question whether Renata believes Heinrich and Madiël are the same person. Her belief is stated as fact. However, one does question the validity of her belief. As the only character at the beginning of the opera experiencing this mental state, Renata sets herself apart. It is not the audible itself that is questioned, but what is audible to Renata. The aforementioned leitmotiv is clearly audible to Renata; the knockings in Köln are also audible to Renata. The difference between these two phenomena is that Ruprecht claims he can hear the knocking as well.

Ruprecht's ability to hear the knocking does not automatically make it a trustworthy sound, though. Prokofiev casts doubt on the ineffable through his libretto and staging, and the audience is aware that Ruprecht does not unconditionally accept the ineffable as a force in his world. Tellingly, when he discusses Count Heinrich or Madiël, the mental state of the two as one (as reified in the motive) is not heard. Ruprecht is skeptical. Just as in the novel, the ineffable is left in doubt despite isolated interactions that hint at its presence.

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[48] Simon Morrison, *Russian Opera and the Symbolist Movement* (Berkley, California: University of California Press, 2002), 297.

Prokofiev has otherwise redefined Renata's original dichotomy through this leitmotiv: if the music makes clear Renata's *intentions*, it leaves the listener doubting her *sanity*. There is never a doubt that she believes in the ineffable. There is also never a doubt of her desire to rejoin Heinrich/Madiël. The music belies any thought that Renata might be leading Ruprecht on for her own benefit. What is in question is the distinction between a clairvoyant Renata and an insane Renata. This clarity of intentions is reflected in other changes from novel to opera. For instance, Prokofiev has Ruprecht return from meeting Agrippa believing that he *and Renata* were misled by charlatans and tricksters in their dealings with demons. Bryusov's Renata falls under suspicion, while Prokofiev's Renata is absolved of any wrongdoing. The focus has been shifted from the content of Renata's mental states to their nature.

Ruprecht's return from Agrippa in Act III, Scene 1 acts as a turning point in the opera. Anticipating his return, the audience is given Renata alone in front of the locked door of Heinrich's house in Köln. This new scene disassociates the Renata of the opera from that of the novel. It would have been impossible in the novel as Ruprecht, the trusty narrator, could not have been present. Prokofiev, though, needs this inserted scene. Renata questions Heinrich through the door. She asks if he truly said she was an emissary of the Devil who ruined his hopes for a divine life. Her questions are answered by silence. Despite this, Renata later claims to have kissed at Heinrich's feet, and to have been dismissed. As in the novel, Renata then demands Ruprecht challenge Heinrich to a duel.

This encounter, and Renata's demand of Ruprecht, might be heard as confirming the unreliability of her motives (as in the novel). But Prokofiev intends something different. The audience is presented with a clear action on stage (visual truth) that is later contradicted by the principle heroine (the untrustworthy audible related to Renata). Yet the music, which has always

conveyed her true intentions, does not here convey deception. A different possibility remains. Perhaps, she hears something in Heinrich's silence, something beyond the audience's hearing. One might imagine this audible silence as a breaking point for Renata's fragile mind.[49] Pushed beyond the brink, Renata has heard a reality to match her own hysteric desires. Heinrich's silence becomes an audio hallucination.

Perhaps here one could understand Prokofiev as dismantling the whole Symbolist project, revealing the ineffable as pathology. He does not seize this moment, though. In fact, he contradicts it. While Ruprecht challenges Heinrich to a duel, the audience is left alone with a praying Renata. Renata begs Madiël to show himself. At this moment, Renata and the audience are shown Count Heinrich as a burning silhouette inside his house, "like a fiery angel."[50] As the visual is trustworthy, the sight of Heinrich as Madiël is irrefutable proof of the ineffable. In Prokofiev's operatic world, Heinrich and Madiël *are* the same person.

This reveal is the only visual confirmation of the occult in Prokofiev's opera, and it has lasting consequences. When Ruprecht returns from setting his duel with Count Heinrich/Madiël, Renata tells him he cannot harm Heinrich. As in the novel, this is a moment of clarity for Renata. However, the clarity Renata achieves is different in the two sources. Where Renata came to see the world as did the rest of the characters in the novel, Prokofiev's Renata perceives that the ineffable *is* a part of her world; Renata has been correctly hearing the music from the stage the

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[49] Renata's contradiction of an action on stage is markedly different than Mélisande's similar contradiction at the Blind Man's Well. Mélisande's actions are informed by her ability to perceive the truth of existence, while Renata's actions are perceived as stemming from her own, misrepresented reality. Mélisande misleads as an enlightened woman; Renata misleads as a result of pathology.

[50] Sergei Prokofiev, *The Fiery Angel*, trans. Christopher Hassall (New York: Boosey and Hawkes, 1977), 343.

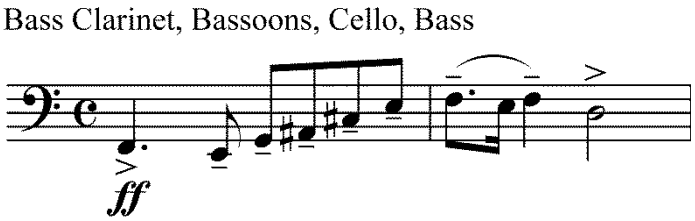
whole time. When Renata directs Ruprecht not to harm Heinrich, she does not do this from guilt. She protects Madiël out of love, demanding that Ruprecht not to harm Madiël (not Heinrich) in their duel.

This confirmation of the ineffable defines Renata as sane; it has the same function as the dog's suicide. Renata is not a lunatic, but one enlightened. Yet this is only apparent to the audience and Renata. Ruprecht claims he did not see Heinrich as Madiël, and so he proceeds with the duel based solely on Renata's testimony. The duel thus functions as a test in Prokofiev's opera. With Renata's sanity confirmed and the presence of the ineffable undeniable, how will Ruprecht interact with these forces?

Fittingly, the duel occurs offstage during the Act III entr'acte; the audience is left with only the music to convey what is occurring. The music is now heard as a source for information that cannot be conveyed through the blunt reality of the visual, it is perceived as a conveyance for something too complex for visual reality. It becomes a portal to the truth of the ineffable.

Perceiving the duel through the orchestra, the audience is presented with an act of apperception. One hears the leitmotiv in Example 4.14, which has been identified throughout with Ruprecht. However, the audience hears this leitmotiv in conjunction with the Heinrich/Madiël leitmotiv (Example 4.13). The musical identification of Heinrich as Madiël is coupled with Ruprecht's sense of self: Ruprecht now perceives Heinrich as Madiël.

Example 4.14: Ruprecht's leitmotiv, Act III entr'acte, rehearsal number 370.



This act of apperception further reifies the ineffable in Prokofiev's opera. Given the outside confirmation of Heinrich-as-Madiël, the audience is left without any doubts that the two are one. This recalibrates the world originally defined by Bryusov. In Bryusov's novel, Heinrich and Madiël are *not* the same person, and the existence of the ineffable is only confirmed after Renata's death. In separating Heinrich and Madiël, Bryusov gifts Renata with transcendence. Her fiery angel did not abandon her; she was deceived. Prokofiev takes this option for atonement (and, thus, transcendence) from Renata. If Heinrich and Madiël are one, Renata truly has been abandoned by the fiery angel that once blessed her. In the opera, this dismissal occurs while Renata is very much alive. Not only has her fiery angel abandoned her, she has to live with that knowledge.

Here is the ultimate mockery Prokofiev inscribes into *The Fiery Angel*. Instead of giving a Renata who welcomes her transcendence in death—accepting her fate as a true Symbolist woman—Prokofiev gives a desperate Renata, one who has seen a darker truth of existence. Though she accurately perceives the ineffable as real, she realizes there is no salvation in death. Prokofiev's Renata begs not to be slain. The confirmation of the ineffable undermines the Symbolist ideology more powerfully than could the representation of a hysteric Renata. Prokofiev confirms the sanity of the Symbolists as he confirms that of Renata's, but he refutes their conclusion. The ineffable is real, but transcendence is not. One must suffer blunt reality, as Prokofiev's Renata must eternally suffer at the hands of the inquisitor.[51] Prokofiev's *The Fiery Angel* defines the damning truth of life. But it is only through the confirmation of the ineffable that this damnation is realized, and it is only through the act of apperception in orchestra that the

[51] The curtain falls with Renata in the hands of the inquisitor; death is not granted to her.

ineffable is confirmed. The confirmation of the ineffable-as-real is the confirmation of human futility.

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