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**“Tone-color, movement, changing harmonic planes”:
Cognition, Constraints and Conceptual Blends in Modernist Music**

The Pleasure of Modernism: Intention, Meaning, and the Compositional Avant-Garde, ed. Arved Ashby (Rochester: University of Rochester Press, 2004), 121–152.

Amy Bauer

I. Ligeti and the “Listenability” of Modernist Music

György Ligeti has discussed his "micropolyphonic" music of the mid-1960s at some length, in an attempt to explain why its composed *structure* seems to bear no relation to its actual *sound*.

Although works such as *Lontano* are based on strict canons, their compositional method assumes a listener will 'mishear' its structure:

[In the large orchestral work *Lontano*] I composed . . . an extensively branching and yet strictly refined polyphony which, however, veers suddenly into something else. . . I don't have a name for it and I don't want to create a term for it. A kind of complex of tone-color, movement, changing harmonic planes.

The polyphonic structure does not actually come through, you cannot hear it; it remains hidden in a microscopic underwater world, to us inaudible. . . . I have retained melodic lines in the process of composition, they are governed by rules as strict as Palestrina's or those of the Flemish school, but the rules of polyphony are worked out by me.

. . . the polyphony is dissolved, like the harmony and the tone-color – to such an extent that it does not manifest itself, and yet it is there, just beneath the threshold.¹

In the above passages, Ligeti appears to ally himself with modernists such as Boulez and Babbitt, composers who use twelve-tone and other methods to systematically organize pitch structure. By composing with "rules as strict as Palestrina's" that paradoxically produce an "inaudible" structure, however, he presumes that the systematic aspects of this structure—by definition—lie below the threshold of conscious perception. Ligeti's sentiment [122] accords with that of the philosopher Roger Scruton, who states baldly that "The order that exists in [serial and atonal compositions] is not an order that can be heard, when we hear the sounds as music."² Of course the pronounced ideological slant of Scruton's statement is at odds with the illuminating metaphors introduced by Ligeti. Scruton's support for an "order that can be heard . . . as music"

references cognitive research that suggests the apparent "unlistenability" of modernist music, music composed outside the eighteenth- and nineteenth-century system of historically-based, hierarchically-structured tonality.

Without discounting this research, I question Scruton's implication that an "order that can be heard" must serve as a paradigm for listening to music. Fred Lerdahl supports Scruton's view, stating that "Comprehension takes place when the perceiver is able to assign a precise mental representation to what is perceived."³ Using the example of Ligeti's micropolyphonic music, and its accompanying commentary, I will argue that to "hear the sounds as music" is never restricted to parsing a work's concrete, self-referential details, but relies on the necessary mediation of metaphor. Scruton himself argues as much, noting that our experience of music depends on a temporal order of tones "dissolved and reconstituted as a phenomenal *space*."⁴ But the level at which metaphor describes our aural experience varies, and often involves the transference of concepts from more than one area to another.⁵ Any theory of "listening to modernism" must rely not only on conceptual mappings from the temporal to the spatial realm, but on metaphoric projections and connections between music and other experiential domains.

Modern Music is Unlistenable

George Rochberg and Lerdahl argue that modern music is incomprehensible, because its imposed compositional structures resist mental representation and intelligible cognition. Rochberg's 1973 "The Structure of Time in Music: Traditional and Contemporary Ramifications and Consequences" borrows the serial and parallel processing of information model developed in von Neumann's *The Computer and the Brain* (1958) to explain the central nervous system and, by extension, our perception of "pitch combination and temporal flow."⁶ This conceptual framework explains the cognitive success of all music that features repetition of some type, music containing "structural devices and patterns whose fundamental purpose is self-perpetuation."⁷ According to Rochberg, contemporary serial, atonal, electronic and aleatoric musics "overthrow" the temporal structure characteristic of tonality. These works lack

perceptible [123] directionality and causality, and promote a “spatialization” of music, where the “sound substance is formed as the primary object of projection and perception.” Music without a clear intention or goal will fail to produce a coherent, organic entity, “which is to say,” Rochberg asserts firmly, “it cannot be described as art.”⁸

Fifteen years later, with a spate of recent research on music perception at his disposal, Lerdahl attempts to reframe the cognitive dilemma of modernist music. “Cognitive Constraints on Compositional Systems” (1988) expands and generalizes on earlier work that dealt exclusively with the cognition of tonal music.⁹ Lerdahl introduces the dual notions of compositional and listening grammars, the latter referring to the unconscious process by which auditors generate mental representations of the music.

These complementary theoretical constructs illustrate the discrepancy between the intentional (purposeful) construction of a modernist work (using Boulez’s *Le Marteau sans Maître* as a benchmark), and the mental representation that “comprises the ‘heard structure’ of the piece.”¹⁰

Lerdahl’s assumptions vary in name only from those comprising Rochberg’s critique. Both authors assume that effective listening strategies rely on the perception of hierarchical aspects of musical structure. But Lerdahl’s article transcends earlier polemics by presenting a positive program, in the form of three categories of cognitive constraints that enable listeners to generate mental representations of a work:¹¹

- 1) *Restrictions on allowable event sequences*
A musical texture must be resolvable into discrete elements—identified in a series of eight constraints—which can then be organized by hierarchical strategies. These strategies include symmetry, parallelism, meter, and clearly articulated groups of events.
- 2) *Constraints on underlying materials*
Six constraints ensure that we may comfortably perceive and relate the basic constituents of the musical language. However, they also allow for leaps of cognitive faith, such as the prescription that chromatic subsets satisfy the mathematically-deduced criteria of uniqueness, coherence and simplicity.
- 3) *Constraints on pitch space. . .*

Three constraints within the third category represent a significant step forward in Lerdahl's evolving theory. His constraints on pitch space not only incorporate the notion of "cognitive distance," (suggested by the multidimensional representation of pitch relations proposed by Roger Shephard, among others), but add to that literature, by proposing a pitch space based on reductive logic rather than geometric symmetry.

Lerdahl presents these constraints as neither deterministic nor universally limiting, noting that some "seem to be binding, others optional."¹² But as a whole his listening grammar explains why serial and other pre-compositional structures defy our attempts to perceive them. This creates a [124] situational paradox: although effective *listening* strategies rely on the perception of hierarchy in musical structure, effective *compositional* strategies often locate musical significance in the literal, note-by-note detail of that structure. This fundamental discrepancy marks what Stanley Cavell calls the "burden of modernism," when artistic technique moves beyond our ken:

[T]he procedures and problems it now seems necessary to composers to employ and confront to make a work of art at all *themselves* insure that their work will not be comprehensible to an audience.¹³

The real question posed by "Cognitive Constraints," in an epilogue entitled "comprehensibility and value," is no less than the question of whether a modernist music of consequence is possible. What do we make of a music that is absolute in design and function, but denies perceptual constraints on event sequences, underlying materials and pitch space? If Lerdahl has correctly defined the cognitive parameters of a typical auditor, than for whom is modern music designed? Is it music "for the eye only," or is it music for an auditor who requires neither hierarchical structure nor audible intent? What becomes of modernist music, a contestable yet still-evolving body of works that remain a strong, presence in the postmodern age?

Lerdahl and Rochberg's theories tacitly present tonal and other hierarchically-structured musics as metaphoric models of "normal" cognition, with the implication that atonal and other non-hierarchically structured musics model "abnormal" states of mind. In effect, cognitive constraints function less as a *requirement for*, then a *description of*, ordinary cognition. If modern music lacks all the elements necessary for comprehensibility, then, it must describe an altered state of cognition, perhaps even psychosis. Music that flaunts cognitive constraints might even represent a kind of reified madness.

Modern music is mad

Louis A. Sass equates madness with modernism, in a less tendentious manner, by proposing that many works of modern art and literature exhibit a strong affinity with the phenomenological experiences of patients with schizophrenia.¹⁴ The disjunct narratives and surreal images of avant-garde fiction and visual art reflect the disruption of "reality" we know as madness. Despite lucid moments, the psychotic patient often communicates his or her experiences in an incoherent manner. Discourse that lacks a recognizable theme or narrative line, conventional space-time structure, comprehensible causal relations, and a normal regulation of conventional symbol-referent relationships—all of these features distinguish schizophrenia from other cognitive disorders.

I would argue that modern music, including the composers cited by Lerdahl, presents in an even starker, more visceral model of the cognitive [125] processes that characterize madness. The desultory and inappropriate speech of schizophrenia—which seems to betray a private language known only to the speaker—parallels the private language of serial and atonal music, which lacks a familiar syntax and clear referential meaning.¹⁵ The fragmentation, lack of contrast, and immediacy of a work like *Le Marteau sans Maître* might then be explained as an evocation of madness, of the forms of "internal multiplicity and disharmony" characteristic of schizophrenic experience. Lerdahl describes reactions to *Le Marteau* from listeners who often perceived little more than the sound qualities presented on the surface of the music, making

“what sense they could of the piece in ways unrelated to its construction.”¹⁶ This perceptual strategy mimics the “concreteness” attributed to schizophrenic discourse, a superficial grasp of reality marked by credulousness, certainty and automatic response.¹⁷

But what of the mid-60s work of Ligeti, which lies, at the other end of the phenomenological spectrum? Unlike *Marteau*, much of Ligeti’s music is continuous and marked by strong contrasts of dynamics, register and instrumentation. As an example, I offer the first section of *Lontano*, which begins quietly on a unison A flat (*pppp*), a focal point of clarity joined by clarinet and bassoon (mm. 1-5), followed by oboe, French horn, and trombone (mm. 3-8; shown in figure 6.1).

The neutral timbre, narrow compass, and extremely low dynamic level of this opening gesture give way when a second canonic unit enters in mm. 14-19. During this passage, the dynamic level rises, and a full complement of strings enters to thicken the texture and expand the registral scope. A dense climax occurs in mm. 25-32, where thirty-six strings occupy a range from E4 to D#6 (E4, F#4-C#5, D#5, F#5-C#6, D#6). The gradual but insistent rise in dynamics, tenuto markings, lack of string vibrato, and individual accents in violin and viola seem to focus the music and bring it closer, as pitches gradually disappear from the mass. (D# drops out in m. 32, B drops out in mm. 34-35, and G# drops out in m. 36.)

The minute rhythmic subdivisions of each canonic strand, and the prescription to *enter with an imperceptible attack* combine to deny any recognizable rhythmic punctuation or periodicity. The ametric entrance of canonic strands in different instrumental bodies causes a pronounced waver in pitch. This effect—when added to the implied vibrato of the expressive marking (*dolcissimo, sempre espressivo*)—causes acoustic beats that add resonance, and shift the overtone structure of the canon. There is no harmonic progression in *Lontano*; rather, triads, octave doublings, and stable intervals rise out of the texture and gradually submerge. The only audible formal cues are a registral expansion and contraction that define first of two large sectional shapes: a second expansion is left open, to break off with a sudden change in range and instrumentation, (see the registral outline of this section in figure 6.2). [126]

♩ = 7

Sostenuto Espressivo (♩ = 64)
dolciss., sempre espr.

System 1:
Flute (fl) and Clarinet (cl) parts. Flute part includes markings: ①, +, ③, +, ④, +, ①, +, ②, +, ③. Clarinet part includes markings: ①, +, ②, +, ③, +, ④, +, ①, +, ②, +, ③. Dynamic marking: *pppp*.
Bassoon (bsn) part includes markings: ①, +, ②, +, ③, +, ④, +, ①, +, ②, +, ③. Dynamic marking: *pppp*.

System 2:
Flute (fl) part includes markings: +, ④, +, ③, +, ②, +, ①, +, ③. Dynamic marking: *dolciss., sempre espr.*
Clarinet (cl) part includes markings: +, ④, +, ③, +, ②, +, ①, +, ③. Dynamic marking: *dolciss., sempre espr.*
Bassoon (bsn) part includes markings: ①, +, ②, +, ③, +, ④, +, ①, +, ②, +, ③. Dynamic marking: *con sord. dolciss., espr.*

System 3:
Flute (fl) part includes markings: ①, +, ②, +, ③, +, ④, +, ①, +, ②, +, ③, +, ④, +, ①. Dynamic marking: *pppp*.
Clarinet (cl) part includes markings: +, ④, +, ③, +, ②, +, ①, +, ③, +, ④, +, ①, +, ②, +, ③, +, ④. Dynamic marking: *pppp*.
Bassoon (bsn) part includes markings: ①, +, ②, +, ③, +, ④, +, ①, +, ②, +, ③, +, ④, +, ①. Dynamic marking: *pppp*.
Horn (hn) part includes markings: ①, +, ②, +, ③, +, ④, +, ①, +, ②, +, ③, +, ④, +, ①. Dynamic marking: *pppp*.
Horn (hn) part includes markings: stopped ①, +, ②, +, ③, +, ④, +, ①. Dynamic marking: *dolciss., espr.*
Horn (hn) part includes markings: attack imperceptibly.

The musical score shows the opening of Ligeti's *Lontano*. It features staggered entrances for the oboe, clarinet, and trumpet. The oboe part begins with a circled '1' and is marked 'dolciss., espr.'. The clarinet part begins with a circled '2' and is marked 'attack imperceptibly ppp'. The trumpet part begins with a circled '3' and is marked 'con sord., dolciss.'. Above the oboe staff, there are circled numbers 2, 3, and 4, indicating staggered entrances for other instruments. The tempo marking is $\text{♩} = 64$.

*) The tempo marking $\text{♩} = 64$ is only a general indication. The piece must be played with great expression; apart from the indicated *rallentandos* and *accelerandos* other fluctuations in tempo are permissible.

**) Bassoon mutes: a cloth placed in the bell of the instrument. All *Vln. I*, *Vln. II*, and *Vcl.* are muted, so are the *Vla.*, except for the first four violins, which begin *senza sord.* and play *con sord.* from bar 17 onwards.

Figure 6.1. Ligeti, *Lontano*. Opening accretion of instruments, mm. 1–7 (circled numbers indicate staggered player entrances, by desk). Schott Music International, Mainz. Used by permission.

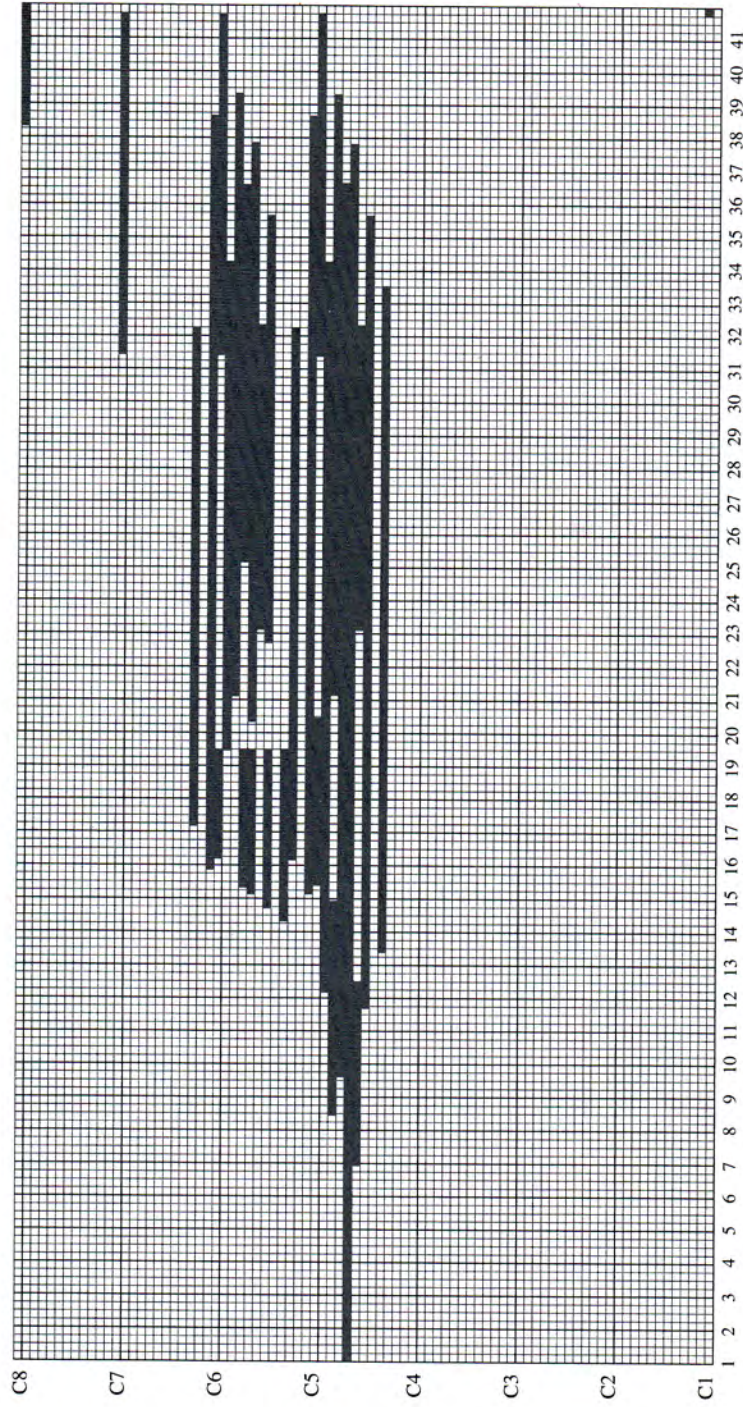


Figure 6.2. Ligeti, *Lontano*. Registral graph of mm. 1–41. Schott Music International, Mainz. Used by permission.

[129] Ligeti has referred to a “new language” in *Lontano*; the work is as far removed from the sound and syntax of Boulez as it is from the music of earlier centuries.¹⁸ This “complex of tone-color, movement, changing harmonic planes” obeys few of Lerdahl’s constraints; it resists hierarchical structuring by a listening grammar, and is devoid of the marked transitions that might structure the work on a higher level. In a manifesto of 1988, the composer said, “I favor musical forms that are less process-like and more object-like. Music as frozen time, as an object in an imaginary space that is evoked in our imagination through music itself.”¹⁹ Here Ligeti embraces Rochberg’s “spatialization” of music, by purposively embracing a compositional style that contrasts with that of the serialists. Paradoxically, Ligeti’s music *also* evokes aspects of psychotic experience, invoking, as Sass records, “a universe dominated by objects rather than by processes or actions.”²⁰ Persons afflicted with schizophrenia often replace the teleological, dynamic and affective aspects of human experience with expressions and actions that emphasize the immobile, static, and spatial aspects of the world. The author of *Autobiography of a Schizophrenic Girl* presents her reality as an “alien and forbidding world, pervaded by a sense of illimitable vastness.”²¹ She continues in describing

a country, opposed to Reality, where reigned an implacable light, blinding, leaving no place for shadow; an immense space without boundary, limitless, flat; a mineral, lunar country, cold as the wastes of the North Pole. In this stretching emptiness, all is unchangeable, immobile, congealed, crystallized. Objects are stage trappings, placed here and there, geometric cubes without meaning.²²

Micropolyphonic works such as *Atmosphères* and *Lontano* evoke a similar “unchangeable, immobile, congealed, crystallized” landscape. In this musical landscape, as in the psychotic experience, time is equated with space, and all that is connected and organic gives way to a discrete, formal isolation, the “infinite present” described by one patient.²³ Ligeti has often compared his music to the paintings of Cézanne’s “false” perspective in which time is a field that stretches out in all directions.²⁴ He describes *Lux Aeterna* (1966) as a “waterfall with a mirror,”

constantly smoothing and reflecting back on itself, while comparing the *Concerto for Violincello* of the same year to a landscape.²⁵

I find many comparisons between schizophrenic accounts of the “infinite present” and Ligeti’s vistas, intended to simulate a “frozen time” full of events, objects and closed forms. The composer states “from the continuity of time, that lasts indefinitely . . . I show a window, that opens out to particular details in this time-process.”²⁶ *Continuum* for harpsichord (1968) and the second Etude for organ, *Coulée* (1969) (the title means flowing or streaming) achieve a sense of stasis through extremely rapid activity, by attempting a kind of *trompe-d’oreille*: [130]

I thought to myself, what about composing a piece that would be a paradoxically continuous sound, something like *Atmosphères*, but that would have to consist of innumerable thin slices of salami? A harpsichord has an easy touch; it can be played very fast, almost fast enough to reach the level of continuum, but not quite (it takes about 18 separate sounds per second to reach the threshold where you can no longer make out individual notes and the limit set by the mechanism of the harpsichord is about 15 to 16 notes a second). As the string is plucked by the plectrum, apart from the tone, you also hear quite a loud noise. The entire process is a series of sound impulses in rapid succession, which create the impression of continuous sound.²⁷

Ligeti’s description eerily approximates one schizophrenic patient’s reported experience of “an intense cerebral activity in which inner experiences took place at greatly increased speed, so that much more than usual happened per minute of external time. The result was to give an effect of slow motion.”²⁸

Compositions that exhibit “static form” represent only part of Ligeti’s oeuvre; his music resists all categorization, as it resists organization into perceptible hierarchies or easily heard forms. Works such as *Lontano* and the *Requiem* fit comfortably within the contemporary “canon,” such as it is, while still representing “an outer extreme of the 20th-century quest for musical otherness.”²⁹ As preeminent examples of modernism in music, they establish a critical, deliberately constructed distance between work and auditor. The aesthetic stance of Ligeti’s music parallels the distinction made by Susan Sontag between the invitation to “look” proffered by representational art, and the invocation to “stare” provoked by modernist avant-garde art.

A look is voluntary; it is also mobile, rising and falling in intensity as its foci of interest are taken up and then exhausted. A stare has, essentially, the character of a compulsion; it is steady, unmodulated, 'fixed.' Traditional art invites a look. [Modernist avant-garde art] engenders a stare.³⁰

If we replace 'a look' with *listening* and 'a stare' with *hearing* in Sontag's formulation, we could position contemporary music as a similar autonomous, self-reflexive art. As the function of modern artworks is bound to the fixed gaze, so the function of modern compositions is bound to their 'heard structure.'³¹ Modernist music offers us nothing to promote active, engaged listening, but demands to be heard, as an object deserving contemplation and analysis.

2. Conceptual Metaphors and Music

My attempt to rehabilitate contemporary music from a listener's perspective has invoked a provocative, if ultimately damning metaphor: modern [131] music as a model for the phenomenology of madness. My cue has been Lerdahl and Rochberg's implication that a hierarchically structured, topically constrained listening grammar models normal cognition. Rochberg's model takes an automated model of information processing and maps its essential aspects onto human cognition. Although Lerdahl's list of constraints affect a literal description of music perception, they transfer concepts directly from the study of language-processing to that of music. Both theories are grounded in the implicit assumption that there exists an ideal listener who's cognitive processes can—themselves—serve as a metaphor for listening to modernist music.

But as noted in my introduction, to speak of music *at all* is to speak metaphorically, to speak of a world out of reach, populated by phenomenal objects of perception.³² The history of discourse on music, including analytical discourse, is a history of metaphoric description and elaboration.³³ The most striking uses of analogy and metaphor—such as the "hero's journey" that marked the critical reception of Beethoven's *Eroica* symphony—range far beyond mere description of the "acousmatic" object. As Scott Burnham notes, programmatic accounts embraced not only syntactic and stylistic but ethical concerns raised by Beethoven's music.³⁴

Metaphor in accounts of music, or of art in general, traditionally addressed those aspects of aesthetic experience that escaped literal description. Marion A. Guck discusses how a figurative description—“portentous” as applied to the C-flats that populate m. 53 in the second movement of Mozart’s K. 550—“reifies their features and relations in a particularly pungent and insightful way: it makes sense of them in ways not formerly possible.”³⁵ Metaphor indirectly makes expression accessible, by addressing a “surplus” in the object described.³⁶ This remainder is intrinsic not only to descriptions of music with programmatic content, but to the historical notion of absolute music as well, which mirrors nature as “perfect form,” and which, therefore, serves as a “metaphor for the universe.”³⁷

This surplus is evident Ligeti’s description of *Lontano* as “an extensively branching and yet strictly refined polyphony which, however, veers suddenly into something else.” Metaphors such as these are usually dismissed as program-note platitudes directed at the restless listener, but they actually reveal a very sophisticated and coherent use of conceptual metaphor. The linguistic surface invokes on an underlying idea, image or experience of the world, one that links a concrete, visceral realm of experience to a very abstract one. The image of “an extensively branching . . . polyphony” relies on a vivid impression of the unchecked, chaotic order of nature as we experience it. The subsequent image of polyphonic structure submerged “in a microscopic underwater world” references a very different encounter with nature. The basic elements of music are “dissolved,” an allusion to the vast gulf between the seen and the unseen in nature, between the concrete [132] surfaces we experience every day, and the infinitely-varied life beneath that surface.

Ligeti’s metaphors do not merely transfer concepts from one area to another; they import the structure of a natural domain to the self-conscious and artificial realm of new music. If polyphony can be mapped to branches, than a musical work can resemble a tree, or surface embellishments may correspond to leaves. If the polyphonic structure can be submerged, than a musical work is like a body of water, and the shimmer of tone-color may represent its surface.

Conceptual Blending

The same, structure-preserving mapping motivates Lerdahl and Rochberg's metaphor, which might be termed "Hierarchical Systems of Musical Organization [Tonal Music] Represent Normal Cognition." This multi-leveled concept rests on an underlying conceptual metaphor, "Mind as Information-Processing Device," and its related "Attention as a Filter" metaphors.³⁸ That is, a listener uses certain "filters" (constraints on event sequences and underlying materials) to select objects (musical events) worthy of attention; only these objects can be stored in memory and operated upon later. This metaphor carries several additional provisos, or entailments: 1) some information will be discarded in passing through the filter; 2) information is processed in a serial, rather than parallel, fashion; and 3) attention is a structure (filter), as opposed to a process or a resource.³⁹

I do not question the efficacy of using the "Attention as a Filter" metaphor to describe the listening process. What I question are the assumptions on which Lerdahl grounds it—that our literal comprehension of music is the only "comprehension" possible, or that it is, by default, the most desirable. I would argue that musical *understanding* for a competent listener, not to mention musical *meaning*, is never restricted to parsing a work's concrete, self-referential details, but relies on conceptual mappings both from other music and other experiential domains.

A growing body of research in cognitive science suggests that most of our abstract reasoning and conceptualization is guided by metaphor.⁴⁰ These metaphors are not only linguistic in nature and design, but conceptual as well. Conceptual metaphors map entities, structures, properties, and relations from a source domain, the domain used as a model, to a target domain, the domain we wish to understand.⁴¹ Most common metaphors—specific instances of figurative language—spring from a basic, conceptual metaphor. The conceptual metaphors we use in language can be traced back, through a kind of recursive mapping process, to "image schemata," source domains based on bodily experience and action.⁴² We map elements of our concrete, physical experience of the world map onto our abstract, intellectual understanding, as when we label one musical pitch "higher" than [133] another, or employ kinesthetic notions such

as gesture, tension and release to structure musical experience. At a higher level, detailed experiences of one cognitive domain may be mapped onto elements of a newly discovered or yet unexplored domain, as both Lawrence Zbikowski and Janna K. Saslaw demonstrate.⁴³ Zbikowski maps the "Great Chain of Being" and "Atomistic" models of hierarchy to various historical theories of music.⁴⁴

In the "Mind as Machine" metaphor illustrated by Diego Fernandez-Duque and Mark L. Johnson, the machine functions as source and the mind as target. Projection mappings erect correspondences from the source to the target domain, using our knowledge of the source, as in analogy, to structure the target domain. The functions products, and even shortcomings of the machine are thus directed towards the target; each represents an entity or structure used to construct a specific counterpart in the domain of mental operations (see figure 6.3).⁴⁵ Thus the preponderance of expressions such as, "I'm a little rusty today," "Boy, the wheels are turning now," "He suffered a mental breakdown," and "We're cranking out ideas," all rooted in this underlying cross-domain mapping. Outside the context of everyday language, a very specific source domain may be used in a conscious manner to structure a target, as in my own elaboration of the "Mind as Machine" mapping as "Mind as Computer" (see figure 6.4).⁴⁶ Fauconnier and Turner stress that, while such a mapping enables us to see the target in new ways, it also constrains our potential knowledge of the target domain. The "Attention as a Filter" metaphor, for instance, maps the filter's property of serial processing onto the target domain of attention, thus eliminating

The Mind as Machine Metaphor

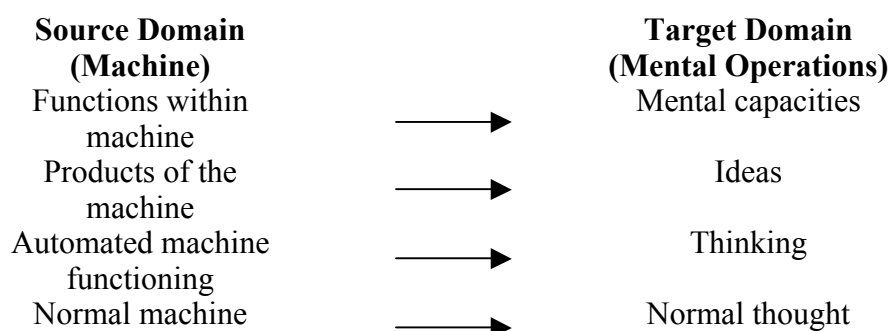




Figure 6.3. Projection mappings in “Mind as Machine” metaphor. [134]

The Mind as Computer

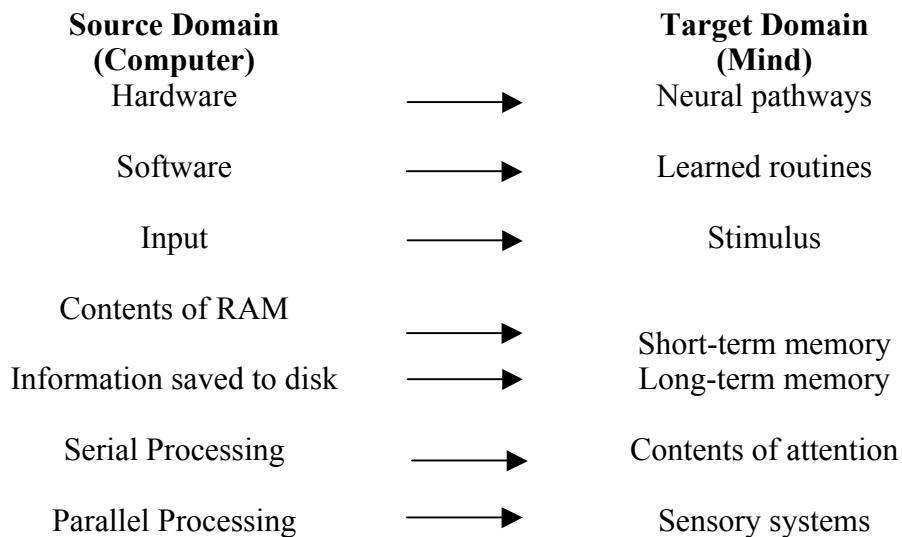


Figure 6.4. Projection mappings in “Mind as Computer” metaphor.

the possibility that our attention could be divided by the parallel processing of discrete stimuli.⁴⁷

Conceptual metaphors and cognitive mappings are thus not restricted to language use. They structure most of our abstract concepts, and constitute a background mental operation—one that lies below our horizon of conscious observation—that applies within and across domains whenever we think and communicate.⁴⁸ Conceptual mappings operate behind the scenes, so to speak, to interpret and provide those inferences necessary to basic cognitive operations.⁴⁹ I find the current work of Fauconnier and Turner on the use of conceptual integration, or conceptual blending, in certain linguistic expressions of particular relevance to the question of listening to modernism.⁵⁰

Fauconnier and Turner’s model of conceptual blending serves to explain how structure is imported from a more stable source domain to structure a more elaborate or complex target

domain. A conceptual blend begins with a conceptual mapping between two or more mental spaces, (a term Fauconnier and Turner prefer to "conceptual domain"). A mental space is a "(relatively small) conceptual packet[s] built up for purposes of local understanding and action."⁵¹ Blending exploits and develops counterpart connections—elements with corresponding structural roles—between input mental spaces. It differs from simple cross-domain mapping in that the [135] blended space may fuse *any* elements, whether they are counterparts or not. Blending may integrate related events into one conceptual event, develop new structure, reason, draw inferences, or produce humor. The emergent structure may be illogical yet prove efficient at transferring the intended inferences back to the target Input, even if this new structure is never stated explicitly as part of the blend.

The familiar metaphor “digging your own grave” represents just such a conceptual blend.⁵² As a warning, this expression is well understood; on the surface, it would seem that the activities that *lead to* failure equate with grave-digging, while failure itself equates with death. It is foolish to *prepare* one’s own failure as it is foolish to prepare one’s own burial while still alive, and it is even more foolish *not to realize* that one’s actions will lead to failure or death.

Yet a closer inspection of the metaphor “digging your own grave” reveals an apparent mismatch: foolish actions may cause failure, but digging a grave does not cause death. The causal structure of the source domain—death in our everyday experience is followed by grave-digging—is inverted in the target domain—foolish actions (grave-digging) lead to failure (death). In the source domain, the “patient” dies, followed by the “agent” digging the grave in which to bury the “patient.” In the target, both actors are fused and the order of events reversed. The conceptual blend inherits the source structure of graves, burial and digging, and there are some direct correspondences. But the blend inherits causal, intentional, and internal event structure from the target input to create what Fauconnier and Turner call emergent structure: new structure not available in either of the input spaces. Only the blend—the new, emergent structure found in neither source domain—can explain why we have an expression in which the existence of a satisfactory grave causes death.⁵³ The discordant structure, that death does not usually

follow the digging of a grave, does not interfere with the conceptual blend, but does indicate that conceptual blends are not arbitrary, and must have considerable concordant structure—in this case activity pursued towards and irreversible goal—to be successful.

Conceptual Blends in Music

Current research on conceptual metaphor and cognitive mapping extends beyond linguistics and music theory to many other disciplines, guiding basic work in science (including mathematics), and explaining central concepts in the history of philosophy and neuroscience.⁵⁴ But to my knowledge, this model has never been applied to music-on-music cross-domain mapping, although Zbikowski has extended Fauconnier and Turner’s model to conceptual blending and integration between text and music in song.⁵⁵

Let me suggest one such conceptual scheme—what Fauconnier and Turner term the “multi-space” model—defined by the four mental spaces [136] outlined above: two input spaces, defined by a source and target space, and two middle spaces, a generic space and a blended space. This model proposes that a listener, confronted by the novel experience of hearing a work for the first time, will draw on prior experience to guide him or her. The role of source space is assigned to a work already known by a hypothetical listener (the Familiar Work), and the target space to a previously unheard work (the New Work).

I assume that a hypothetical listener will draw an analogy between the two, mapping information from the already conceptualized source domain (Familiar Work) to the novel target domain (New Work). The source space of our ideal familiar piece may contain a vast amount of information, but for our purposes the Familiar Work will be represented by Lehndahl’s seventeen cognitive constraints on compositional grammar. Twelve of these are unique to the Familiar Work; with the other five shared by the source and the target, and thus found in the generic space (see figure 6.5). (I have added a “closed work” stipulation as a sixth property to list in this generic space.) The target space—or New Work—will contain Ligeti’s *Lontano*. The two input spaces project structure into two “middle spaces,” a generic and blended space. The generic

space of our model contains elements or structures, along with constraints (such as "the octave is divided into equal parts"), shared by both input spaces: our ideal source piece and the target *Lontano*.⁵⁶ The conceptual blend itself is a rich space within which partial structure (elements and functions) from both input spaces is integrated. This generic resemblance will include salient counterparts: both works represent self-contained listening experiences, and may contain information such as instrumentation, genre, or function. However, only five common constraints, Lerdahl's numbers 9 through 13 regarding underlying materials, are imported to the generic space.

Our hypothetical listener recruits structure from each input space to compose the blend, exploiting counterpart connections (such as the role of harmony) between input spaces. For instance, the musical surface of the Familiar Work is capable of being parsed into a sequence of discrete events, whereas in *Lontano*, the musical surface is opaque, and blurs distinctions between events. Nevertheless, the ample concordant structure (those common elements that compose the generic space) encourages the construction of a blended space. The listener combines aspects of Source and Target in order to comprehend *Lontano* as he or she might comprehend a Familiar Work: as exhibiting audible form and structure within a closed aesthetic framework. Emergent structure in the form of a "complex of tone-color, movement, changing harmonic planes" develops in the blended space, and is then available as an input space when the next New Work is encountered.

This account of one possible way in which cross-domain mapping may represent the cognition of new music is necessarily tentative and ill-defined. [137]



Figure 6.5. Cross-domain mapping, with *Lontano* as New Work (target space).

There are evident difficulties in demonstrating music-to-music mapping across domains, and any discussion of music relies on prior metaphoric blends. Lerdahl's theory of compositional grammar itself relies on several complex but more or less transparent mappings, many which are

listed in a master metaphor list compiled by the Berkeley Cognitive Linguistics Group.⁵⁷ These include the following, with Lerdahl's renditions given in parentheses: [138]

"Understanding is Seeing"
("Comprehension takes place when the perceiver is able to assign a precise mental representation to what is perceived.")

"Music is a Language"
(Music can be described by a grammar, or rule system)

"Reasoning is Following a Path Through a Landscape"
(Map-like diagrams of grammatical systems illustrate Lerdahl's thesis)

Each of these dominant metaphors is structured by fundamental assumptions about the object of investigation and the act of perceiving music. Consider the presupposition that informs the first compositional constraint, "the musical surface breaks down into individual events."⁵⁸ This objective definition invokes two foundational metaphors: 1) that "Music is a Container," (if it has a surface, it must also have an interior), and 2), that "Coherent is Whole" (smaller, discrete elements come together to compose the musical surface).⁵⁹

The dominant underlying metaphor of Lerdahl's critique, however, is the governing tenet of musical formalism, the rather opaque if sophisticated assumption that "Hearing is Understanding/Understanding is Seeing." That is, aural comprehension of musical structure is equivalent to knowledge of that structure, and that knowledge depends on sight. To truly understand Boulez's *Le Marteau sans Maître* is to perceive the serial structure revealed by visual analysis of the score. Listeners who do not "even begin to hear its serial organization" do not, in essence, "comprehend" the piece.⁶⁰ Although Ligeti's music is not serial, it also challenges this well-worn assumption. By blurring distinctions between musical events, Ligeti's music interferes with the perception (hearing) of composed (visible) structure. As noted, the composer has time and again asserted his intentions to *disguise* compositional structure, to separate his compositional grammar from whatever listening grammar may guide his audience. Once again referring to his micropolyphonic music of the '60s, Ligeti discussed the relation of intonation to notation, or "seen" structure:

And because of the fact that more and more adjacent pitches are played and because, besides that, the ensemble of strings is divided into many single instruments, the result is small deviations in intonation. . . . The small deviations that result in this involuntary manner are here a constructive element in the composition. . . The music has something artificial about it: it is an illusion. There are many elements in it that don't manifest themselves, but remain subliminal.

I specify many details that are not in themselves audible. But the fact that I have specified these details is essential for the general result – at least, that is what I hope. I think of a large architectural edifice in which many details are not visible.⁶¹ [139]

In these passages Ligeti confirms the importance of "involuntary" deviations and "inaudible" details to the composition as heard. In works like *Lontano*, not only the music but the notation *itself* contains a surplus, "invisible" quirks of intonation and form essential to the aural illusion of the work. Ligeti's suggestion that "A Musical Work is Like a Building" introduces an alternate metaphor for listening, one which attempts to bridge the gap between our visual knowledge of the score and our aural perception of a micropolyphonic work.

Any discussion of music and, arguably, a great deal of musical appreciation, relies on conceptual mappings from extramusical source domains. Much musical criticism seems to rely on cross-domain mapping, as when the "hero's journey" is combined with structuralist accounts of Beethoven's *Eroica* Symphony.⁶² Ludwig Tieck recognized that mixed and inconsistent metaphors let the reader imagine what the hearer of absolute music does: "an experience that overcomes him for an instant, but which cannot be held fast. The musical impression is as fleeting as it is compelling, the poetic paraphrase lingering but insufficient."⁶³

Guck has shown the theoretical implications of such a blend, using the image of a "breathing laborer" as an "organizing metaphor" with which to coordinate the "constellation of metaphors" applicable to an analysis of Chopin's B minor Prelude.⁶⁴ I would argue that the richest music would be that capable of the widest range of associations. Those associations may

arise through cross-domain mappings from one work or genre to another, or through conceptual blends that link one area of sensory and intellectual experience to music. In fact, multiple space mappings would be more directly cognized than mental models which draw from only one source domain (such as "Attention is a Filter"), and would enlarge our perceptual horizons by establishing a fund of conceptual blends from which to draw in the future. Ligeti relied on just such a conceptual blend when creating his "complex of tone-color, movement, changing harmonic planes." As indicated above, he has evoked painting, vistas, machines and even food as obvious metaphors for his music. The composer's evocation of visual and tactile referents suggests fresh ways of hearing a music that cannot rely on one standard conceptual scheme—such as that represented by Lerdahl's listening grammar—for its full comprehension.

Ligeti on his music

As an illustration of what I mean by conceptual blending in modernist music, I will analyze three passages from interviews in which Ligeti discusses *Lontano*. Many critics have employed colorful and elaborate metaphors to describe the sound and visceral appeal of Ligeti's music. I have restricted my illustrations to the composer's own extramusical remarks to [140] suggest that—by conditioning the listener's experience of a work—this commentary in effect acts as an extension of the composition.

Each passage appears to rely on one or two central, isolated metaphors, but, in fact, each metaphor has several entailments.⁶⁵ Ligeti's comments suggest ten possible input spaces which project partial structure into an eleventh space, the "conceptual blend," as well as a generic space. The elements of the target space are linked to the input spaces in systematic ways, yet are closely integrated to produce their own emergent structure.

Passage 1

- 1) I rather imagined a vast space of sound in gradual transformation, not through dense chromaticism but through a constantly changing pattern of color like a moiré fabric.
- 2) Although *Lontano* encompasses the entire chromatic scale, strictly speaking, it is based on a diatonic scale. As I have said, the changes happen in space, the sound of drawing nearer and moving away again.
- 3) But you are right that there is a second plane on which the music moves in time – quite deliberately.
- 4) I do not actually quote composers, only allude to nineteenth-century music, evoking late Romantic orchestral effects.⁶⁶

This passage erects four separate source spaces that serve as inputs to the target space "*Lontano*," listed in figure 6.6. The striking metaphor "*Lontano* is a Moiré Fabric" is found in the first sentence (1). This metaphor establishes "Moiré Fabric" as an input space, a complex metaphor suggesting that some elements (partial structure) within the "Fabric" spaced map onto elements in the "*Lontano*" space. Thus "Musical Scales," "Harmonies," or "Melodic Lines" may be equated with "Threads" or "Colors." A mapping such as "Melodic Lines are Threads" is a component of the space, but it may also be seen as a specific example of the underlying conceptual metaphors "Change of State is Change of Shape" and "Sound is a Solid." These conceptual metaphors are rooted in image schemata, in our experience of change in nature, and our propensity to relate abstract concepts to corporeal objects.

The third sentence tells us that "*Lontano*" is a "vast space" in which changes in pitch move nearer to and farther away from a diatonic scale, as though we were traveling through a landscape (2). The complex metaphor "*Lontano* is a Landscape we Move Through" conceives of music as not just space but as a space the listener traverses. This input space thus conveys the entailments, or associated metaphors "Change of State is Change of Location," "Listening is Following a Path," and "Loud is Near/Soft is Far." The fourth sentence suggests yet a third input space, borrowed from geometry: "Hearing *Lontano* is Recognizing Two Planes" (3). The concept of geometric planes is a specific instance of the conceptual metaphors "Perception is Shape Recognition" and "Shapes are Containers." The final [141]

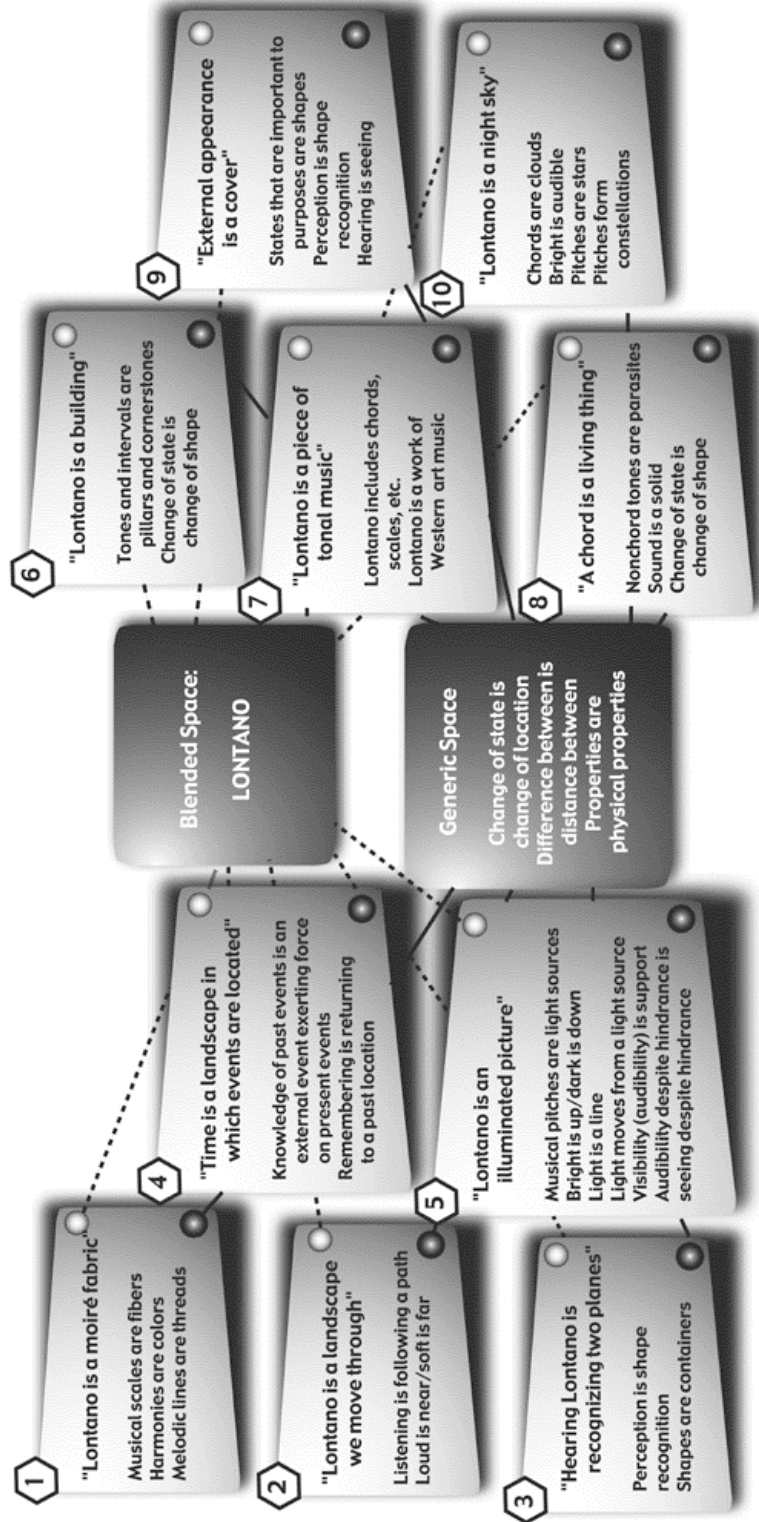


Figure 6.6. Cross-domain mapping in the metaphors used by Ligeti to describe *Lontano*

sentence of this passage tells us that one of the two "Planes" represents the past. "Lontano" is not a metaphor for nineteenth-century music, since it only "alludes" to Romantic orchestral effects. Rather, the fourth conceptual space evoked here is a metaphor for the past that is referenced. The assertion that "the music moves in time" combined with "[the music evokes] Romantic orchestral effects" leads to the metaphor "Time is a Landscape in Which Events are Located" (4). And Ligeti alludes to nineteenth-century music, implying that "Knowledge of Past Events is an External Event Exerting Force on Present Events."

Passage 2

5) In approximately the last third of [*Lontano*] we get, after a static, very soft plane of sound, formed by a major second and a minor third, a gradual passing into dim, deep regions. . . . Now, this dark progress is suddenly lightened, as if the music had been illuminated from behind . . . This progress, once it has begun, goes forwards: the violas, cellos and double basses carry on the sequence that has started. All the other instruments, and then the cellos as well, take on a new gesture, something suddenly bright, often not perfectly delineated; it gets continually brighter and the music seems to shine, to be radiant. . . . a single note, a D sharp, very high up, emerges and stands there, as if this musical light were at first diffuse, but slowly the diffuseness disappears and there is a single directed beam. . . . At the moment when the high D sharp is there, forming the concentrated pencil of this musical beam, suddenly there yawns an abyss, a huge distancing, a hole piercing through the music. . . And through this suddenly gaping distance can be heard the sound of horns. . . . Horns coming in like that after a tutti awake in us involuntarily not a direct association perhaps, but an allusion, a reference to certain elements of late romantic music. . . . I can think of a passage in Bruckner's *Eighth Symphony*, in the coda of the low movement, where with great tranquility and gentleness the four horns suddenly play a passage that sounds almost like a quotation from Schubert, but seen through Bruckner's eyes.⁶⁷

Several metaphors introduced in Passage 1 above recur in Passage 2, with further elaboration. *Lontano* is equated with an elaborate visual metaphor, through discussions of "dim, deep regions," music "illuminated from behind," "bright" gestures and a note that serves as a "musical light." This opens up a fifth input space, "Lontano is an Illuminated Picture" (5), a metaphor with several specific entailments explicitly addressed in the passage. These include "Musical Pitches are Light Sources," which refers to the conceptual metaphors "Bright is

Up/Dark is Down," "Light is a Line," and "Light Moves From a Light Source." Added to this musical picture is a musical sequence “carried” by violas, cellos and double bass, suggesting that "Making Visible (Audible) is Supporting." The “new gesture . . . often not perfectly delineated” states that "Audibility Despite Hindrance is Seeing Despite Visual Hindrance." [143]

Comments such as "a gradual passing into dim, deep regions," "illuminated from behind," and "a hole piercing through the music" all support "Difference Between is Distance Between," a foundational metaphor that is shared by all five input spaces. An even more complex statement recalls input space (4), as the "four horns suddenly play a passage that sounds almost like a quotation from Schubert, but seen through Bruckner’s eyes." An earlier composer remembering yet another composer adds one more entailment to "Time is a Landscape": "Remembering is Returning to a Past Location."

Passage 3

- 6) I believe that *Lontano* is the example that demonstrates most purely the crystallization of corner-stones or pillars that are specific intervals or single notes or harmonies on one level of the work there are tone-color transformations, but there is another, harmonic level which, I would almost say, is behind it: that is also an aspect of *Lontano*, of being distant. . . .
- 7) there are certain places in which a pitch or an interval or even several intervals – let us use the old-fashioned term ‘chords’ – are clearly to be heard.
- 8) Then in the middle of a chord the 'parasitic' tones gradually sound; they are not ornamental in the sense of the passing notes or auxiliary notes of tonal music, but they do contain a slight allusion to them.
- 9) The whole tradition of tonal music is present, but always hidden. Now this intervallic or harmonic plane gradually clouds over, and this cloudiness expands more and more, until finally this originally pellucid, clear harmonic structure dissolves into an opaque plane.
- 10) In the middle of this opaque or neutral plane we then get signs of a new constellation of pitches which by degrees becomes more and more dominant. At first, the constellation is barely audible. Gradually, however, the different parts gather together into the individual intervals which are later revealed in a bright light.⁶⁸

Two new mental spaces are opened by this passage. The “corner-stones or pillars that are specific intervals or single notes or harmonies” summon up "Lontano is a Building" (6). The

musical work as a man-made structure is juxtaposed, however, with a discordant notion of “parasitic” tones that disrupt a chord, opening up yet another input space: "A Chord is a Living Thing" (8), where "Nonchord Tones are Parasites." In between the contrasting notions of Lontano as a "Building" full of "Living Chords," Ligeti returns to the continuing image of “tone-color transformations” on different planes. This image is able to connect all seven input spaces through its implied entailment "Comparison of States in a Dynamic Situation is Comparison of Distance."

Of course this metaphor is an entailment of conventional metaphors used to discuss music, and Ligeti takes the opportunity to invoke the conceptual space of tonal music through use of the terms “chords” and [144] “auxiliary notes”(7). Yet the "whole tradition of tonal music" is paradoxically not audible. The “tradition is hidden,” an example of the metaphor "External Appearance is a Cover" (9), which opens up a ninth input space. "Appearance is a Cover" shares the entailment "Hearing is Seeing" with several other spaces, allowing “parasitic tones” to become “clouds” that obscure clear intervallic or harmonic “planes.” Here Ligeti invokes the third input space "Hearing Lontano is Recognizing Two Planes" again, and the conceptual metaphor "States That are Important to Purposes are Shapes." This metaphor informs the final image in Passage 3, the “constellation of pitches,” which opens up yet another space, "Lontano is a Night Sky" (10). This rich metaphor implies that "Pitches are Stars" and "Bright is Audible." The mapping of musical pitches and qualities onto a night sky could imply other general metaphors, such as "Importance is Central," implied by the emergence of "individual intervals" into a "bright light."

As shown by figure 6.6, Ligeti’s comments open ten vastly different but related mental spaces. The conceptual blend that represents *Lontano* as experienced inherits partial structure from each space, and exploits counterpart connections among spaces: elements that represent the general metaphors "Change of State is Change of Location," "Difference Between is Distance Between," and "Properties are Physical Properties." It is thus highly structured, drawing on both metaphoric connections and conventional connections already part of our listening experience.

The target space inherits chords, intervals and scales from the space of tonal music, and those conventions that come with the “listening to music” frame. This rich blend develops its own emergent structure, which can be recruited for future listening experiences, or for future blends incorporating *Lontano*.

My dissection of the above passages represents more than one or two alternate hearings of *Lontano*. Ligeti’s metaphors enrich our musical experience of the work even as they suggest that conceptual blends are inevitable when confronting a work of art that extends the boundaries of our experience. The conceptual blend indicates one route the mind may take towards assimilating new information and complex structures.

3. Listening to Modernism

Modernist music was once simply challenging music. When married to a narrative framework in film, a theatrical spectacle, or a visceral art such as dance, it might momentarily reach beyond a modest, devoted audience. But as an ongoing enterprise unto itself modernist music has fallen into neglect.⁶⁹ When it was not loved it was at least tolerated by the musical establishment, because—in its unrelenting idealism and purity— it seemed alone among contemporary cultural expressions to have, as Ruth Rosengaard Subotnick put it, “kept alive the idea of individuality and thus the possibility of art.”⁷⁰ [145]

Musicologists are infamous for their reluctance to engage in thorny questions of value and meaning: Subotnick could assert as late as 1982 that “Criticism, including the study of criticism, remains an unestablished field of musical scholarship . . . openly deprecated by mainstream musicology as a purely derivative and parasitical enterprise.”⁷¹ And they have only recently broken the silence surrounding contemporary music’s viability as living culture. The concept of absolute music and its associated ideologies has brought modernist composition under increasing attack from reception and ethnographically-oriented scholars, such as Susan McClary, Georgina Born, Allan F. Moore, and Subotnick.⁷² Carl Dahlhaus rejects charges of elitism

leveled at modern music, citing the “moral and social right” of the avant-garde to be unpopular, a position adopted by several prominent composers.⁷³ Meanwhile scattered counterattacks attempt to rehabilitate on an individual basis those provocative and compelling works that labeled as modernist.⁷⁴

Yet we can shift the figure of the musical work endlessly on its ideological ground without affecting the object itself, without addressing just what it is that we *do* hear when we listen to modernist music. Lerdahl, Scruton and Rochberg censure modernist music as a phenomenal object incapable of being cognized. A modernist music that cannot be processed as music undermines the very idea of an “autonomous significant structure”;⁷⁵ its rehabilitation lies beyond the appeals of either historical revisionism or political will. Thus, recent cognitive research that would prove the apparent “unlistenability” of modern music comes to take on far-reaching and complex implications.

In a sense, both the compositional and listening “grammars” of *Lontano* critique the idea of an essentialist, formalist music whose structure necessarily determines a particular mental representation. Ligeti's music and its accompanying commentary suggest that modernist music is best approached through a theory that allows for metaphorical and associative leaps, even if those leaps include the input space “Modern Music is Madness.” *Lontano* itself thus serves as a metaphoric solution to the problem of “listening to modernism,” with the entailments “A Problem is a Region in a Landscape” and “The Solution is Contained in the Problem.” To quote Jean-Claude Risset, Ligeti's music is “about composing the sound itself, not merely composing with sounds,” a sophisticated critique of modernism, and of the presumptions—both cognitive and historical—that would limit our musical perception.

Notes

¹ *Gyorgy Ligeti in Conversation with Peter Varnai, Josef Hausler, Claude Samuel and Himself* (London: Eulenburg Books, 1983), 95, 14-15, 99. [145]

² Scruton, *Aesthetics of Music* (Oxford: Clarendon Press, 1997), 294.

³ Lerdahl, “Cognitive Constraints on Compositional Systems,” in *Generative Processes in Music: the Psychology of Performance, Improvisation, and Composition*, ed. John A. Sloboda, 231–59 (Oxford: Clarendon Press, 1988), 232;

Lerdahl's essay was reprinted in *Contemporary Music Review* 6, no. 2 (1992): 97–121; subsequent notes refer to the latter publication..

⁴ Scruton, *Aesthetics of Music*, 75.

⁵“What Scruton does not consider in espousing a traditional empiricist view of metaphor . . . is that all language is a product of human cognition and imposes order on the material world, often by transferring words between different realms of experience.” Naomi Cumming, “Metaphor in Roger Scruton's aesthetics of music,” in *Theory, Analysis and Meaning in Music*, ed. Anthony Pople (Cambridge: Cambridge University Press, 1994), 8. See also 9 and 27.

⁶ Rochberg, “The Structure of Time in Music: Traditional and Contemporary Ramifications and Consequences,” in *The Study of Time*, vol. 2, ed. J. T. Fraser and N. Lawrence for the International Society for the Study of Time (New York: Springer-Verlag, 1975), 136–49; a revised and abridged version of this essay appears in Rochberg, *The Aesthetics of Survival: A Composer's View of Twentieth-Century Music*, ed. William Bolcom (Ann Arbor: University of Michigan Press, 1984), 137–47.

⁷ Rochberg, “The Structure of Time in Music,” in *The Study of Time*, 141.

⁸ *Ibid.*, 146, 141.

⁹ Lerdahl, “Cognitive Constraints”; *A Generative Theory of Tonal Music*, which Lerdahl co-authored with linguist Ray Jackendoff (Cambridge, MA: MIT Press, 1983), is among the notable studies of tonal music drawn on in “Cognitive Constraints.”

¹⁰Judgments of relatedness in tonal music vary as a function of context. Multidimensional scaling techniques position musical elements in a Euclidean space, so that chords, (for example) judged as being closely related are near one another, while those judged as being less related are farther apart (e.g. as in J.J. Bharucha and Carol L. Krumhansl, “The representation of harmonic structure in music: Hierarchies of stability as a function of context,” *Cognition* 13 (1983), 63–102). Lerdahl proposes a hierarchy of pitch relations, with different elements (scale degrees, chords, keys) occupying different levels of tonal space: 1) only the most primitive stability conditions are exempted from multidimensional representation, where spatial distance correlates with cognitive distance; 2) levels of pitch space must be available from musical surfaces to be internalized; and 3) a reductionally-oriented pitch space expresses steps and skips that measure cognitive distance and express degrees of melodic completeness. Lerdahl, “Cognitive Constraints,” 112–115.

¹¹ The following numbered constraints are taken from Lerdahl, “Cognitive Constraints,” 112–113.

¹² *Ibid.*, 114.

¹³ Stanley Cavell, “Music Discomposed,” in his *Must We Mean What We Say? A Book of Essays* (Cambridge: Cambridge University Press, 1976), 187.

¹⁴ Sass, *Madness and Modernism: Insanity in the Light of Modern Art, Literature, and Thought* (NY: Basic Books), 1992.

¹⁵ A study by J. David Smith and Jordan N. Witt asked listeners to compare late romantic and serial excerpts by both Webern and Schoenberg. The serial excerpts were rated as more ‘sensory’ than the tonal passages, that is, as pieces [147] emphasizing “pure, unanalyzed, sound qua sound.” Adjectives used to describe the serial excerpts were grouped under the categories ‘agitation,’ ‘extreme activity,’ ‘chaotic motion,’ ‘chaotic structure,’ and ‘insanity.’ Smith and Witt, “Spun Steel and Stardust: The Rejection of Contemporary Compositions,” *Music Perception* 7, no. 2 (Winter 1989): 169–186. Experiments by Nicola Dibben suggest that any inference of structural stability in atonal music is drawn from events at the musical surface: phenomenal accents, dissonance, and voice-leading. “The Perception of Structural Stability in Atonal Music: The Influence of Salience, Stability, Horizontal Motion, Pitch Commonality, and Dissonance,” *Music Perception* 16, no. 3 (Spring 1999), 265–294.

¹⁶ Lerdahl, “Cognitive Constraints,” 97–98.

¹⁷ Sass, *Madness and Modernism*, 123.

¹⁸ Ligeti, *Ligeti in Conversation*, 126.

¹⁹ Ligeti, “On my Piano Concerto,” trans. Robert Cogan, *Sonus* 9/1 (1988): 13.

²⁰ Sass, *Madness and Modernism*, 156.

²¹ *Ibid.*, 47.

²² “Renée,” from *The Autobiography of a Schizophrenic Girl*, ed. M. Secheheye (NY: New American Library, 1970), 19, quoted in Sass, *Madness and Modernism*, 47.

²³ “Lawrence,” cited in Sass, *Madness and Modernism*, 156. On p. 161, Sass notes the gradual progression toward flatness and ‘morbid geometricism’ visible in schizophrenic commercial artist Louis Wain.

²⁴ Ligeti quoted in Denys Bouliane, “Geronne Zeit und Narration: György Ligeti im Gespräch,” *Neue Zeitschrift für Musik* 149, no. 5 (May 1988), 21. Eva-Maria Houben further discusses this conceit in *Die Aufhebung der Zeit: Zur Utopie unbegrenzter Gegenwart in der Musik des 20. Jahrhunderts* (Stuttgart: Franz Steiner Verlag, 1992), 31–32.

²⁵ Ligeti quoted in Ove Nordwall, *György Ligeti: Eine Monographie* (Mainz: B. Schott's Söhne, 1971), 78–79; Ligeti's reference to the “waterfall with a mirror” is strikingly similar to Secheheye's experience of a world pervaded

by the “gloss and smoothness of material things” (*Autobiography of a Schizophrenic Girl*, 19, quoted in Sass, *Madness and Modernism*, 47).

²⁶ Ligeti in conversation with E. Lackner in *Frankfurter Allgemeine Magazin* 393 (11 September 1987): 20.

²⁷ *Ligeti in Conversation*, 22-23.

²⁸ Sass, *Madness and Modernism*, 160.

²⁹ Alex Ross, “Critic’s Notebook: Searching for Music’s Outer Limits,” *New York Times* (20 March, 1993), 11, see also *Ligeti in Conversation*, 106. Regarding the plurality of styles that comprise musical modernism, see Robert P. Morgan, “Secret Languages: The Roots of Musical Modernism,” *Critical Inquiry* 10, no. 3 (March 1984): 443–61.

³⁰ Sontag, “The aesthetics of silence,” in *Styles of Radical Will* (NY: Dell, 1978), 15-16, quoted in Sass, *Madness and Modernism*, 66.

³¹ Note the composer’s dictum: “I was always a partisan of ‘closed’ form. Music is not everyday life. Art is artificial, it’s an artificial product.” Ligeti quoted in *Trackings: Composers Speak with Richard Dufallo*, ed. Richard Dufallo (Oxford: Oxford University Press, 1989), 334. [148]

³² Scruton calls the experience of sound “acousmatic,” “the intentional object of an experience that only rational beings can have, and only through the exercise of imagination,” *Aesthetics of Music*, 2-3, 96. Lydia Goehr’s paraphrase puts it more succinctly: “the sound world is not a space into which we can enter; it is a world we treat at a distance.” Review of Scruton’s *Aesthetics of Music* in *Journal of the American Musicological Society* 52, no. 2 (Summer 1999): 402.

³³ As noted by Scott Burnham and elaborated by Marion A. Guck. Burnham, “Theorists and ‘The Music Itself,’” *Music Theory Online* 2, no. 2 (March, 1996); Guck, “Two Types of Metaphoric Transfer” in *Metaphor: A Musical Dimension*, ed. Jamie C. Kassler, 1–11 (Sydney: Currency Press, 1991). In “Rehabilitating the incorrigible,” Guck lists a series of well-known contemporary analyses in which figurative language facilitates the detailed progress of a musical work. “Rehabilitating the incorrigible,” in *Theory, Analysis and Meaning in Music*, ed. Anthony Pople (Cambridge: Cambridge University Press, 1994), 68 n. 28.

³⁴ Burnham, *Beethoven Hero* (Princeton: Princeton University Press, 199), 8-9, 16-18.

³⁵ Guck, “Rehabilitating the incorrigible,” 71.

³⁶ Hans-Jost Frey, *Studies in Poetic Discourse: Mallarmé, Baudelaire, Rimbaud, Hölderlin*, trans. by William Whobrey, trans from Fr and Latin by Bridget McDonald (Stanford: Stanford University Press, 1996), 29.

³⁷ Carl Dahlhaus, *The Idea of Absolute Music*, trans. Roger Lustig (Chicago and London: University of Chicago Press, 1989), 8, 29.

³⁸ See the discussion of how attention metaphors have guided research on the cognitive psychology of attention and, by extension, circumscribed the nature of what is attended to, in Diego Fernandez-Duque and Mark L. Johnson, “Attention Metaphors: How Metaphors Guide the Cognitive Psychology of Attention,” *Cognitive Science* 23/1 (Jan-March 1999): 83–116. Alan Ruttenberg’s discussion of Lerdahl and Jackendoff, 1985 explicitly discusses rules that presume the simple matching processes or face-recognition processes employed by a computer program. Ruttenberg, “Review and Discussion of A Generative Theory of Tonal Music” (August 10, 1994)

[<http://alanr.www.media.mit.edu/people/alanr/Jackendoff&LerdahlFinal.html>]

³⁹ Fernandez-Duque and Johnson, “Attention Metaphors,” 84–92.

⁴⁰ Much of this work traces back to George Lakoff and Mark Johnson, *Metaphors We Live By* (Chicago: University of Chicago Press, 1980); see also Lakoff, *Women, fire, and dangerous things: What categories reveal about the mind* (Chicago: University of Chicago Press, 1987); and Lakoff, “The Contemporary Theory of Metaphor,” in *Metaphor and Thought*, 2nd ed., ed. Andrew Ortony (Cambridge: Cambridge University Press, 1993).

⁴¹ See especially Lakoff and Mark Turner, *More Than Cool Reason: A Field Guide to Poetic Metaphor* (Chicago: University of Chicago Press, 1989); Lakoff and Turner, “Language is a Virus,” *Poetics Today* 13, no. 4 (1992), 725-736; Lakoff and Johnson, *Philosophy in the Flesh: Cognitive Science Brings to Philosophy the Embodied Mind, the Cognitive Unconscious, and Metaphorical Thought* (Chicago: University of Chicago Press, 1999); Turner, *Death Is the Mother of Beauty: Mind, Metaphors, and Criticism* (Chicago: University of Chicago Press, 1987); [149] Turner, *Reading Minds: The Study of English in the Age of Cognitive Science* (Princeton: Princeton University Press, 1991), and Turner, *The Literary Mind* (New York and Oxford: Oxford University Press, 1996).

⁴² Mark L. Johnson, *The Body in the Mind* (Chicago: University of Chicago Press, 1987) and Turner, *Reading Minds*.

⁴³ Zbikowski, “Conceptual Models and Cross-Domain Mapping: New Perspectives on Theories of Music and Hierarchy,” *Journal of Music Theory* 41, no. 2 (Fall 1997), 202–4, and Zbikowski, “Metaphor and music theory: Reflections from cognitive science,” *Music Theory Online* 4, no. 1 (January 1998) [mto.98.4.1.zbikowski.art]; see also Janna K. Saslaw, “Forces, Containers, and Paths: The Role of Body-Derived Image Schemas in the Conceptualization of Music,” *Journal of Music Theory* 40, no. 2 (Fall 1996), 217-43. My own essay was completed prior to the publication of Zbikowski’s *Conceptualizing Music: Cognitive Structure, Theory, and Analysis*, AMS

Studies in Music (New York: Oxford University Press, 2002), which describes the function of categorization, cross-domain mapping, and the use of conceptual models in theories of musical organization.

⁴⁴Zbikowski posits the “Atomistic” notion of hierarchy as opposed to The “Great Chain of Being” metaphor in “Conceptual Models and Cross-domain Mapping,” 204–18. The “Great Chain of Being” is explored at length in chapter four of Lakoff and Turner, *More Than Cool Reason*, 160–213.

⁴⁵Fernandez-Duque and Johnson, “Attention Metaphors,” *passim*.

⁴⁶*Ibid.*, 85; see also G. Gigerenzer and D. G. Goldstein, “Mind as computer: Birth of a Metaphor,” *Creativity Research Journal* 9, nos. 2 & 3 (1996): 131–144.

⁴⁷D. Kahneman, *Attention and Effort* (Englewood Cliffs, NJ: Prentice-Hall, 1973), 121.

⁴⁸Gilles Fauconnier, *Mappings in Thought and Language*, 2nd ed. (Cambridge: Cambridge University Press, 1997), 1.

⁴⁹Mark Turner, “Backstage Cognition in Reason and Choice,” in *Elements of Reason: The Science of the Mind and the Limits of Political Rationality*, ed. Andrew Lupia, Mathew McCubbins, and Samuel Popkin (Cambridge: Cambridge University Press, in press); available at [www.wam.umd.edu/~mturn/www/backcog/bcframe.html].

⁵⁰Fauconnier and Turner, “Conceptual projection and middle spaces,” UCSD Cognitive Science Technical Report 9401 (San Diego, 1994) [Available from <http://www.wam.umd.edu/~mturn>]; “Conceptual Integration and Formal Expression,” *Metaphor and Symbolic Activity* 10, no. 3 (1995), 183–203; Fauconnier and Turner, “Blending as a Central Process of Grammar” in *Conceptual Structure, Discourse, and Language*, ed. Adele Goldberg, 113–129 (Stanford: Center for the Study of Language and Information, 1996; distributed by Cambridge University Press), and Fauconnier and Turner, “Conceptual Integration Networks,” *Cognitive Science* 22/ 2 (April-June 1998), 133–187.

⁵¹Fauconnier and Turner, “Conceptual Integration and Formal Expression,” 1.

⁵²*Ibid.*, *passim*.

⁵³All of the elements necessary for conceptual blending are present in this metaphor: 1) Two input spaces; 2) Selective projection from the input spaces: Input 1 (graves, digging, burial); Input 2 (state of ignorance regarding one’s actions); [150] 3) A Generic space, which contains those properties shared by both Input spaces; 4) A Blended space in which the two Input spaces are composed and elaborated, to become a coherent unit (“Digging your own grave” is foolish, unmindful activity leading to a disastrous end.); and 5) Emergent structure (The deeper you dig your own grave, the closer you are to dying.).

⁵⁴A selection of metaphor research in other fields would include Jackson Barry, “Cognitive Science and the Semiotics of Art,” *Interdisciplinary Journal for Germanic Linguistics and Semiotic Analysis* 11 (1997), 59–76; Raymond W. Gibbs, Jr., *The Poetics of Mind: Figurative Thought, Language, and Understanding* (Cambridge: Cambridge University Press, 1994); Elizabeth F. Hart, “Cognitive Linguistics: The Experiential Dynamics of Metaphor,” *Mosaic* 28 (1995), 1–23; E. F. Keller, *Refiguring Life: Metaphors of Twentieth-century Biology* (New York: Columbia University Press, 1995); George Lakoff and R. E. Nunez, “The metaphorical structure of mathematics: Sketching out cognitive foundations for a mind-based mathematics,” in L. English, ed., *Mathematical Reasoning: Analogies, metaphors, and images* (Hillsdale, NJ: Erlbaum, 1996); and Yeshayahu Shen, “Metaphors and Conceptual Structure,” *Poetics* 25 (1997), 1–16.

⁵⁵Subsequent to the completion of this article, Zbikowski has published *Conceptualizing Music* (see fn 43).

⁵⁶Some of Lerdahl’s constraints are vague regarding the scope and degree of “local grouping boundaries” (Constraint 3) or “a degree of regularity in the placement of phenomenal accents” (Constraint 5), so textual references to specific musical examples have been used to gauge the applicability of each constraint to the work under consideration. Lerdahl, “Cognitive Constraints,” 105–6.

⁵⁷“Master Metaphor List,” 2nd ed., compiled by George Lakoff, Jane Espenson, and Alan Schwartz, Cognitive Linguistics Group University of California at Berkeley, December 1994, <http://cogsci.berkeley.edu/pub/cogling/Metaphor/>

⁵⁸Lerdahl, “Cognitive Constraints,” 104.

⁵⁹Metaphoric entailments to this constraint include “Properties are Contents” (phenomenal accent, interval, pitch and other salient properties carry structural information to the auditor); “(Bounded) Time is a Container” (time is marked by a “sequence of discrete events” that are grouped and bounded according to the high-level metaphoric “tree” structures of time-span and prolongational segmentation); and “Logic is Causation in Control over an Entity Relative to a Location” (time-span and prolongational trees determine a hierarchy of probable events at particular points in a work). These individual metaphors form part of what Lakoff has termed the Event Structure Metaphorical System, a large metaphorical construct that includes notions of attribute, change, and causation conceived in terms of force-dynamic systems; “Master Metaphor List.”

⁶⁰Donald C. Freeman offers an explanation for the ubiquity of this particular metaphor (Freeman, “Songs of Experience: New Books on Metaphor,” *Poetics Today* 12 (1991): 154):

As an image schema, hearing lacks the structure and components of vision that can be mapped onto understanding: our hearing is much harder to focus and while it can select, it does so with greater difficulty than vision. Both abilities are elements crucial to our understanding. Even the modern locution "I hear ya," meaning roughly "I understand," lacks intellectual conviction [151] and connotes at most a fuzzy emotional sympathy precisely because the faculty of hearing appeals chiefly to intercommunication. Hence the sense of "I hear ya" is almost that of a powerless phatic communion – "I sympathize, but there really isn't much I can do except listen.

⁶¹ *Ligeti in Conversation*, 96, 101.

⁶² "The Eroica served its earlier critics well as an example of music rising to the level of an Idee, but not to an exclusive Idee from a specifiable source . . . the type of Idee that A. B. Marx has in mind rose above any one exemplar." Burnham, *Beethoven Hero*, 25.

⁶³ Dahlhaus, *The Idea of Absolute Music*, 69.

⁶⁴ Guck, "Musical Images as Musical Thoughts: The Contribution of Metaphor to Analysis," *In Theory Only* 5 (1981), 29-42.

⁶⁵ Some of these metaphors are explicitly invoked by Ligeti's comments, while others refer implicitly to metaphors catalogued on the "Master Metaphor List" (see note 57).

⁶⁶ *Ligeti in Conversation*, 56.

⁶⁷ *Ibid*, 92.

⁶⁸ *Ibid*, 96-97.

⁶⁹ Witness Michel Foucault's remark, "[T]his music which is so close, so consubstantial with all our culture, how does it happen that we feel it, as it were, projected afar and placed at an almost insurmountable distance?" Boulez Pierre and Michel Foucault, "Contemporary Music and the Public," *Perspectives of New Music* 24, no. 1 (1985): 7. Of course modernist music has received more than its share of outright derision from both professional music critics and composers themselves. These range from rants against the substance of the music itself, (Henry Pleasants, *The Agony of Modern Music* (New York: Simon & Schuster, 1955)), to polemics aimed at its institutional and social role (Benjamin Boretz, "Interface Part II: Thoughts In Reply to Boulez/Foucault, 'Contemporary Music and the Public,'" *Perspectives of New Music* 24/1-2 [1987]: 608-611).

⁷⁰ Subotnick, "The Challenge of Contemporary Music," in *Developing Variations: Style and Ideology in Western Music* (Minneapolis: University of Minneapolis Press, 1991), 275.

⁷¹ Subotnick, "Musicology and Criticism," *Musicology in the 1980s: Methods, Goals, Opportunities*, ed. By D. Kern Holoman and Claude V. Palisca (New York: Da Capo Press, 1982), 147.

⁷² See Born, *Rationalizing Culture: IRCAM, Boulez, and the Institutionalization of the Musical Avant-Garde* (Berkeley, CA: University of California Press, 1995); Moore, "Serialism and Its Contradictions," *International Review of the Aesthetics and Sociology of Music* 26, no. 1 (June 1995): 77-95 and "Anachronism, responsibility and historical intension," *Critical Musicology Journal* [<http://www.leeds.ac.uk/music/Info/CMJ/Articles/1997/03/01.html>]; McClary, "Terminal Prestige: The Case of Avant-Garde Music Composition," *Cultural Critique* 12 (1989): 57-81; and Subotnick, "Toward a Deconstruction of Structural Listening: A Critique of Schoenberg, Adorno, and Stravinsky," in *Explorations in Music, The Arts, and Ideas: Essays in Honor of Leonard B. Meyer*, ed. Eugene Narmour and Ruth Solie, 87-122 (Stuyvesant, NY: Pendragon Press, 1988). As Dahlhaus noted, the discipline has divided between music historians who deal with composition and [152] those who deal with reception. Dahlhaus, "Progress and the Avantgarde," *Schoenberg and the New Music: Essays by Carl Dahlhaus*, trans. Derrick Puffett and Alfred Clayton (Cambridge: Cambridge University Press, 1987), 19.

⁷³ Dahlhaus, "Progress and the Avantgarde," 25. Representative examples from early modernism to the present include Alban Berg, "Why is Schoenberg's Music so Hard to Understand?" (1924), in Willi Reich, *Alban Berg* trans. Corenelius Cardew, 189-204 (New York: Harcourt, Brace and World, 1965); Arnold Schoenberg, *Style and Idea*, ed. Leonard Stein (Berkeley and Los Angeles: University of California Press, 1984); Babbitt, Milton "Some Aspects of Twelve-Tone Composition," *The Score and I.M.A. Magazine* 12 (1955): 53-61; reprinted in *Sonus* 13, no. 1 (1992), 56-74; Pierre Boulez, *Orientalisms: Collected Writings by Pierre Boulez*, ed. By Jean-Jacques Nattiez, trans. Martin Cooper (Cambridge: Harvard University Press, 1986); Roger Sessions, *The Musical Experience* (Princeton: Princeton University Press, 1950) and James Boros, "Why complexity? (Part One)" *Perspectives of New Music* 31, no. 1 (Winter 1993), 6-9; and "A 'new totality'?" *Perspectives of New Music* 33, no. 3 (1995): 538-53.

⁷⁴ A select listing of recent analyses that self-consciously address the "problem" of a work's reception would include Richard Cochrane, "The Ideal Four Minutes and Thirty-Three Seconds: Response to Covach," *Music Theory Online* 1, no. 1 (January, 1995) [mto.1.1.cochrane.art; on listening to John Cage]; Thomas DeLio, ed., *Contiguous Lines* (Lanham, MD: University Press of America, 1985) [various composers cited for their use of open form]; Joseph Dubiel, "Three Essays on Milton Babbitt (2)," *Perspectives of New Music* 29, no. 1 (1991): 90-122; Catherine

Costello Hirata, "The sounds of the sounds themselves: analyzing the early music of Morton Feldman," *Perspectives of New Music* 34, no. 1 (Winter 1996): 6–27; and Stephen Peles, "Continuity, Reference, and Implication: Remarks on Schoenberg's Proverbial 'Difficulty'," *Theory and Practice* 17 (1992): 35–58.

⁷⁵ Subotnick, "The Challenge of Contemporary Music," 266.