

**Temporal Complexity in Modern and Post-Modern Music:
A Critique from Cognitive Aesthetics
Justin London**

In Memoriam, Jonathan Kramer

1. Aesthetic Relevance and Audibility

What are the aesthetically relevant properties of a musical artwork? Artworks, both musical and non-musical, have many properties—a sculpture may have a certain size and mass, which makes it a good paperweight; a piece of music may have a soothing effect which is therapeutically useful, and so on—but these properties are not usually thought of as aesthetically relevant. An aesthetically relevant property is one which appertains to our experience, understanding, and critical appreciation of an artwork qua artwork—that is, music as music, and not music as sleep-aid.

To sort aesthetically relevant from aesthetically non-relevant properties of an artwork, one approach is to consider the notion of aesthetic function as recently critiqued and developed by Gary Iseminger (2004). Iseminger begins with a traditional view of the function of a work of art, as best expressed by Monroe Beardsley (1981). The gist of it is as follows:

The function of a work of art is to afford aesthetic experience.

As Iseminger points out, the problems with this approach are two (at least). First, nobody quite knows what a work of art is. Second, nobody quite knows what an aesthetic experience is (though we often have a good idea when we have one). To avoid these pitfalls, Iseminger makes the following emendations:

1. The function of the practice of art is to promote aesthetic communication.

AND

2. A work of art is a good work of art to the extent it has the capacity to afford appreciation. (Iseminger 2004, p. 23)

Iseminger goes on to note that

3. Appreciation is finding the experience of a state of affairs to be valuable in itself. (Iseminger 2004, p. 36).

To fully unpack all of these notions would require another paper in its own right, but what I want to glean from them is that if we agree that artworks, as socially-entrenched states of affairs of a particular sort, afford appreciation, then this appreciation involves the *experience* of the artwork. Different genres of art are defined/differentiated in large part in terms of the materials used in their composition, and correspondingly in terms of the sensory and cognitive faculties with which we perceive and understand them. We may thus relate aesthetic communication and aesthetic appreciation to these differentiae as follows:

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Aesthetic experience and aesthetic communication are strongly tied to the experience of the primary medium of the work.

Without trying to define what exactly a musical work is, I think it reasonable to presume that musical works involve the organization and presentation of sounds in time—sound being the “primary medium” of music. If the primary medium of music is that of sounds, then a proper experience of a musical work involves hearing those sounds. Thus while musical scores may be interesting in their own right, their physical/visual properties are not of primary aesthetic relevance. Any relevance that the visual aspect of a score may have must supervene on the underlying experience of the music-as-heard. To put it another way, Crumb’s beautiful notation would not salvage a work that we felt was musically defective. While we may have experiences of music that involves other senses (we may follow Crumb’s score while we listen, we may watch an opera acted out on stage), it is our aural experience of it that is key.

Moreover, this has to be a first person/first order aural experience of the music. While we may be interested in someone else’s experience of a work (e.g., that of a good critic or analyst), we do not count such secondhand reports as a substitute for our own experience of a work. We have to have to hear it ourselves.

If the aesthetically relevant properties are tied to our first order experience of the medium of the work, then that experience is subject to our perceptual and cognitive limits as they pertain to that medium. In music, the limitations of our ears and brains are fundamental constraints on our experience of the musical medium. And here is the problem for much modern, “difficult,” “complex,” or “hyper-complex” music: many aspects of its structure and organization are not even remotely audible. With such music, extended score study is required in order for us to grasp even a fraction of what is going on. Indeed, the devotee of such music may spend far more hours to studying the score than actually listening to the piece. Even after such study, many aspects of the music’s structure remain beyond our aural capacities. What, then, can their aesthetic relevance possibly be?

In the remainder of this paper, I will explore the aesthetic relevance of rhythmic hyper-complexity. First, a small portion of the psychological literature on auditory perception and cognition is reviewed in order to give the reader some idea of what kinds of rhythms we can and cannot hear. The role of meter in our experience of music, both as a framework for rhythmic perception and understanding as well as a source of continuity, coherence, and motion, is also discussed. Next the work of two composers, Messiaen and Babbitt, is considered in relation to the limits on rhythmic perception drawn in the first part of the paper. The emphasis here will be on just why and how certain structural premises and devices used by these composers lie beyond our perceptual capacities. The role of theoretical or analytical knowledge in our experience of music is then considered, drawing on the work of Mark DeBellis. This in turn leads to a consideration of the distinction between aesthetic and artistic properties, and the relationship between the two. The paper then concludes with a rumination on the relationships between rhythmic complexity and artistic and aesthetic properties, and various sources of aesthetic value.

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2. The Perception of Rhythmic Duration, Number, Motion, and Complexity

2.1 Duration and Number

Dating back to the nineteenth century, there is a large body of work in auditory psychology that probes the limits and biases of human hearing. For example, every musician knows that if a pair of notes (say, middle C and the D above it) is played in alternation, as the tempo increases one reaches a point where the notes begin to blur. This, unsurprisingly, is known as the “trill threshold,” and for most listeners this blur occurs at a tempo of around 10 notes per second. Likewise, if a melody is played slower and slower, at some point it loses its sense of coherence and motion, and becomes a series of isolated tones. This happens for most listeners when the notes are more than 1.5-2.0 seconds apart.

FOOTNOTE: For more details on the “speed limits” for musical rhythm, and their implications for music theory and performance, see the author’s *Hearing in Time*, esp. Chapters 1 and 2).

Rhythm involves our perception of durations within a fairly narrow range—from 1/10 of a second (that is, 100 milliseconds or “ms”) to about two seconds. Within this range we are aware of the number of elements in a rhythmic group (e.g., a triplet versus a quadruplet). It is within this range that we are best able to judge duration. In perceptual psychology the sensitivity of any sensory modality is typically expressed in terms of the “just noticeable difference” or “JND.” That is, given a stimulus of a certain magnitude (whether it is light intensity or color in vision, duration or frequency in audition), how much change in a stimulus is necessary before it becomes perceptually apparent? As Dowling (1986) noted, in early studies of rhythm perception:

The just noticeable difference between time intervals was measured in terms of subjects' precisions in reproducing isolated intervals and in judging the relative durations of successive intervals in pairs. . . . But even at best, the JND size typically fell in the range of 5-10% (Woodrow 1951). This seemed enormous in comparison with JNDs for pitch, for example, which typically fall well under 1%. . . . It has become apparent since 1950 that if the task is tapping along with a steady beat, listeners' precision is much better. . . . with JNDs of the order of 2-3%" (p. 185).

This is also true when one has to make judgments of duration in a metrical context (as opposed to tapping along to a steady beat); here again the observed JND was around 2.5% for intervals greater than 250ms, and a constant 6ms for intervals [between 100ms and] 250ms (Drake & Botte 1993; Friberg and Sundberg 1995).

Our sensitivity to durational differences goes hand in hand with our limits to categorize various durations, both within and outside of a metric context. Miller (1956) proposed the famous rule of “seven plus or minus two” as a broadly applicable limit on our capacity for categorization. That we have a similarly limited number of durational categories was more recently shown by Desain and Honing (2003). In their study, they presented subjects with 66 variants on a 3-note figure, and then ask them to notate what they heard as precisely as possible. They found a strong tendency among subjects to employ only two basic rhythmic categories, a long and short, and so the four dominant figures were, as one might expect, Long-Short-Short

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(L-S-S), S-L-S, S-S-L, and a series of even durations. The 66 various stimuli were construed in terms of about a dozen basic patterns, all of which related to these four archetypes. Moreover, this categorization was enhanced when subjects were primed with a particular metric context.

In his essay “Cognitive Constraints on Compositional Systems” Fred Lerdahl develops a number of desiderata—17 in all—for composing cognitively intelligible musical structures. These constraints are of two types, “constraints on event sequences” and “constraints on underlying materials.” The former focuses on hierarchical structure of the rhythmic surface and the creation of well-formed grouping structures, while the latter centers mostly on the nature of pitch materials. Lerdahl’s event sequence constraints give emphasis, perhaps too much emphasis, on regular accents and durational symmetry in the creation of well-formed rhythmic and metric structures. However, one can also look at “constraints on underlying materials” in the temporal domain. For here is precisely where the limits on our perception and cognition of number and duration come into play. So, for example, constraint 10, “intervals between elements of collection arranged along a scale should fall within a certain range of magnitude” (p. 244) may be applied to durations, i.e., they all should be within the range of 1/10 to 2 seconds, as noted above.

It is important to note that within the range 1/10 to 2 seconds not all durations are alike. There seems to be a qualitative difference between durations less than about 1/3 of a second and those longer than about 1/3 of a second, what Paul Fraisse termed “temps courts” and “temps longs” (Fraisse 1956, Clarke 1999). Moreover, we have a preference for durations around 1/2 a second (James 1890, Parncutt 1994, van Noorden and Moelants 1999)—if there is a regular periodicity in or around this range, we are strongly drawn to it. Thus most musical rhythms, which mix short, medium, and long durations, involve qualitatively different “kinds of time.”

2.2 Motion

When presented with a series of undifferentiated clicks or tones, we nonetheless have a propensity to hear groups of twos or threes; this is known as *subjective rhythmicization* (Bolton 1894) or *subjective metricization* (London 2004). Likewise, when given a metrically ambiguous melody (one which, for example, could be heard either in duple or triple meter), we often experience a clear sense of a particular metrical organization on any given listening experience. We actively organize what we hear, based on innate perceptual and cognitive mechanisms, as well as on our habitual responses to familiar rhythmic stimuli. We do not hear a series of individual events, but patterns of *motion*, especially in the case of temporally continuous event sequences.

The philosopher Jerrold Levinson, drawing on the work of Edmund Gurney (1880), argues that musical experience is rooted in our grasp of these sorts of low-level patterns and their succession. He claims that “To take satisfaction in some music is, above all, to enjoy following it, and its value as music . . . [involves] an experience of following it over time that is intrinsically rewarding” (Levinson *Evaluating* 1996). Accordingly, Levinson’s conception of *Basic Musical Understanding* essentially entails:

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[a] present-centered absorption in the musical flow; active following of musical progression; inward seconding of musical movement; sensitivity to musical alteration; continuational ability; and grasp of emotional expression (Levinson 1997, p. 32).

Note how much of Levinson's basic musical understanding is rhythmic in nature, as he speaks of our "active following of musical progression." Likewise we have and make use of an "inward seconding of musical movement" as well as "continuational ability" (by this last term I take Levinson to mean both that we connect successive events as well as image future events). A prerequisite for this sort of understanding is rhythmic regularity and continuity: events should occur in a discernable temporal pattern, and we should have a contiguous series of such patterns. Levinson is describing the phenomenon of *entrainment*, and I have argued that it is the essence of musical meter:

In many contexts we synchronize our attentional energies [and our motor behaviors] to the rhythms of the world around us. This synchronization is achieved by latching on to temporal invariants, that is, similar events that occur at regular intervals. Meter is a specifically musical instance of a more general perceptual facility of temporal attunement or entrainment. (London 2004, p. 25).

Thus not only is the presence of rhythmic regularity (and the meter it engenders) an aid to our durational discrimination, as noted above; it also is normative or prototypical for most styles and genres of music. To say that something is "musical" is, among other things, that it affords our metrical engagement with it. Meter allows for musical understanding of a particular sort, as we may both (a) sense how it moves, and (b) move along with it. This is precisely the point made by Victor Zuckerkandl:

"Music contexts are *motion* contexts, kinetic contexts. Tones are elements of a musical context because and in so far as they are conveyors of a motion that goes through them and beyond them. When we hear music, what we hear is above all motions." (Zuckerkandl 1956, p. 76)

The motion we hear in music is of course illusory—it is, as Susanne Langer so aptly put it, the creation of a "virtual time" in a "virtual space" (Langer 1953). But the fact that it may be illusory does not make it any less perceptually palpable. Indeed, as Robert Gjerdingen (1994) has noted, the perception of apparent motion in music (and other auditory phenomena) may involve the same neural mechanisms as motion perception in the visual domain.

To summarize, basic *rhythmic* understanding (pace Levinson) involves an awareness of the number of events present in a given amount of time (quantity) as well as their relative lengths (duration). We would not claim to "understand" a rhythmic figure if we could not say whether it was a duplet or a triplet, or if it involved even or uneven durations. Likewise, our rhythmic engagement with music typically involves some degree of entrainment, which affords both the perception of motion as well as our ability to move with the music, either in our aural imagination or in fact. These are characteristic aspects of our experience of music.

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2.3. Rhythmic Complexity

Both Jonathan Kramer (1988) and Fred Lerdahl (1988) have pointed out that musical complexity has to be structured in a certain way—hierarchically—in order for us to be able to comprehend it. Here is Kramer’s example of how a hierarchical arrangement of pitches makes them readily graspable and memorable, while other orderings (which preserve the pitch-class content within each measure) do not:



Here is a very simple rhythmic analogue, composed by the author:



Both phrases use the same set of durations. In the first there is a clear sense of order and arrangement, a duple meter is strongly projected, and there is a sense of motion as the series unfolds. Indeed, the patterning of durations allows the listener to infer an underlying pulse, as well as the implied 4/4 meter. The hierarchical organization of rhythm compliments the metric context under which it is understood. Not so in the second phrase. The juxtaposition of extremely short and extremely long durations at the outset forestalls any sense of intervening pulses, nor does any predictable grouping pattern ever emerge. Hierarchical structuring for rhythm thus is just as important as hierarchical structuring for pitch. With neither a palpable pulse nor a clear grouping structure, it is unlikely that any sense of meter or motion will emerge. In short, in most instances intelligible rhythmic complexity involves the establishment of a metrical framework under which the configuration of durations can be understood.

3. Messiaen and Babbitt: Two Case Studies in Rhythmic Composition

Having argued that aesthetically relevant properties of a musical artwork are tied to our first order experience of its primary medium—sounds in time—and having presented some empirical

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evidence as to the limits of our rhythmic perception and cognition, the next step in my argument should be fairly obvious: the aesthetic success of a work cannot depend upon our experience of work's rhythmic structures if they involve distinctions or configurations which we cannot perceive. Here I will take up two cases, both more of compositional premises or systems rather than particular analyses, which seem to presume the unhearable: the duration series/scales used by Oliver Messiaen in his *Mode de valeurs et d'intensités*, and the time-point series discussed by Milton Babbitt in his essay on "Twelve Tone Rhythmic Structure" (and subsequently used by him and others). Others have noted the problems with these works (for a recent thorough critique and relevant bibliography see Taruskin 2005).

3.1 Messiaen's *Mode de valeurs et d'intensités*

The score of *Mode de valeurs et d'intensités* tellingly includes tables of the articulative, dynamic, durational, and pitch palettes used in the construction of the piece. Here is my rendering of Messiaen's table of durational values used in *Mode de valeurs*:



It is telling that Messiaen refers to these durations as “chromatic degrees” (and thus as analogs to the order pitch classes of a chromatic scale). And as Pascal Decroupet indicated in his presentation at the Orpheus Institute, Messiaen used these materials in systematic combinations of rhythmic and melodic cells. Thus in order to grasp these permutations and derivations, we have to be able to grasp the presence of particular pitch, duration, attack, and intensity “classes”—that a figure involves duration class 5 (8th note tied to a 32nd) versus class 6 (dotted 8th)—as well as their more complex configurations.

Let us just consider Messiaen's duration series, apart from their interaction with pitch, attack, and intensity. From the outset it is clear that there are simply too many durational categories—well beyond the “seven plus or minus two” limit noted above. Moreover, the “chromatic degrees” of his various divisions require distinctions between categories well beyond our perceptual capacities. Messiaen's tempo marking is “Modéré—moderately. While not a metronome mark, if a quarter note is at 100 BPM, a reasonably central tempo marking for moderato, it would have a duration of 600ms. Thus a 32nd note, the integer unit of Messiaen's duration scale, would have a duration of 75ms, and is probably too short to be heard as a rhythmic element. Likewise, the durational differences between categories are similarly slight (though, admittedly, above the JND threshold for most listeners). The fact that the piece does not project a stable meter makes the JND threshold for durations even higher.

Messiaen himself seemed aware of the impossibility of hearing such fine-grained aspects of *Mode de valeurs*, as he noted these sorts of structures convey a “charm of the impossibilities,”

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(*Technique*, p. 21), of musical “facts” to be known with our minds, if not our ears. Taruskin’s comment on this piece is most apt in this regard:

The music consists of a ceaseless “counterpointing” of elements drawn from the stringently limited menu [of pitches and durations] just described, individual hypostasized objects in seemingly fortuitous relationships. . . . One may fairly wonder why Messiaen would have wished to court an impression of randomness; or (perhaps more to the point) why one would wish to plan such an apparently haphazard outcome in such meticulous detail. . . . In the case of Messiaen himself, answers are probably to be sought in his religious philosophy, in which the incomprehensible results of unknowable plans can symbolize the relationship of man and God. (Taruskin 2005, vol 5, pp. 25-26).

3.2 Babbitt on “Twelve Tone Rhythmic Technique”

In his 1962 essay on “Twelve Tone Rhythmic Structure” Milton Babbitt was critical of interpreting durations as analogs to scale steps, as he notes that “the temporal analog of pitch interval is translatable only as the ‘difference between durations’” (Babbitt 1962/1972, p. 161). Instead, he draws an analogy between pitch organization and meter, and gives the following example:

Metric time-point series, after Babbitt (1972) ex. 6.1:



In each measure of 6/8 one may identify 12 attack points (at the level of the 16th note), and these attack points may be regarded as analogs to an ordered collection of chromatic pitch classes. As such, this example displays the following time point (or “attack point”) series: [0,3,11,4,1,2,8,10,5,9,7,6], putatively isomorphic to a tone row of analogous pitch classes. There are several problems, however, in approaching the rhythmic structure of this passage in this way. First, as this pattern of attack points does not clearly indicate the presence of 6/8 to the listener, there is little if any way for her to grasp the time-point series, as she would lack the appropriate metric index. Even if 6/8 were readily apparent (imagine this with a click track or other percussive underpinning—the dance club version, if you will), we don’t grasp “filling the metric aggregate in a manner analogous to filling the pitch class aggregate. This is because in a metric context the intervening attack points over the course of a long duration are still present as part of the listener’s entrainment, in a way that intervals between widely separated pitches are not. Babbitt is aware of these difficulties, as he notes that there are “manifest differences between the elements of the pitch system and those of the time-point system, that is, perceptual—not formal—differences” (p. 162, and see also his remarks on repetition, p. 163-164). But a larger problem looms. For meter itself is hierarchical, and so we grasp these time points in a hierarchically-structured way. Thus rather than a sense of an attack “at time point 7” (in this example, this attack occurs in the 5th measure), we rather hear such an articulation as occurring

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on “the second subdivision of the first 8th that itself is a subdivision of beat two.” Babbitt’s non-hierarchical index of time point locations does not match with the way we hear temporal locations in a metrical context.

3.3 Other Aspects of Rhythmic Composition and Development

We are on somewhat firmer ground if we think of a more familiar melody or rhythm, and then speak of it undergoing some sort of global transformation, such as retrograde, transposition (moving a rhythmic figure about in a measure), or augmentation or diminution. These are familiar compositional devices. However, they too have their limitations, as John Sloboda (1985) has shown:



Sloboda used these two versions of the “same” melody in an experiment which studied how notation led the performers to use different patterns of expressive timing to make the metric orientation of each version of this tune clear. From a set-theoretic point of view, the second melody is a simple “transposition” of the first by one unit of subdivision. But in the course of Sloboda’s experiment, where these two versions were presented interleaved with other melodies, *none* of his subjects noticed that one was a “transposition” of the other. On a more basic level, one cannot transpose, retrograde, or rotate elements time-series in the same way as a pitch series. A permutation of a Long-Short-Short rhythm results in a syncopation, and as Gjerdingen (1993) has noted, retrogrades of rhythms, especially as they are actually performed, often induce radically different perceptions.

Thus it would seem that Messiaen’s and Babbitt’s careful and systematic rhythmic designs are in large part, for nought, for in the case of the former there are too many categories (and they are too finely drawn) while in the case of the latter we do not relate meter to pitch in the manner suggested. Therefore these details and isomorphisms cannot be part of our first-order experience of the primary medium of these compositions. Can they still have any aesthetic relevance?

4. Analytically-Informed Listening(?)

An obvious rejoinder to the argument developed this far is that we do not and need not know music by our ears alone. We read essays by the composers, analyses by music theorists, and study scores ourselves. Surely our knowledge of structural relationships, gained from our second order experience of the work (analyses, commentary, score study) will enable us to appreciate at

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least some of these relationships and structures, and thus affect our first order experience of the work.

Mark DeBellis (1995) has considered the issue of “Theoretically-Informed Listening” in some detail. In his discussion, DeBellis draws on a previous essay by Peter Kivy which invokes the characters of Tibby and Mrs. Munt from E.M. Forster’s novel *Howard’s End* listening to Beethoven’s Fifth Symphony (Kivy 1990). Tibby is the listener who is “profoundly versed in counterpoint, and holds the score open on his knee,” while Mrs. Munt who can only “tap surreptitiously when the tunes come.” Tibby listens with a full knowledge of structure and theory; Mrs. Munt has nought but her innocent ears.

DeBellis characterizes certain aspects of Tibby’s versus Mrs. Munt’s experience of the music in this way:

Tibby knows that closure is explained by reference to scale-step properties. Hence, not only does he hear the music coming to a close, and hear the arrival of the tonic, but he hears the closing with an appreciation of the way it depends on the tonic’s arrival. For this reason, his [listening experience] has a coherence not present in the experience of someone who is unaware [of those properties, such as Mrs. Munt] (p. 126).

Tibby is DeBellis’s exemplar of a *theoretically-informed listener*. By listening under the framework of music-theoretical knowledge, Tibby “has a deepened perception of a structural property for what it is, and that is central to his increased appreciation [of it]” (p. 129). In the case of Messiaen and (perhaps especially) Babbitt, analytical knowledge of the piece may allow the listener to at least grasp more of the relevant structural features, if only by making a greater effort to hear them. Even if one cannot aurally grasp particular features (e.g., durational categories, time point series), one still has a sense of what is behind the surface effects that one can hear.

However, DeBellis goes on to note that while this account has some plausibility, two important objections can be made to it. First, it is not clear why we ought to count the understanding Tibby derives from know the explanatory connection as an understanding *of the music* rather than of how the music *is* or *works*. While sensitivity to consonance and dissonance, or durational distinctions is surely essential to musical understanding, it is doubtful that a knowledge of their physical basis in frequency ratios or particular durational proportions is essential. Second, if our aesthetic posture towards a work consists in appreciating the way feature *A* depends on feature *B*, then it had better be the case that one really does depend on the other. To put it another way, theoretically informed musical pleasure is subject to a certain defeasibility. Were we to learn that a certain rhythmic repetition does not explain coherence—for example, if a slightly different pattern (one which does not have the dependency relationship noted above) sounds just as coherent—then a pleasure taken in that supposed connection would be shown to be in a certain sense unjustified. (DeBellis, pp. 130-131).

This “defeasibility” is precisely where empirical studies of musical perception and performance gain purchase. For if slight alterations (in durational ratios, for examples) were to go unnoticed, or if they cannot even be performed in the first place, then analytical or theoretical accounts of

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the compositional complexity of a piece based on such relationships cannot account for a piece's aesthetic value (or lack thereof). One cannot have a "deepened perception for what something is" if one cannot have even a shallow perception in the first place.

DeBellis' original case of theory-laden hearing presumes that there are perceivable structures onto which a theory may or may not gain purchase. And indeed, his main point seems to be that what music theories and analyses typically do is give the listener a greater and more nuanced awareness of what is there to be heard. That is, given the perception of two different pitches, or rhythms, or other structural configurations, a theory will tell us how they are different and in what ways they are alike, and may (perhaps) lead us to hear a structural relation where we did not. What theories do not aim to do is to make perceptually indiscernible identicals discernable.

At this point we have arrived at a place where the appreciation of such musical works depends not on our experience of them, but on our second-order knowledge of their structure, means of production, and the composer's aesthetic aims. This is not so much an appreciation of the musical works, but of the composer's intentions and motivations behind such works. As such, the music of high modernism becomes conceptual art: works (that is, scores) to be seen but not necessarily heard. Performances of such works serve as demonstrations or authentications that simply allow one to say that such-and-such a piece of music has an existence as sounding music.

5. Aesthetic versus Artistic Properties

Having backed DeBellis into a corner, another distinction is in order. That is the distinction between *aesthetic* versus *artistic* properties of an artwork. This distinction originates with Frank Sibley (1959, 1965); here is a more recent definition from Davies:

Aesthetic properties are usually characterized as objective features perceived in the object of appreciation when it is approached for its own sake. Such properties are internal to the object of appreciation. They are directly available for perception in that their recognition does not require knowledge of matters external to the object of appreciation. In particular, their recognition does not depend on information about the circumstances under which the item was made or about its intended or possible [non artistic] functions. (Davies 2006, 53-54).

Aesthetic properties are characterized by these sorts of adjectives: unified, balanced, dynamic, powerful, graceful, delicate, elegant, beautiful (Davies 2006, p. 54).

FOOTNOTE: Note that works may embody different aesthetic properties of differing degrees of relevance. The audible properties of George Crumb's music and the visual properties of his scores may both be regarded aesthetic properties, though as noted above the former usually take precedent over the latter in terms of relevance.

By contrast, *artistic properties* require the mediation of knowledge about the artist or artwork under appreciation; as such they are characterized by adjectives like innovative (or its negative, derivative), inventive, transgressive, symbolic, metaphoric, and so on. Artistic properties often

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involve the relation of a work to traditions of style, genre, and medium. For example, there are conventions of representation (e.g., a painting that involves woman with a dove hovering on her shoulder is a representation of the annunciation), or quotation or allusion (e.g., the use of the “Dies Irae” in Berlioz’s *Symphonie Fantastique*), and so forth. Many, if not most artworks involve both aesthetic and artistic properties, and (at least according to some philosophies of art), a full experience and understanding of a work of art involves both. That is, without knowledge of iconography you may see a man and a funny lizard, but not grasp that it is St. George and the Dragon, nor will you understand that number of measures in the “Crucifixus” from Bach’s B-minor Mass is a representation of the number of steps Christ traversed on the via Dolorosa.

Theories and analyses of musical structure of the sort DeBellis details tend deal with “properties directly available for perception” whose “recognition does not require knowledge of matters external to the object of appreciation.” As such they are more concerned with aesthetic than artistic properties of works. Indeed, music theorists and analysts have largely left considerations of artistic properties to historical musicologists and music critics. Of course there are exceptions—Perle’s analysis of Berg’s *Lyric Suite* immediately comes to mind—but even in this case, while there may be hidden meanings and symbolism, it is usually claimed that the primary value of such works comes from their aesthetic properties. Moreover, it is usually presumed that our grasp of artistic properties comes from our first-order experience of the work in combination with our knowledge of its historical and artistic context. For example, when we hear the “Dies Irae” in Berlioz’s *Symphonie Fantastique*, it is our ears that tell us the borrowed tune is there. Our prior knowledge allows us to identify the tune, and know its religious significance. But we are not dependent on second order knowledge for our grasp of these artistic properties.

6. Artistic Aspects of Rhythmic Complexity

Works may can fail artistically, but succeed aesthetically, and vice-versa. For example, one may paint an aesthetically successful watercolor of a woman and child (well balanced, vibrant colors, animate faces, etc.), which fails as a representation of the Madonna and Child, as it botches the necessary symbolic conventions. Conversely, one can succeed in one’s artistic intentions (e.g., I will write a piece that contains allusions to and quotations from Wagner’s *Ring Cycle*) that nonetheless fails aesthetically (the piece is a horrible motley). Notice, however, that there is an implicit asymmetry here. While an aesthetic success usually makes for a good work of art, whether or not the artistic aims are fulfilled (our failed representation of the Madonna may nonetheless be a good figure painting, for example), the converse is not true. A successful representation of the Madonna, iconographically correct, may nonetheless have so many flaws in perspective, composition, rendering of the figure, and so forth, as to make the painting a failure (and indeed, something one can identify as a “very bad attempt at painting the Madonna”).

It may help to recall Iseminger’s remarks about artworks and our experience of them given at the start of this essay:

- A work of art is a good work of art to the extent it has the capacity to afford appreciation.

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- Aesthetic communication occurs when someone makes a work with the aim that someone else appreciate it.
- Appreciating is finding the experience of the work to be valuable in itself.

On this view, appreciation is grounded in the experience of the work, and by “capacity to afford appreciation” I take Iseminger to mean (or at least strongly imply) this “capacity” is grounded in an artwork’s ability to afford a valuable first-order experience of it. In short, it is grounded on aesthetic properties. Were this not the case, then the asymmetry between positive aesthetic and artistic properties noted above would not hold: so long as a work afforded appreciation under *any* mode of experience of it, we would have to grant that it has value as an artwork.

Here is a compositional thought experiment. Consider my *Subtle Etude #1*, a piece consisting wholly of a series of long, repeated tones (the particular pitch is not important). The tones should sound identical, but really are not, as they involve minute differences in duration and dynamics. The score might begin like this:



The score uses only three classes of durations (in a quasi-random order), and at the given tempo (quarter note = 40 beats/minute), each note is six seconds long (or slightly more; the hemidemisemiquaver adds about 23 milliseconds of duration, for example). Likewise there are three dynamic levels, and here I will stipulate that each differs by .2 decibels. These distinctions have been chosen because they fall well below our ability to perceive them (the JND for volume is approximately 1 db, and for unmetred duration roughly 5% of the interonset interval—here about 300 ms—though durational discrimination is very poor for intervals greater than about 2 seconds).

Consider two performances of this piece. One performance is a MIDI realization, with precise control of the durations and dynamics indicated in the score. In a computer realization, what you see is what you hear, even though you can’t hear it. Any distinctions we think we might hear in listening to the MIDI realization will be misperceptions, perhaps influenced by the presence of the score. The other performance would involve a human performer. The human performer faithfully tries to realize the score, with the paradoxical constraint that if she should make any note audibly longer or louder, it would be a mistake. In the latter context, any durational or dynamic differences we might hear could be either (a) figments of our musical imaginations, as in the MIDI performance, or (b) performance mistakes. But we may not be able to tell which is which. Furthermore, it is likely that there will be mistakes, as this is an impossible performance task. But that impossibility is precisely the point.

What sort of appreciation is afforded by our experience of this piece? If we were to hear the MIDI version piece without knowing its premise, I presume we would find it extremely boring. We are likely to find the “live” version of the piece also quite boring on a naïve listening. If we

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do know the premise of the piece, we may find a performance interesting—at least part of a performance, perhaps at least once. I doubt, however, if most listeners would care to hear the piece a second time. While the piece might be said to raise a number of interesting artistic questions (about the nature of “subtlety” in structure or performance; about effable and ineffable aspects of performance; about the limits of human control in performance, etc.), engaging these questions does not require much in the way of first-order experience of the piece.

If this subtle etude is too subtle and too simple to be heard, it is an analogue to hyper-complex works—and of course, I have posited it for that very reason. By their very nature, hyper-complex works will tend to maximize artistic properties—what we might regard as aspects of compositional design or method—at the expense of aesthetic properties. That is, whatever aesthetic properties such works have in a particular musical parameter (rhythm, pitch, timbre), they have as a result of “gross morphology” of that parameter that results from the more minute underlying structure. Our perceptual and cognitive limitations block our direct access of complex structural details, and hence we are unable to infer these complex artistic properties from our first order experience of the work. However, this does not forestall a positive experience of the works’ accessible aesthetic properties: what we can hear may well be engaging, display formal balance, have varied musical colors, and so forth.

In hyper-complex music we hear an effect without a clear grasp of its cause. We all become like Mrs. Munt in our experience of the work—our musical expertise as performers or composers or even music theorists(!) is of little avail. Indeed, this seems just what Messiaen means when he speaks of the “strange charm of impossibilities” noted above; here is the quote in full:

In spite of himself he [the listener] will submit to the strange charm of impossibilities: a certain effect of tonal ubiquity in the nontransposition, a certain unity of movement (where beginning and end are confused because identical) in the non-retrogradation, all things which lead him progressively to that sort of *theological rainbow* which the musical language, of which we seek edification and theory, attempts to be (*Technique*, p. 21; quoted in Taruskin, vol. 4, p. 235)

In this quote from his *Technique of my Musical Language*, Messiaen is specifically referring to his modes of limited transposition for pitch and his palindromic (non-retrogradable) rhythms, but the “confusion” here is of a piece with the effect of the pitch and durational organization of *Mode de valeurs*. Messiaen’s aim here is not the production of complexity with the intention we grasp it. His point is a religious one. Here is Taruskin’s apt summary of Messiaen’s theological aims:

Many of the rhythmic techniques Messiaen describes . . . [involve] durational plans that could be mentally conceptualized but not followed perceptually. . . . Like the truths of astronomy and many other scientific truths (as well, needless to say, as religious truths), it is the sort of fact that reflective intellect reveals sooner than the senses. Putting such a thing into an artwork is an implicit warning against assuming that true knowledge can only be gained empirically. The highest truths, Messiaen’s music implies, are revealed truths. Theology was truth. Anything beyond that, Messiaen implied . . . was mere history.” (vol. 4, p. 236)

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Messiaen's complexity is a means of musically pointing to transcendence. We are meant to be overwhelmed by the complexity in his music, not to grasp it. Our resultant listening experience will be fragmentary and/or incoherent. Richard Shusterman has noted that such experiences may also have a kind of aesthetic value:

We appreciate such art because it disturbs our sense of order and gives us a feeling of shock and disruption that we find somehow valuable (interesting, challenging, therapeutic, refreshing, and so forth) . . . Such experience, though not coherent or complete, displays at least the integrity of standing out as a distinctly singular experience, in contrast to the stream of ordinary experience" (Shusterman 2006 p. 222).

This may be true, and if anything, such musical experiences are a reminder of the "phenomenal fragility" of music: as an art of sound in time, we presume it must involve sounds we can hear, whose shape we can grasp, and whose organization we can remember. But sometimes we cannot hear, we cannot grasp, we cannot remember. Hyper-complex musical forms are not just challenges to the listener (or performer), but to the very notion of what properly constitutes the musical artwork itself.

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