1 Rhythm in Western Music

Concepts and Literature

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Although each chapter in this book has a distinct focus, there are many concepts that recur. This is especially true for Chapters 2–12, which explore various aspects of Western music. The present chapter introduces some of these recurrent ideas for readers less familiar with rhythmic terms and surveys significant recent theoretical contributions to the study of rhythm in Western music. The interested reader can find more comprehensive overviews of rhythmic theory in two essays by William E. Caplin and Justin London in *The Cambridge History of Western Music Theory*.[1]

As noted in the Introduction, the present volume takes the term *rhythm* to refer to the temporal organization of music. Writers on time in Western music, however, frequently use the term *rhythm* in a more circumscribed manner to refer specifically to the durations of sound events. A repeating sequence of durations might be referred to as a rhythmic pattern, for instance. In this sense, rhythm is a property of a wide range of styles from Medieval plainchant to common-practice tonal music to the plethora of compositional languages present in the past hundred years. Within most Western music since the late Medieval period, there is also a sense that the individual rhythmic events occur in relation to a regular underlying pulse, typically referred to as the beat. And, moreover, those beats are not perceived to be of equal strength but have a recurrent pattern of strong and weak beats called meter. Meter is a feature of some music from the late Medieval period, is found in virtually all music from the Renaissance to the start of the twentieth century, and is present in most – but by no means all – music from the past hundred years. Meter offers a way of measuring musical time that is distinct from chronometric time; its patterned regularity, or periodicity, provides a framework that coordinates individual sound events, or rhythm.

The origin of rhythm, in the sense of durations of sound events, is clear enough: sounds begin and end, and this physical property is directly observable in the same way that pitch (frequency) and volume (amplitude) are. Meter, on the other hand, cannot be ascribed to a discrete component of sound. Yet, for the most part, listeners immediately respond to meter, such as by coordinating a pattern of dance steps or clapping on

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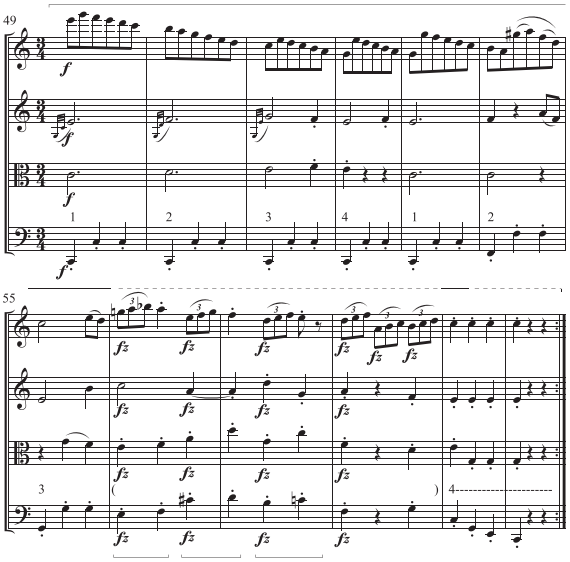
particular – rather than all – beats. What are the musical features that allow listeners to infer meter from the aural input? This is a complex question that music psychologists and music theorists have wrestled with, but it is the latter body of scholarship on which I draw below.

Meter and Metric Dissonance

A detailed and highly influential treatment of the musical factors that create meter is found in Fred Lerdahl and Ray Jackendoff's *A Generative Theory of Tonal Music*.[2] Lerdahl and Jackendoff present a series of preference rules. These include preferences for similar musical content to receive parallel metric placement and for the onset of long events to fall on stronger beats. Long events refer not only to extended rhythmic durations but also to a variety of other parameters, such as the length of a dynamic level, pattern of articulation, or harmony. For common-practice Western art music and genres such as jazz and rock, changes of harmony are often the most significant factor in the projection of strong beats. In addition, the pitch onsets within the bass line itself, at least in many styles, tend to occur on strong beats.

As a demonstration of meter in common-practice tonal music, consider an excerpt from a string quartet by Haydn (shown in Example 1.1) and



1.1 Haydn, String Quartet in C Major, Op. 74, No. 1, III, mm. 49–60

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try to auralize it without paying attention to the notated $\frac{3}{4}$ meter and the barlines. In the first seven measures, observe the placement of long durations (half notes and dotted half notes) in the second violin and viola. Although moving in consistent quarter notes, the cello also outlines a three-beat pattern owing to the lower register of every third pitch. Moreover, when the lowest note departs from the pitch C and the harmony moves to predominant and then dominant, these changes coordinate with the established triple meter.

Now consider the music that begins in the excerpt's eighth measure. The repeated melodic-rhythm pattern in the first violin outlines a two-beat pattern. The sudden shift to this contrasting thematic material, reinforced by the *forzando* marking, suggests a strong-weak (rather than weak-strong) identity for these two-beat units, as does the placement of long durations in the second violin. For two measures, the music projects a duple grouping of beats, namely, $\frac{2}{4}$ meter. One could argue that a composer writing after 1900 might have notated a change from $\frac{3}{4}$ meter to $\frac{2}{4}$ meter for these two measures, and that the aural effect here is a change in meter completely akin to that which can occur between the large sections of a common-practice tonal work, such as a ternary or rondo form. The prevalent view, however, is that the established metric context informs our understanding of short passages that project a different meter. In other words, the duple grouping of beats in these two measures is not heard as fully stable but rather as an unstable intrusion that subsequently resolves. The phenomenon of duple grouping of beats, usually across a two-measure span, within a triple-meter context is frequently encountered, and is referred to as hemiola. In Baroque music it even has a typical formal function as preparation for a cadential arrival. I will return to the formal function of the hemiolic measures in the Haydn excerpt below, but for now it suffices to observe that the harmonic changes in the excerpt's last two measures re-establish triple meter and bring the phrase to a satisfactory tonal – and metric – conclusion.

During the past two decades, many authors have applied the terminology of consonance and dissonance familiar from theories of pitch organization to the domain of meter. The most extensive development of this analogy is found in Harald Krebs's book on the music of Robert Schumann.[3] Krebs outlines two types of metric dissonance: grouping dissonance and displacement dissonance. In a grouping dissonance, one or more layers in the music projects a grouping of beats that is non-congruent with that of the prevailing meter. The hemiola described

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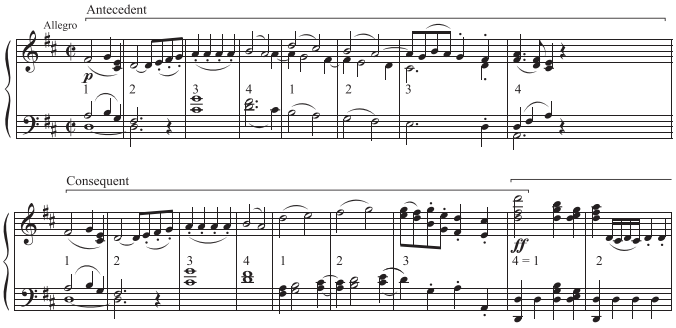
above is the simplest instance of grouping dissonance, as it involves a switching between triple and duple grouping at the level of the beat. More complex grouping dissonances might involve a switching between quadruple and triple grouping, for instance. The number of textural layers involved in the grouping dissonance, as well as the particular musical parameters that cause it to arise, give grouping dissonances a variety of intensities.

Displacement dissonance involves one or more textural layers that shift the strong beat from its expected location. For instance, in a triple meter dynamic accents or placement of harmonic changes might make the second or third beat of the notated meter – the prevailing metric consonance – sound as the strong beat in the meter. As with grouping dissonance, displacement dissonance can involve the entire musical texture or only particular layers and can thereby seem to be stronger or weaker. Consider the initial pair of phrases from the first movement of Haydn's Symphony No. 104, shown in piano reduction in Example 1.2.

At the start of the excerpt, strong beats in the meter are articulated through the placement of long durations in the melody and the harmonic changes at the moments corresponding to the downbeats of the first, third, and fourth measures. The lack of rhythms faster than the eighth note suggests the beat is the notated half note (as does Haydn's cut-time, or 2/2, meter signature to the reader of the score). The metric organization is duple with no ambiguity as to the location of the strong beats. In the fifth measure, the alto voice (played by the second violins) has a series of half-note durations displaced by a quarter note from the strong beats. Compared to the grouping dissonance in the string quartet excerpt, the displacement dissonance here is much weaker and in no way makes the location of the strong beats unclear. (And for a listener thoroughly familiar



1.2 Haydn, Symphony in D Major, No. 104, I, mm. 17–33 (piano reduction)

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with eighteenth-century style, the sense of displacement dissonance is very minimal since the dislocation of this layer arises through the contrapuntal technique of the suspension.) Many writers would simply refer to this alto line as syncopated, although the term *syncopation* can also be used for the singular placement of the onset of a long duration on a weak beat. In the excerpt's second phrase (shown on the second line of Example 1.2), the fifth and sixth measures exhibit a somewhat stronger displacement dissonance owing to the participation of two voices (played by the second violins and cellos) and the placement of these voices in the bottom of the texture.

Hypermeter

To this point, I have written almost exclusively about the level of meter referred to as the beat or tactus, that is, the level to which most listeners would respond bodily through finger- or toe-tapping and to which most conductors would coordinate their gestures. Yet, at least in music of the eighteenth and nineteenth centuries, the sense of strong and weak ascribed to beats within a meter also operates on larger (i.e., slower) levels of the metric hierarchy. The annotations on Example 1.2 include Arabic numerals, and these represent a type of meter. A widespread, but not pervasive, view among music analysts is that all of the measures marked "1" have a strength, or metric accent, analogous to the first beat in $\frac{4}{4}$ meter.[4] This strength is articulated by changes in melodic design and harmony. Meter above the level of the notated meter is referred to as hypermeter, the unit corresponding to a complete cycle of hyperbeats as a hypermeasure, and the first beat of a hypermeasure as a hyperdownbeat.

Hypermeter is less consistently periodic than is meter. One scenario where hypermetric irregularity frequently occurs is when a cadential arrival simultaneously functions as the beginning of the next phrase. In Example 1.2, the first phrase spans eight measures, concluding on the dominant harmony. The second phrase, which is parallel in construction, heads to a cadence on tonic harmony in its eighth measure. However, the arrival is marked by the sudden onset of a new dynamic and the entrance of the winds, brass, and timpani. The melodic idea that begins at this point initiates the next phrase, meaning that the measure has a dual function in the passage's phrase organization. Hypermetrically, a measure that was initially weak (a fourth hyperbeat) is reinterpreted as strong (a hyperdownbeat); this is shown by the 4 = 1 annotation.[5] Phrase overlap, or elision, can

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occur without hypermetric reinterpretation, and hypermetric irregularities can arise in other situations.

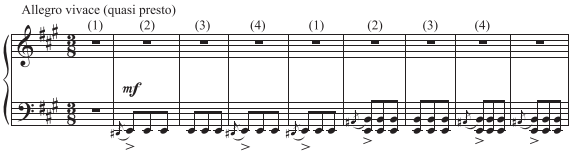
Let's return to the string quartet excerpt in Example 1.1 and consider its hypermetric structure; the reading shown, with which I concur, is adapted from William Rothstein's book *Phrase Rhythm in Tonal Music*.[6] The Arabic numerals convey quadruple hypermeter, stemming from melodic parallelism (compare measures 1 and 5 of the excerpt). The hemiolic passage begins where the fourth hyperbeat of the second hypermeasure is expected, and it also replaces the expected cadential arrival on tonic harmony. From the perspective of phrase structure, the hemiolic measures expand the phrase by delaying the cadence; adopting Rothstein's terminology, they can be understood as a parenthetical insertion in the phrase structure owing to the degree of contrast they exhibit with the surrounding music. The theoretical question that arises is whether they cause hypermeter to be inoperative or whether they suspend hypermeter temporarily. In the view of Rothstein and many other authors, a parenthetical insertion does not preclude the continuation of hypermeter; in fact, some analysts contend that lengthier parenthetical insertions can even have their own independent surface hypermeter while the underlying hypermeter is held in abeyance until the end of the parenthetical insertion. This view stretches the extent to which periodicity can be withheld without losing the temporal foundation of hypermeter. It asserts that hypermeter is more dependent upon the influence of phrase organization and the distinct qualia of hyperbeats than upon the measuring of duration.

The idea that hypermeter can exist in the absence of strict periodicity has led theorists to debate the extent to which meter is operative at levels above the notated measure. For Lerdahl and Jackendoff, meter is a "relatively local phenomenon" that, in tonal music, often extends "from one to three levels . . . larger than the level notated by barlines, corresponding to regularities of two, four, and even eight measures."[7] Theorists influenced by the hierarchical understanding of pitch organization posited by Heinrich Schenker, such as Carl Schachter, William Rothstein, and Frank Samarotto, typically view meter as still operative on slightly deeper levels (i.e., levels corresponding to sixteen or thirty-two measures). Of course, the number of hypermetric levels present depends somewhat on the nature of the music; a piece with exceedingly regular phrase structure or harmonic rhythm – such as a waltz or march – is more readily interpreted in this manner. In other cases, a greater degree of abstraction is required, as higher levels of meter are correlated with significant tonal arrivals and assumed models of underlying periodic phrase structure beneath surface-levels expansion (or, less

frequently, contractions). Very few authors posit the existence of hypermeter at the larger levels of form (i.e., beyond thirty-two measures) owing to the extreme deviations from periodic beats, but one notable instance is Jonathan Kramer in his book *The Time of Music*.[8]

Positing multiple levels of hypermeter asserts that meter has a quality not unlike the physical property of inertia, that is, once established meter has considerable inherent stability and independence from the individualities of the musical foreground. In other words, when events that induce the perception of metric accents occur at unexpected moments, the ongoing meter and hypermeters have a resilience that allows them to continue. Some recent authors have questioned this separation of meter from the details of the musical surface, either on phenomenological or cognitive grounds, or both. Informed by research in music cognition, Justin London suggests that meter has a "temporal envelope" whose "upper limit is around 5 to 6 seconds."[9] London demonstrates how the constraints on human temporal perception can explain the prevalence of certain meters at various tempi, as the shortness of subdivisions of beats and the length of hyperbeats move toward perceptual thresholds. The latter perhaps explains the rarity of triple hypermeters, besides an aesthetic preference for the symmetry and balance of duple construction.[10] From a phenomenological perspective, Christopher Hasty has offered the strongest critique of what I have called metric inertia, arguing for the role of rhythmic durations in creating "projected potentials" that are realized or denied depending on whether an immediately successive event begins at the expected moment in time.[11] Hasty's approach invites close hearing of the music and demands constant renewal of meter through the durations of events and their identities as beginnings, continuations, or anacruses. For Hasty, meter is not fundamentally about levels of beats in proportional relationships but about different configurations of rhythmic events whose particularities can make two passages with the same notated meter have quite different temporal characteristics, and in Hasty's view these features are metric, as opposed to rhythmic.

Given the competing claims in contemporary music theory about the nature of hypermeter, one might wonder about the validity of the concept and whether there is any evidence that composers of common-practice tonal music were sensitive to hypermetric considerations. There are clear indications that some composers were cognizant of hypermeter, at least for one or two levels above the notated meter. Explicit notation of hypermeter is exceedingly rare, but there are examples. The most famous occurs in the scherzo of Beethoven's Ninth Symphony where he writes *ritmo di tre*



1.3 Liszt, *Mephisto Waltz*, No. 1, mm. 1–9

battute and *ritmo di quattro battute* to show shifts between triple and quadruple hypermeter. A less well-known instance is found in the Mephisto Waltz No. 1 where Liszt uses Arabic numerals to indicate quadruple hypermeter in a manner exactly parallel to the analytic annotations on the examples above, as shown in Example 1.3.[12] Moreover, Liszt notates a measure of rest before the music begins. Somewhat more commonly encountered is a notated measure of rest at the end of a movement or work to complete a hypermeasure; an early instance of this happens at the end of the first movement of Beethoven's Piano Sonata in A Major, Op. 2, No. 2.

Perhaps the strongest support for the idea of hypermeter comes from pieces in fast tempi where the notated downbeats are perceived as beats. In these instances, the perceived meter is not the notated one but rather a hypermeter; given that there is some subjectivity involved in deciding which level of meter corresponds to the heard meter, most analysts simply employ the terms *meter* and *hypermeter* with respect to notation. Many nineteenth-century scherzo movements are notated in $\frac{3}{4}$ meter but proceed at a sufficiently fast tempo where the downbeats of consecutive measures are perceived as beats in a larger, usually quadruple, meter. The scherzo from Beethoven's Ninth Symphony mentioned above is exceptional in that this larger meter shifts back and forth between triple and quadruple organization; typically, the larger meter remains quadruple throughout, albeit sometimes with playful moments of dislocation when the hyperdownbeat shifts (generally by two notated measures), as in the scherzo from Beethoven's Seventh Symphony. Outside of the scherzo repertoire, a clear instance where the notated meter is not the perceived meter occurs in the first movement of Beethoven's Fifth Symphony, shown in reduction in Example 1.4. Instead of coordinating their gestures with the notated 2/4 meter, conductors uniformly show a larger quadruple pattern that spans four notated measures. This leads to a moment of metric crisis in the development section when Beethoven fragments the thematic material until the winds and brass play isolated chords in rapid alternation with ones sounded by the strings, and the clarity of four-measure units dissolves.

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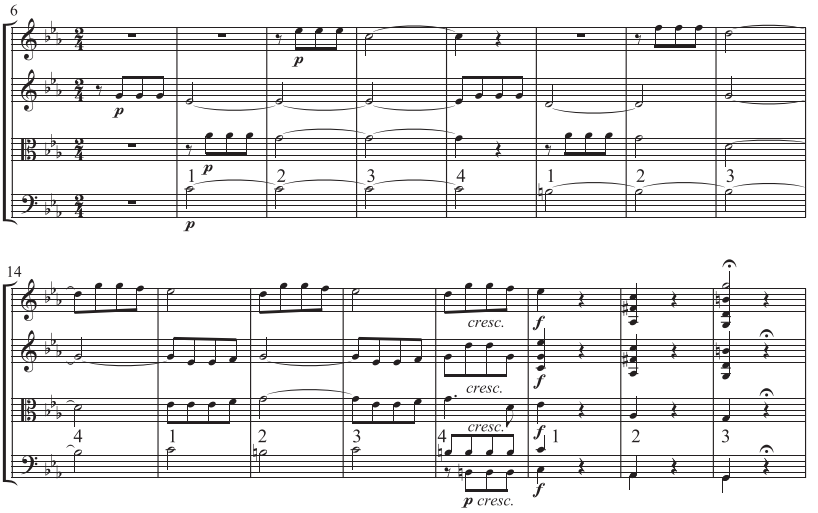

1.4 Beethoven, Symphony No. 5, I, mm. 6–21

Meter in Post-tonal Music

In music written since 1900, metric structure has become much more varied, not unlike the broadening in pitch organization beyond common-practice tonality. The degree of metric periodicity found in music throughout the eighteenth and nineteenth centuries waned, except in many genres of popular music, where – due, at least in part, to the connection to dance – metric periodicity remains present. In fact, popular genres are distinguished as much by their characteristic beat, or groove, as by features of melodic, harmonic, or formal organization. Often these characteristic elements are recurrent rhythmic patterns or established norms for using particular instruments to articulate meter, as in the rock drum kit.

While some genres of Western popular music, such as progressive rock, moved away from multiple levels of duple (and less frequently triple) meter, it was in the art-music tradition where the most consistent break from metric periodicity occurred. The present chapter cannot survey all of the rhythmic innovations of the past century; rather, it outlines some of the most significant ones and their implications for thinking about rhythm.

Throughout the eighteenth and nineteenth centuries, meter consists of equally spaced beats that are organized in a duple or triple grouping, depending on whether one or two weak beats fall between adjacent strong beats. Except for unmeasured pieces, such as some Baroque keyboard preludes, there are very few exceptions to the principle of equally spaced,

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or isochronous, beats. The most famous exception is the second movement of Tchaikovsky's Symphony No. 6 ("Pathétique"), composed in 1893, where instead of a triple-meter scherzo (or waltz) a lively movement in 5/4 meter occurs. Quintuple meter consists of both duple and triple grouping of beats, either consistently (as recurring 2+3 or 3+2), or with variable patterning of the duple and triple groupings. In either case, a larger periodicity results, and the sense of meter remains clearly intact. Very occasional instances of septuple meter can be found before the twentieth century, yet in these instances composers stuck to the convention of notated duple and triple measures. Two examples occur in the music of Brahms: his piano variations on a Hungarian song (Op. 21, No. 2) and the slow movement of his Piano Trio in C Minor, Op. 101; in the former work, a consistent alternation of notated $\frac{3}{4}$ and $\frac{4}{4}$ measures occurs, while in the later one each notated $\frac{3}{4}$ measure is followed by a pair of $\frac{2}{4}$ measures. In the piano variations the folk inspiration of the asymmetrical meter is explicit, but in the piano trio movement the transparent melody-and-accompaniment texture, slow harmonic rhythmic, and simple harmonies invoke folk music (as depicted by nineteenth-century composers).

The folk impetus behind asymmetrical meters remains explicit in much of the music of the early twentieth century, most notably that of Bartók and Stravinsky. While much of Bartók's music features consistent use of an asymmetrical meter such as $\frac{5}{8}$ or $\frac{7}{8}$, some of his works and many of Stravinsky's present a more trenchant challenge to the sense of meter through the use of rapid changes of notated meter, often referred to as mixed meter (e.g., a succession of four measures with $\frac{3}{8}$, $\frac{5}{8}$, $\frac{2}{4}$, and $\frac{3}{8}$ notated meters). Most often, mixed-meter passages maintain a consistent beat or subdivision – usually the eighth note – and the way those beats group into a meter or the subdivisions group into beats changes unpredictably. Frequently, such passages are based around a short melodic cell that recurs in slightly varied forms that render it longer or shorter, and the onset of each of its iterations is generally an important reference point for feeling the temporal organization. Passages with such a high degree of metric irregularity raise several theoretical questions: How much deviation from periodic accentuation can a listener relate to a periodic underlying metric grid? At what point does the notated meter become best conceived as an element of the score that communicates compositional organization and helps performers synchronize with one another but does not have much connection with listener perception? When does a sense of beat and meter dissolve into a tracking of periodic pulses? Music theorists have offered a variety of perspectives on these questions; perhaps most influential is Hasty's *Meter as*

Rhythm, which has broad applicability even in music with little periodicity due to its continual engagement with local durations and their potential for replication. Hasty's approach compels the analyst to engage temporally with music, however complex its rhythmic design, as seen in his discussion of music by Anton Webern, Elliott Carter, and Stefan Wolpe.

Besides a greater range of possibilities within the domain of rhythm, art music of the past century has also seen changing relationships between rhythm and other musical parameters. Returning once again to Stravinsky, I would point out that passages with mixed meter and additive rhythmic construction are not his only rhythmic innovations. Equally new are passages built upon three or more independent rhythmic layers, each repetitive, sometimes composed of an exactly repeating ostinato and sometimes an irregularly recurring figure. A clear example is the first of Stravinsky's *Three Pieces for String Quartet* where the cello and viola have an ostinato that repeats after seven quarter notes, violin I has an ostinato that repeats after twenty-three quarter notes, and violin II has an irregularly recurring four-note interjection. Similar layered textures occur in Stravinsky's *Rite of Spring*, composed at nearly the same time, often building to a thick texture involving the entire orchestra. In such passages, one layer is often sufficiently prominent to exert its metric identity on the texture as a whole, but the distinction between the rhythmic profile of individual lines and the effect of the overall musical texture begins to breakdown. This permeability between the parameters of rhythm and texture became of considerable interest to composers in the middle of the twentieth century, such as in the ensemble and orchestral works of György Ligeti in the 1960s and 1970s.

In eighteenth- and nineteenth-century music, rhythmic-metric design and pitch structure are closely intertwined but have different organizational principles. Composers of the twentieth century experimented with importing techniques familiar from the domain of pitch into the realm of rhythm, such as mid-century approaches known as integral, or multi-parametric, serialism. The transformations of transposition, retrograde, inversion, and retrograde inversion applied to twelve-tone pitch rows by Schoenberg were adapted to rhythm, albeit in different ways, by composers including Pierre Boulez, Karlheinz Stockhausen, and Milton Babbitt.

Meter and Meaning

Music exists in time, and rhythm is therefore an inherent property, however it is organized and perceived. Rhythm also plays an important role in

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the communication of expressive meaning in a wide range of music. For instance, fast rhythms might convey excitement or agitation, a rhythmic pattern might reflect some aspect of the lyrics in a texted work, or a rhythmic figure might reference a musical topic. Or rhythm might produce a visceral response such as when the bass groove re-enters at a beat drop in electronic dance music. In closing, I will explore a few more abstract ways that rhythmic design can create meaning.

In my research on the music of Brahms, I have observed several instances where thematic material undergoes rhythmic transformation during the course of a movement or work, typically leading from a less stable initial state to a more stable one.[13] This might involve a theme whose metric or hypermetric structure is initially unclear or incorporates metrically dissonant elements and that later recurs in a more stable or metrically consonant version. This type of large-scale thematic process is not unique to Brahms's music, although it occurs with greater frequency than in the music of many other composers. Moreover, I have suggested that large-scale changes in metric or hypermetric structure can have significant meaning even when they occur in the absence of shared thematic content.[14] Similarly, through his use of "metrical maps," Krebs tracks changes in the types of metric dissonances in pieces, and has coined terms to reflect intensification and de-intensification (e.g., tightening and loosening; surfacing and submerging).[15] These global processes, although less celebrated than tonal procedures such as modulation, can shape the overall expressive impact of a work. In the music of the past century, and especially as composers have written more about their own practices, certain rhythmic techniques have been developed for particular expressive purposes, such as Messiaen's deployment of repeating rhythms and symmetrical rhythms to project qualities of timelessness and contemplation. The following chapters offer perspectives on the possibilities for rhythm to convey meaning in addition to its role as a structural component of musical design.

Endnotes

1 W. Caplin, "Theories of Musical Rhythm in the Eighteenth and Nineteenth Centuries," and J. London, "Rhythm in Twentieth-Century Theory," in T. Christensen (ed.), *Cambridge History of Western Music Theory* (Cambridge University Press, 2002), 657–94 and 695–725.

2 F. Lerdahl and R. Jackendoff, *A Generative Theory of Tonal Music* (MIT Press, 1983).

3 H. Krebs, *Metrical Dissonance in the Music of Robert Schumann* (Oxford University Press, 1999).

4 Besides Lerdahl and Jackendoff, theorists who view hypermeter as having essentially the same accentual properties as meter include Carl Schachter, William Rothstein, and the author of the present chapter; see C. Schachter, "Rhythm and Linear Analysis: Aspects of Meter," *Music Forum*, 6 (1987), 1–59; W. Rothstein, *Phrase Rhythm in Tonal Music* (New York: Schirmer Books, 1989). Writers who view larger levels of meter as less similar to meter include Christopher Hasty and Justin London, as will be explored later in this chapter.
5 This example is cited in the discussion of phrase elision and hypermeter in Lerdahl and Jackendoff, *A Generative Theory*, 57–8.
6 Rothstein, *Phrase Rhythm*, 88–9.
7 Lerdahl and Jackendoff, *A Generative Theory*, 21 and 99.
8 J. Kramer, *The Time of Music: New Meanings, New Temporalities, New Listening Strategies* (New York: Schirmer Books, 1988).
9 Justin London, *Hearing in Time: Psychological Aspects of Musical Meter*, 2nd ed. (Oxford University Press, 2012), 27.
10 For examples of triple hypermeter see S. Rodgers, "Thinking (and Singing) in Threes: Triple Hypermeter and the Songs of Fanny Hensel," *Music Theory Online*, 17.1 (2011).
11 Christopher Hasty, *Meter as Rhythm* (Oxford University Press, 1997).
12 I would like to acknowledge Robert Rival for bringing this example to my attention.
13 R. McClelland, "Brahms and the Principle of Destabilised Beginnings," *Music Analysis*, 28 (2009), 3–61.
14 See, for instance, my analysis of the F–A–E scherzo in *Brahms and the Scherzo* (Aldershot: Ashgate, 2010).
15 Krebs, *Fantasy Pieces*.