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Meter and Grouping in African Music: A View from Music Theory

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Introduction

That rhythm is of paramount importance in African music, and a major source of its richness and complexity, is a widespread popular notion, but one which has also received a good deal of scholarly affirmation (Waterman 1952:211; Jones 1954:26; Chernoff 1979:40–42; Merriam 1982:84). In the large body of research on African music, considerable attention has been given to rhythm, including a number of studies which are devoted exclusively to the subject. One of the goals of this work has been to compare rhythm in African music to that in Western music, and to identify the fundamental differences and commonalities between the two. This task has not been easy, however, for our understanding of rhythm in Western music has itself evolved dramatically in recent years. Work in music theory over the last two decades has led to a view of Western rhythm which is rather different from earlier views; not surprisingly, this recent work has not yet fully penetrated other disciplines such as ethnomusicology.

In this essay I will approach African rhythm from the perspective of music theory, with the following questions in mind: how well can African rhythm be reconciled with the prevailing music-theoretical view of rhythm? What similarities and differences emerge between African rhythm and Western rhythm, as the latter is viewed by contemporary music theory? To anticipate my conclusions, I will argue that at a fundamental level, African rhythm as described by ethnomusicologists is similar to Western rhythm and can be accommodated in the same basic model. However, my aim is not merely to point out a convergence in the conclusions of theorists and ethnomusicologists: the music-theoretical view goes further, in a sense, providing a deeper and more explanatory understanding of how African

rhythm works than has previously been available. There are also important differences between African and Western rhythm, but I will argue that these differences, too, are greatly illuminated by the music-theoretical view of rhythm.

A few words of humility are in order after such a brash introduction. While my perspective in this study is music-theoretical, the evidence I will consider is drawn almost entirely from the work of ethnomusicologists: observation, transcription, and analysis of African music and music-making, based in many cases on years of first-hand involvement and participation. Indeed, the work of these ethnomusicologists goes much farther than the narrow musical questions I will address here, also discussing the larger cultural context of African music. While consideration of cultural context is of course vital for a full understanding of any music, it can also be worthwhile to focus on purely musical issues.

A word is needed about the musical domain of this study. Very few of the studies reviewed here are truly general studies of African music (Nketia's *The Music of Africa* is a notable exception). Most concern themselves primarily with the music of a single cultural group; the Ewe of Ghana have received particular attention. However, a number of authors extend their conclusions, to some degree, to traditional sub-Saharan African music in general (Jones, Koetting, Pantaleoni, Chernoff, Kauffman, Arom, Agawu); Jones, in particular, argues at length for the "homogeneity of African music" (1959 I:203–29). Other authors limit their claims to a single group (Blacking, Locke, Pressing); but none deny that there are significant musical commonalities across cultural groups in sub-Saharan Africa. This paper will concern itself with the general features of African rhythm, and will necessarily neglect the many interesting differences between groups and regions in Africa brought out by these studies. The research discussed here also explores a number of different genres. But for the most part, it is concerned with two: a) songs—often children's songs or work songs—generally sung without accompaniment or only with clapping; and b) drum ensemble pieces, performed with an orchestra of percussion instruments as well as singers and dancers.

A Model of Meter

Some of the major developments in recent music theory have been in the area of rhythm. Among these developments has been the emergence of a new conception of meter. According to this view, a metrical structure consists of a framework of rows of beats, where beats are points in time, not necessarily events. The meter of a piece must be inferred from the events of the piece (in ways which I will discuss below); but once the meter

is established, the events of the piece need not constantly reinforce it, and may even conflict with it to some extent. In this sense, a metrical structure is best regarded as something in the mind of the listener, rather than being present in the music in any direct way.

Perhaps the most important contribution to this view of meter was Lerdahl and Jackendoff's *Generative Theory of Tonal Music* (*GTTM*).[1] Lerdahl and Jackendoff present a theory which predicts the metrical structures that listeners will infer for a given piece (Lerdahl and Jackendoff 1983:68–104). (In that *GTTM* specifically purports to be a theory of *listening*—which is not always the aim of music theory—one might argue it belongs more to the field of music cognition than to music theory.) The theory is presented as a set of rules, of two types: "well-formedness rules" and "preference rules." *Well-formedness rules* state the criteria that define a "legal" metrical structure: essentially, a metrical structure must consist of several levels of equally-spaced beats, in which every second or third beat at one level is also a beat at the next level up. In Western art music, the metrical structure of a piece is usually partially indicated by the time signature. For example, a piece in 6/8 has one level of eighth-note beats; every third beat at that level is a beat at the dotted-quarter-note level; and every second beat at that level is a beat at the dotted-half-note (or one-measure) level. However, there may also be additional levels below or above those indicated by the time signature.

Figure 1. Metrical Preference Rules (Lerdahl and Jackendoff 1983:347–8. Only some rules are shown. The language has been simplified in some cases).

MPR 1 (Parallelism) Where two or more segments can be construed as parallel, they preferably receive parallel metrical structures.

MPR 2 (Strong Beat Early) Weakly prefer a metrical structure in which the strongest beat in a group appears relatively early in a group.

MPR 3 (Event) Prefer a metrical structure in which event-onsets are aligned with strong beats.

MPR 4 (Stress) Prefer a metrical structure in which onsets of relatively loud events are aligned with strong beats.

MPR 5a (Length) Prefer a metrical structure in which onsets of relatively long events are aligned with strong beats.

Linguistic Stress Rule (not in *GTTM:* See Halle and Lerdahl 1993) Prefer a metrical structure in which stressed syllables are aligned with strong beats.

Regularity Rule (this is considered a "well-formedness" [hard-and-fast] rule in *GTTM;* I consider a preference rule here): Prefer metrical structures in which beats at each level are relatively evenly spaced.

Preference rules state the criteria that listeners use to choose the correct metrical structure for a given piece out of all the possible ones (see Figure 1). For example, there is a preference to locate beats at event-onsets rather than rests or continuations of events (MPR 3), at longer events rather than shorter ones (MPR 5a), and at louder events rather than quieter ones (MPR 4). These rules apply especially to higher-level or "strong" beats. All these rules concern what *GTTM* calls "phenomenal accents": a phenomenal accent is a factor which encourages us to hear a beat or strong beat at a particular point in the music. A further kind of phenomenal accent which will be important to us concerns the setting of text: in vocal music, there is a strong tendency to align strong beats with stressed syllables of text. (This rule is not addressed in *GTTM* itself, but see Halle and Lerdahl 1993.) Another factor in meter is parallelism: given segments involving a repeated pattern of pitch or rhythm, there is a preference to assign them parallel metrical structures, so that strong beats occur in the same place in each instance of the pattern (MPR 1). While Lerdahl and Jackendoff assert that beats at each level must be equally spaced, in practice, beats are of course not exactly evenly spaced, due to imperfections in performance as well as deliberate fluctuations in tempo; therefore, it has been argued that the regularity of beats should be regarded as a preference rule rather than a well-formedness rule (Temperley and Sleator 1999). This is the "regularity rule" listed in Figure 1. (One further rule, MPR 2, will be discussed below.) In essence, then, a preferred metrical structure is one which aligns beats with phenomenal accents and parallelisms in the music, while also maintaining the regularity of beats at each level. Note that the preferred metrical structure is not necessarily the one which maximizes the alignment of beats with accents at every moment; because of the regularity rule, a certain amount of conflict between beats and accents (or "syncopation") may arise.

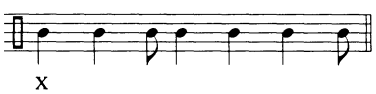
Meter in African Music

Turning now to African rhythm, the most basic question is this: does African music have meter, as we have defined it? There is almost unanimous agreement among scholars that it does.[2] An important figure in this regard is Waterman, who suggested that African music involves a "metronome sense," an underlying pulse which is felt but not constantly expressed (1952): this idea has been affirmed by a number of other scholars (Chernoff 1979:49–50, 96–8; Locke 1982:245). Jones speaks on a number of occasions of an underlying regular beat, which is often not explicit but is present in the mind of the performer and can easily be supplied if requested (1959, I:19, 32, 38, 40). Agawu remarks on the "secure metronomic

framework" underlying complex rhythms of the surface (1995:110; see also 189, 193); Nketia expresses a similar view, using the term "regulative beat" (1963:65, 86–7). Pantaleoni and Koetting also seem to assume some kind of level of beats in African music; however, they differ with the authors cited above as to the nature of this structure, as we will see.

According to the *GTTM* theory, Western music has several levels of beats, each one selecting every second or third beat from the level below. To what extent are these multiple levels of meter present in African music? The comments of these authors about meter, metronome sense, and the like usually relate only to a single level of meter. Locke claims that it is the dotted-quarter beats in Ewe drum music that form the "primary metric accents" (1982:221–2). Jones, Blacking, Chernoff and Pressing also seem to have mainly the quarter or dotted-quarter beat in mind (Jones 1959, I:19, 32, 38, 40; Blacking 1967:157–8; Chernoff 1979:48; Pressing 1983b:5). Tempo indications in these authors' transcriptions suggest that the quarter or dotted quarter corresponds to a pulse of 80–170 beats per minute (Jones 1959, II: *passim*; Blacking 1967: *passim*; Locke 1982:221). Decisions about how to express durations in terms of note values are, of course, somewhat arbitrary, but there seems to be general agreement as to the appropriate durational range for each note value. Not all authors, however, accept the dotted-quarter pulse. The "regulative beat" proposed by Nketia appears to be the half-note or dotted-half-note level (Nketia 1963:78–9, 85–7, 91); the Ewe bell pattern (Example 1), for example, has two regulative beats per cycle. Koetting and Pantaleoni maintain, particularly with respect to Ewe dance music, that the eighth-note level constitutes the only regular pulse (Pantaleoni 1972a, Koetting 1970:122–3).[3] In Koetting's words: "The fastest pulse is structurally fundamental, there being no standard substructure internal to it or between it and any pattern as a whole. . . . The fact that the repetitions of the fastest pulse often group themselves into 'gross' pulses or beats is . . . incidental" (Koetting 1970:122). However, this is clearly a minority view: the strongest support is given to the dotted-quarter level. It is worth noting that the tempo range of the quarter or dotted-quarter pulse—80–170 beats per minute—is close to the range proposed by Lerdahl and Jackendoff for the "tactus level," the most salient metrical level in Western music (1983:73); experimental evidence has been found for this as well (Parncutt 1994).[4]

Example 1. The "standard pattern" of Ewe drum ensemble music.

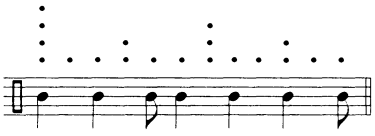


There is some consensus, then, that the most salient level of meter in African music is in the same range as that of Western music. What about levels of meter below the tactus; what evidence is there for these? As noted, Koetting and Pantaleoni argue for the eighth-note level as the *only* level of meter in drum ensemble music. Other authors acknowledge the eighth-note level as forming a level of basic time-unit—sometimes called a "density referent"—from which rhythmic patterns are composed (Jones 1959 I:24; Nketia 1974:127, 168–9; Kauffman 1980:396–7). The reality of lower metrical levels is often reflected in more subtle ways as well. For example, the standard bell pattern of Ewe dance music, shown in Example 1, is often expressed as a series of integer values: 2-2-1-2-2-2-1 (Pressing 1983a, Rahn 1987). Representing the rhythm in this way would seem to imply the existence of a lower-level pulse.

Regarding higher levels of meter, the picture is less clear, but some evidence can be found. Nketia's comments about the importance of the half-note pulse have already been noted. One clue to ethnomusicologists' views on higher metrical levels—although it should be used with caution—lies in the way their transcriptions are notated. Among the scholars who notate Ewe drum ensemble music—much of which is built on the bell pattern shown in Example 1—a 12/8 time signature is generally used; in Western terms, this implies a four-level metrical structure, with beats at the eighth-note, dotted-quarter, dotted-half, and dotted-whole-note levels (see Example 2). Moreover, there is universal agreement in these transcriptions that the position marked X in Example 1 marks the "downbeat;" it is also usually described as the "beginning" of the pattern.[5] The assumption of a "measure level" of meter is also reflected in other references to the "downbeat" or the "main beat" (Chernoff 1979:56; Agawu 1995:64). Song transcriptions are usually notated in 6/8, 2/4, or 4/4, again implying at least one level above the tactus. However, the evidence for higher levels is somewhat less conclusive. (We should note that, in general, the evidence for meter in African music points entirely to duple or triple relationships between levels, with every second or third beat being a beat at the next level up; other metric relationships—such as quintuple—seem virtually nonexistent.)

To summarize, there seems to be broad support for a tactus-like level

Example 2. The "standard pattern," showing the metrical structure implied by a 12/8 time signature.

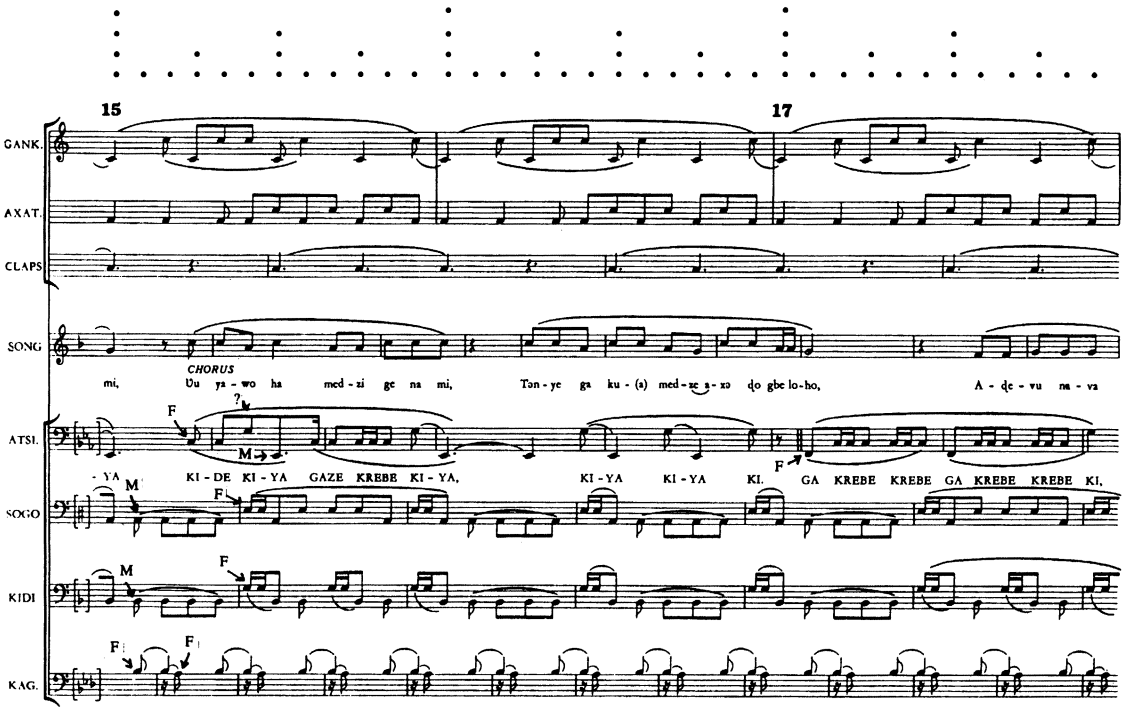


of meter in much African music; there is strong evidence for lower levels, and some evidence for higher levels as well.[6] Despite general support for the idea of meter in African music, some authors show ambivalence on this issue, notably Jones. In his extensive transcriptions of African songs and drum ensemble pieces, Jones often uses different barlines in different lines. In Example 3 (1959 II:16), the gankogui (bell) and axatse (rattle) pattern are notated with one barring pattern (which is completely regular throughout the piece); this apparently indicates the "underlying beat" Jones describes. However, the parts for the supporting drums (sogo, kidi, and kagan) have a different barring, out of phase with the bell-rattle barring; the clapping pattern has another; and the atsimevu (solo drum) and vocal line are given their own highly irregular barring. These barrings are mysterious. One might suppose they represent the meter that would be perceived if the individual lines were heard in isolation. This is of interest, since the metrical implications of individual lines presumably contribute to the metrical implications of the texture as a whole—although if Jones and others are correct, the secondary meters of these lines are not usually strong enough to override the underlying meter. But if this is what the barrings represent, it is odd that they are often highly irregular—for example, the barring of the vocal line here, and in many other cases. Another possibility is that what the barlines represent is not meter, but grouping; but this too is problematic, as I will discuss.[7]

How Is Meter Inferred?

How is meter inferred in African music? While I can find no extended discussion of this issue, a number of comments are made about the way meter is affected by musical cues. Most often, these comments relate to ways in which surface events conflict with or undermine the underlying meter. Agawu on numerous occasions notes things in the music that give rise to "contradictions" or "tension" with the prevailing meter (1995:64, 68, 110, 192; 1986:71, 79). Chernoff notes that a player can vary his part to a certain extent, but not so much that it destroys the beat (1979:53–60, especially 58; 98; 121); similarly, Locke and Pressing discuss at length how instruments of the drum ensemble can create conflicts with the main beat. Regarding the specific factors influencing the perception of meter, however, only a few passing remarks are found. Agawu notes the effect of duration—a long note on a weak beat creates tension (1995:64, 68). Parallelism is also mentioned: when a repeated pattern occurs, there is a tendency to hear a metrical structure that is aligned with it (Locke 1982:233). (While Lerdahl and Jackendoff had in mind repeated patterns of pitch and rhythm, a repeated *timbral* pattern could surely constitute a parallelism as well—

Example 3. Excerpt from the Nyayito dance, transcribed by Jones (1959 II:16). The staff lines of the drum parts, as well as showing approximate pitches, indicate different kinds of strokes (see Jones 1959 I:67). Notes indicating "free" (louder) strokes are marked F; notes indicating "mute" (quieter) strokes are marked M. The underlying 12/8 metrical structure is shown above the staff (added by me). Jones indicates a tempo here of quarter = 113. Adapted from A. M. Jones, *Studies in African Music* (1959). By permission of Oxford University Press.

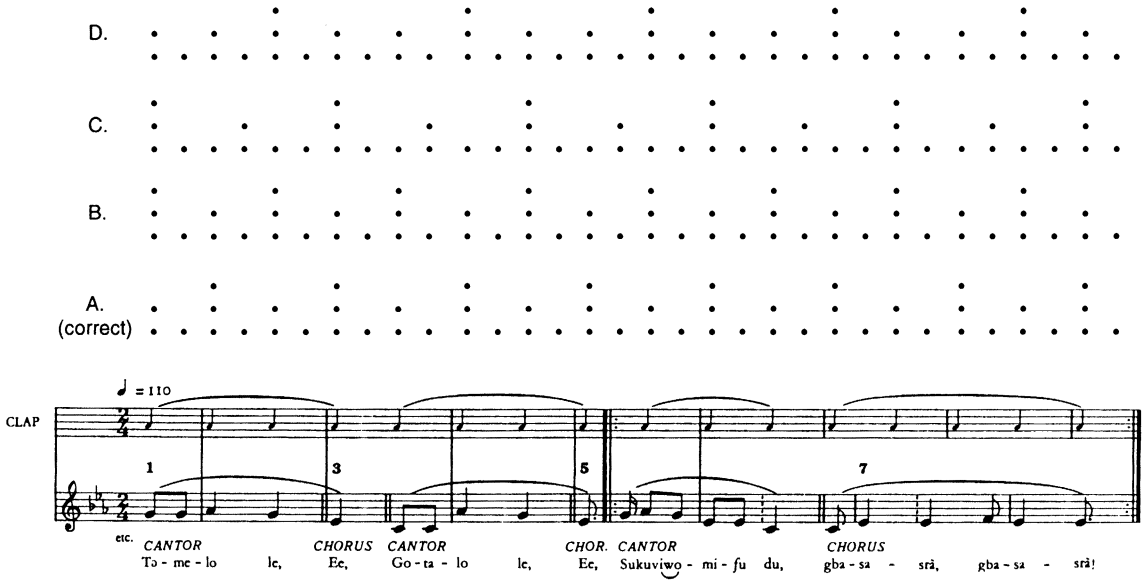


something which might well be relevant in African drum music.) Several authors also discuss the relationship between word stress and meter. The consensus here seems to be that, while there is usually some correspondence between stressed syllables and strong beats, there are frequent conflicts between the two as well (Blacking 1967:165; Nketia 1974:182–3; Agawu 1995:192).

While these authors give little discussion to the factors involved in African meter, we can examine this ourselves, using the transcriptions provided (which, we must assume, accurately show the pitches and durations of the music), along with their time signatures and barlines (indicating the perceived meter).[8] Example 4 shows a children's song transcribed by Jones. As discussed earlier, Jones sometimes uses different barrings in different lines, as is the case here. Let us assume that the time signature and barring of the clapping line represents the underlying meter of the melody. The clapping line here is not used in performance, but was provided on request by an informant. Four possible metrical structures are shown above the melody. Assuming structure A is the correct one, and is preferred over the others, can this be explained using the *GTTM* preference rules? Consider just the first half of the melody, up to the double bar. By the event rule—preferring structures where strong beats coincide with events—structures A, B, and D are favored over structure C (which would imply a 6/8 hearing), since in structure C, two level 2 beats do not coincide with events (level 1 being the lowest level). The event rule eliminates many other possible structures not shown here. The length rule favors structure A over structure B, since by structure A all the level 3 beats coincide with longer notes (quarters or dotted-eighths), whereas in structure B some do not. However, structure D is roughly equal to structure A by the length rule; in structure D, all the level 3 beats coincide with quarter-notes. The preference for structure A over structure D seems to be due to parallelism; by structure A, the two occurrences of the two-measure pattern at the beginning of the melody are aligned with the meter in the same way. If we proceed to the second half of the melody, we find that the situation is less clear-cut. Measures 7–8 are somewhat in conflict with structure A, since two level 2 beats do not coincide with events (and two quarter-note events fall on very weak beats). But we can assume that the previously established metrical structure is strong enough to persist here, with the conflicting events of measures 7–8 simply adding a degree of tension and interest. In this case, then, the event rule, the length rule, and parallelism appear to be sufficient to infer the correct metrical structure. Linguistic stress may also be a factor, but I will not consider this here.

In drum ensemble textures, the situation is of course more complex. Consider Example 3—a fairly typical excerpt from the Ewe Nyayito dance,

Example 4. Children's Song No. 2 from Jones 1959 II:1, showing four alternative metrical structures.



as transcribed by Jones. (The notation of the drum parts only approximately indicates their pitch; sometimes the noteheads also carry information also about the type of stroke, as I have indicated.) The time signature at the beginning, as well as numerous comments by Jones and others, indicates that 12/8 is the underlying meter here; this is shown above the staff. How well does the passage accord with this metrical structure? The clapping pattern clearly implies the dotted-quarter pulse; moreover, the longest clap occurs on the strongest beat of the measure (the "length" of an event is assumed to be the time interval between the event's onset and the onset of the following event). The gankogui pattern here establishes the 12/8 meter quite strongly (compared with the more common pattern of Example 3), since all the dotted-quarter beats are marked by bell notes (and two of them by long bell notes); the gankogui and axatse both favor a 12/8 periodicity by parallelism. The sogo and kidi patterns clearly favor a 6/8 periodicity, but they accent the third eighth-note of each dotted-quarter rather than the first (the louder "free beats" carry phenomenal accents relative to the "muted beats"); the kagan, similarly, favors a 3/8 periodicity, but avoids the first eighth of each dotted-quarter. The atsimevu does not particularly favor the notated meter; while the repeated "high-low" pattern supports it somewhat by parallelism and by the length rule, the (unusual) 5/8 parallelism towards the end strongly undercuts it. The vocal line seems rather ambiguous metrically; again, linguistic stress may be a factor here (Jones's barlines suggest that it is implying quite a different metrical structure from the notated one). The overall effect will of course depend on the relative prominence of the different instruments, the vocal line and master drum being the most prominent elements here. On the basis of *GTTM*'s rules, the passage seems to support the 12/8 meter shown more than anything else, but there are definite elements of conflict.[9] Of course, there might be sections in a piece where the ensemble is in conflict with the underlying meter (due perhaps to cross-rhythms in the master drum); but one assumes the underlying meter is supported most of the time, in order for it to be conveyed and maintained.

Parallelism is a factor of particular importance in this passage. Note that each of the levels of the underlying meter is reinforced by parallelisms in one line or another: the dotted-quarter level by the kagan, the dotted-half-note level by the sogo and kidi, and the dotted-whole level by the gankogui, axatse, and clapping. This relates to the earlier discussion of higher levels of meter. If we assume that parallelism is generally a factor in African meter, the pervasive use of parallelisms at the 6/8 and 12/8 level is further evidence that these higher metrical levels are present. The role of parallelism is complex, however. Recall that parallelism refers to the effect of repetition; given a repeated pattern, there is a tendency to hear a metrical structure which

is aligned with the pattern. Parallelism thus relates primarily to *period,* rather than phase; that is, it favors a particular time interval between beats, rather than a particular placing of those beats relative to the music.[10] In terms of phenomenal accents, the supporting drum parts in the Nyayito passage are sharply in conflict with the notated meter, in that they align few accented events with strong beats; but because of parallelism, they give the notated meter at least partial support.

All in all, the view of African meter in these studies accords well with the *GTTM* view. There is almost unanimous agreement that something like Western meter is present in African music; and African metrical structures appear to involve several duple and triple levels. Regarding the criteria for choosing metrical structures, support can be found—in these authors' comments as well as in my own analyses—for several of the factors discussed in *GTTM* (in particular, the event rule, the length rule, the stress rule, the linguistic stress rule, and parallelism); and there is no evidence for important determinants of meter which are not covered by *GTTM*'s rules. We should remember that the *GTTM* model is primarily a model of listening, a model of mental representations in the mind of the "experienced listener;" one might wonder how much basis we have for conclusions about this in the case of African listeners. To a large extent, my conclusions here are based simply on ethnomusicologists' intuitions about how African music should be heard. But it seems fair to assume that these authors—many of whom (unlike myself) have had years of immersion in African music—developed a hearing of the music which was similar to that of Africans themselves. In some cases, other kinds of evidence were sought as well; most notably, both Jones and Blacking asked native informants to indicate the meter of a number of pieces by clapping, sometimes establishing more than one metrical level by this means. Some of Blacking's results are of particular interest, and will be discussed below.

Western and African Meter: A Comparison

The reader may at this point be becoming uneasy. Much has been said about the commonalities between African and Western rhythm, but little has been said about the differences. This is intentional; for one problem with the research discussed above is its exaggeration of the differences between Western and African rhythm. Consider Waterman's comment, regarding the "metronome sense":

> The assumption by an African musician that his audience is supplying these fundamental beats permits him to elaborate his rhythms with these as a base, whereas the European tradition requires such close attention to their concrete expressions that rhythmic elaboration is limited for the most part to mere or-

> nament. From the point of view of European music, African music introduces a new rhythmic dimension (1952:211-12).

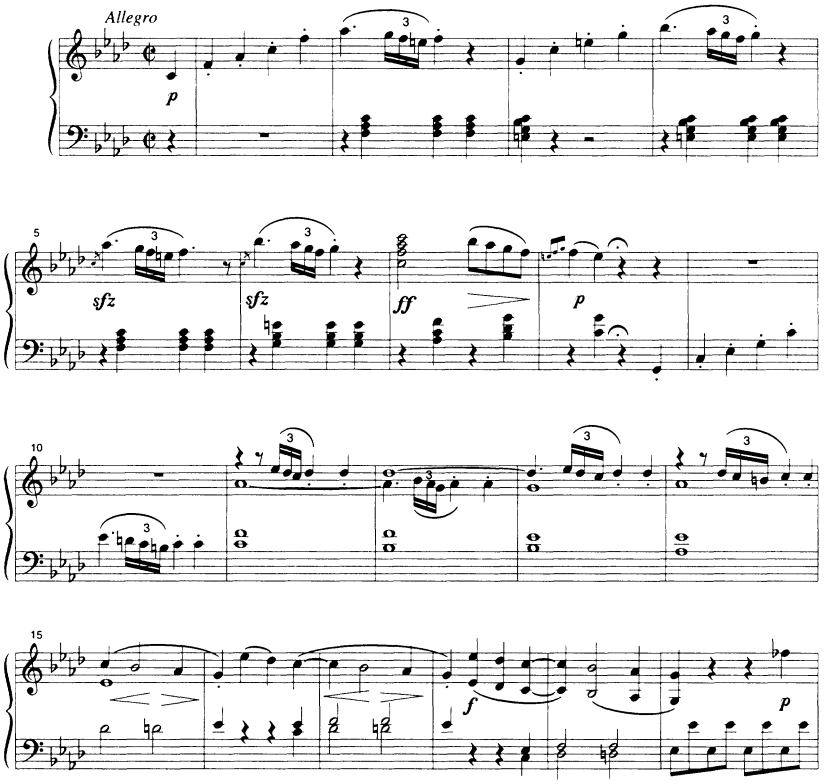
Chernoff goes even further, drawing a series of stark, qualitative contrasts between African and Western listeners:

> We begin to "understand" African music by being able to maintain, in our minds or our bodies, an *additional* rhythm to the ones we hear. . . . In African music, it is the listener or the dancer who has to supply the beat: the listener must be *actively engaged* in making sense of the music (1979: 49-50).

"[T]he Western and African orientations to rhythm," Chernoff concludes, "are almost opposite" (1979:54; see also 40-2, 47-54, 94-7). Even where no explicit comparison is drawn with the West, discussions of "metronome sense," "regulative beat," and the like tend to carry the implication that this is something distinctively African. But as we have seen, the basic framework which these scholars propose for African music—a framework of regular beats, which the events of the music establish but may then conflict with and deviate from in pursuit of musical interest and tension—is, at least in its basic outlines, very similar to that proposed by Lerdahl and Jackendoff for Western music. If "metronome sense" merely means the ability to infer and maintain a pulse that is not always directly reinforced by the music—or perhaps sometimes is even in conflict with the music—this is surely a commonplace ability among Western listeners.[11]

A short example may be useful in illustrating this point. Consider the Beethoven sonata excerpt shown in Example 5. It is true that, compared with the Nyayito excerpt discussed earlier, the meter here is fairly straightforward. Yet this piece relies heavily on the listener's "metronome sense." Consider just the first five notes. The meter of these notes is not obvious from the notes themselves; they might well be heard, for example, with the second and fifth notes metrically strong (that is, in 3/4), or with the first and fifth notes strong (in duple meter, but in a different "phase"). One could indicate the metrical strength of the second and fourth notes by playing them louder than the others, but it would be quite unmusical to do so.[12] Rather, the metrical structure here is inferred by the listener from the larger metrical context—particularly the long note in the right hand on the downbeat of measure 2, and the long left-hand chord on the downbeat of measure 3. Consider also the numerous syncopations of the passage—the "empty" strong beats in the left hand in measures 4-8, the long notes on weak beats in the right hand in measures 15-19. Again, it is the metrical structure carried over from the previous context that ensures the correct interpretation here. If one just heard measure 8 in isolation, for example, one would probably hear the *second* beat as strong. Even a simple classical passage such as this, then, requires a metrical structure supplied by the listener—essentially similar to what has been proposed for African music.

Example 5. Beethoven, Sonata Op. 2 #1, I.



If the differences between Western and African rhythmic perception have been exaggerated, it is nevertheless true that there are differences. The studies discussed here give some examples of this. In some cases, the authors note examples where they suggest African and Western judgments of meter would be different; I also find that my own judgments sometimes differ from those of Africans (as indicated by the authors' time signatures and barlines). It is interesting to consider some situations where this occurs. A simple case is found in Example 4. According to Jones, this melody is heard with an unvarying quarter-note pulse; for me, however, there is an inclination to hear the final phrase as metrically irregular.[13] Similarly, there are a number of cases in drum ensemble music where I find myself being seduced by the cross-rhythms of the solo drum, losing the dotted-quarter pulse which is supposed to remain primary (this tendency among Western listeners to African music is noted by Locke [1982:230] and Chernoff [1979:46–7]). Another difference of a more general nature, although

it is harder for us to appreciate experientially, concerns the setting of text. In Western music, the tendency for stressed syllables to be aligned with strong beats is quite strong; deviations from this rule would probably cause considerable metrical confusion. As mentioned earlier, several authors note that this rule is violated quite frequently in African music, so that stressed syllables are set on weak beats; although all seem to agree that there is *some* correspondence between linguistic stress and meter.

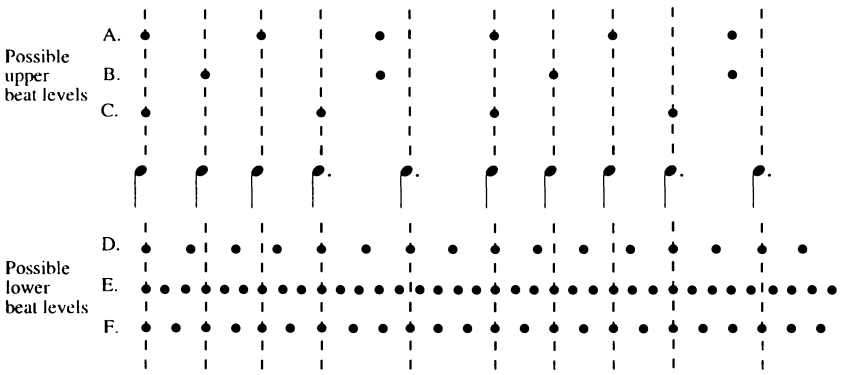
How can these differences in perception be explained? All of them have something in common: the Western perception involves shifting the metrical structure in order to better match the phenomenal accents, while the African perception favors maintaining a regular structure even if it means a high degree of syncopation. In *GTTM*'s terms, the African mode of perception gives relatively more weight to the regularity rule, and relatively less to the accentual rules. One might argue that this is nothing more than a different way of expressing Waterman's "metronome sense" idea; and in a way, this is true. But the current formulation—as well as being more precise—views the difference as much less fundamental than it has generally been portrayed by Waterman and others. The principles involved in the two modes of perception are the same—Africans have no kind of "sense" that Western listeners do not have; all that differs is the relative weightings of the different rules.

One might argue that this difference represents a greater degree of rhythmic complexity in African music. African music possesses more syncopation, that is, more conflicts with the underlying metrical framework; and African listening requires a greater ability to maintain a steady beat despite conflicting accents. My own feeling—and claims about complexity are hardly more than feelings, given the vagueness of the term—is that African rhythm does, indeed, possess a richness and subtlety found in no other music. However, the difference between African and Western rhythm is not simply a matter of complexity. Viewed in another way, the greater tendency of Western listeners to shift their metrical structures in response to phenomenal accents might be seen as a greater sensitivity to metric shift in the music. One wonders if this "ability" is reflected in any way in Western music. One possibility is the fact that, in some kinds of Western music at least (classical and Romantic music, as it is usually performed), there is considerable fluctuation in tempo for expressive purposes—a kind of metric shift, since it implies continual slight variations in the time intervals between beats. This requires the listener to continually adjust the metrical structure accordingly. Perhaps in some cases, African listeners would "mishear" such music, regarding the fluctuations as syncopations and attempting to maintain a perfectly regular beat throughout. These "cross-cultural" perceptions would be interesting areas for experiment.

Hemiolas and the "Standard Pattern"

A centrally important aspect of African rhythm, noted by a number of authors, is "hemiola": an implied shifting between two different meters, most often 3/4 and 6/8 (Jones 1959 I:23; Nketia 1974:127–8, 170; Agawu 1995:80, 189–93). This is often reflected in a simple alternation between quarters and dotted-quarters, as in Example 6; this pattern is a common accompaniment pattern for songs (often expressed in clapping or work-related actions). In many other cases hemiola patterns are present in more elaborated forms. The preference rule view provides an interesting perspective on the rhythm in Example 6. Consider just the event rule, that is, the preference for aligning beats with note-onsets (this seems to be the only rule expressing a strong preference in this case): what metrical structure does the *GTTM* model predict? At the tactus level, the pattern is ambiguous between a quarter or dotted-quarter-note pulse. At the next level up, however, the pattern clearly implies the dotted-half-note pulse shown as structure C in Example 6, since every beat in this pulse coincides with an event. It can be seen that a half-note pulse is not supported in this way (structure A), nor is any other phase of the dotted-half-note pulse (such as structure B). By contrast, an undifferentiated string of quarters or dotted-quarters would be quite ambiguous in terms of the higher-level pulse it implied. Similarly, at the lower level, the eighth-note pulse shown as structure F in Example 6 is clearly the favored pulse; other alternatives such as a dotted-eighth pulse (structure D) or a triplet-eighth pulse (structure E) coincide with fewer notes. These favored levels, structure C and structure F, correspond to the measure level and the eighth-note level in the way the pulse is normally notated. In short, this pattern conveys a three-level metrical structure, which is ambiguous in terms of its middle level but quite clear in terms of its upper and lower levels.

Example 6. The "hemiola" pattern, showing possible beat levels.



Patterns such as Example 6 raise the issue of metrical ambiguity. We are assuming that an African listener infers a particular metrical structure for a piece. There may be cases of conflict, for example, between the underlying meter and the cross-rhythms of the master drummer; but either these cross-rhythms override the underlying meter, or they do not. But is it not possible that the listener maintains two, or even several, metrical interpretations at once? Jones suggests that, in pieces with pervasive cross-rhythms and hemiolas, African listeners are able to perceive both duple and triple meters simultaneously—for example, hearing the rhythm of Example 6 as being in 3/4 and 6/8 at once (Jones 1959 I:102).[14] I am doubtful about this. In my own experience, one of the striking things about metrical perception is the difficulty of perceiving multiple interpretations at once. It is relevant to consider, however, how *different* the conflicting metrical structures are in such cases. In Example 6, as noted earlier, the two different possible metrical structures (3/4 and 6/8) share both the eighth-note and dotted-half-note levels; only the intermediate level is different. In such a case, then, it seems plausible that both structures might be entertained simultaneously, or at least that it would be relatively easy to switch back and forth between them.

Another pattern which deserves special attention is the "standard pattern" of Ewe drum ensemble music, shown in Example 1. The pattern is hardly a metrically stable one—relative to the 12/8 meter normally associated with it, or indeed relative to any other regular meter. In fact, as Pressing has shown, the standard pattern is almost maximally ambiguous, as it samples several different meters (12/8, 6/4, and 3/2)—and different phases of those meters—almost equally (Pressing 1983a:46–7). One could argue, of course, that the standard pattern is satisfying precisely because of its metrical ambiguity and instability, but this is hardly an explanation for it. We might also consider whether the preference rule approach provides any insight into the fact that the position marked with an X is usually the downbeat. Of the twelve positions in the standard pattern, the X position is a relatively good candidate for a strong beat, since there is an event there, and a relatively long event (that is, a quarter-note rather than an eighth-note). But this still leaves five possibilities, and the preference rules seem to offer little basis for choosing between them.

It has been noted that the standard pattern is exactly analogous to the diatonic scale (Pressing 1983a; Rahn 1987, 1996). If we consider the pattern as a series of durational values, and we consider the diatonic scale as a series of intervals on the chromatic scale, we arrive at the same pattern in both cases: 2–2–1–2–2–2–1. Moreover, the *centricity* of the pattern is the same in both cases: the "strong beat" position in the Ewe rhythm corresponds to the "tonic" position in the diatonic scale. (I am assuming the

"Ionian" mode of the scale here—the major mode in Western tonal music—although of course other modes of the scale are used as well; similarly, other "modes" of the Ewe bell pattern occur in some kinds of African music [Pressing 1983a:57].) Recent work in pitch-class set theory has shown that the diatonic set has a number of interesting and highly unusual properties (Browne 1981; Clough and Douthett 1991; Cohn 1996). A detailed discussion of this work seems unwarranted here, since it has little connection to the *GTTM* approach. The importance of this pattern—we might call it the "diatonic pattern"—in both pitch and rhythm suggests that the reasons for its success might, indeed, lie in quite abstract properties. However, it is one thing to show that a pattern has unusual properties, and another thing to show how these properties might explain the pattern's success; so far, the set-theoretical approach has had little to offer towards the latter question.

One property of the diatonic pattern should be mentioned, however, which is of some relevance to the current study: this is its asymmetry. In the diatonic pattern, each position in the scale is unique with respect to its intervals with other positions; for example, the tonic is the only diatonic scale degree that lies a half-step above one scale degree and a perfect fourth below another (Browne 1981). Thus it is possible for one to orient oneself to the pattern simply from the intervals between the notes presented. In a whole-tone scale, by contrast, every step of the pattern is intervallically identical. This has possible relevance to rhythm, and particularly to meter-finding. Once it is conventionally established that a certain position in the standard pattern is the "downbeat," then one could orient oneself metrically to whatever is going on simply by locating that position in the rhythm and considering it the downbeat.[15] Whether the standard pattern serves this function for African listeners is unclear. If so, it suggests a factor in African meter perception which is quite unlike the other factors proposed by *GTTM*: a *conventional* cue to meter, which relies simply on the listener's knowledge that a certain position in the pattern is conventionally metrically strong. Again, however, there are many asymmetrical twelve-beat patterns, and it remains to be explained why the diatonic one achieved such unusual prominence. For now, the prevalence of the diatonic pattern remains something of a mystery.

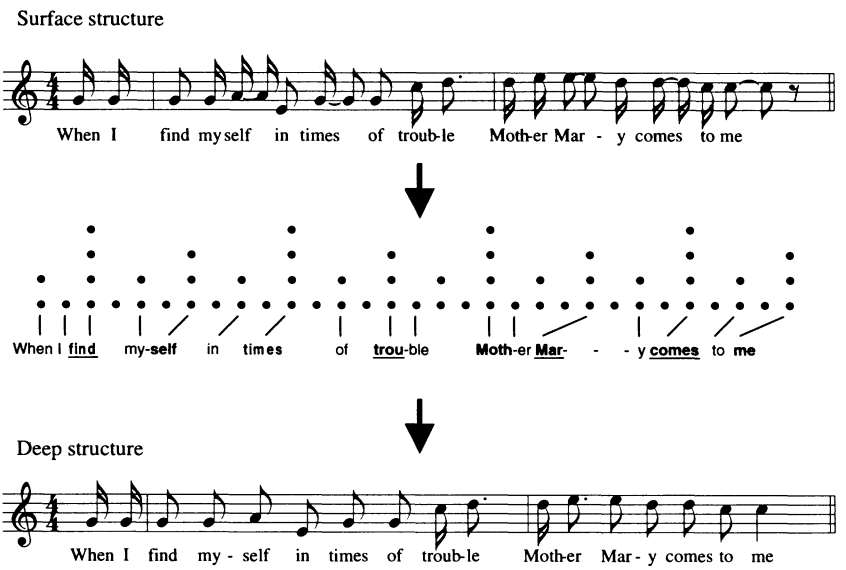
"Syncopation Shift" in African Music

A comparison of Western and African rhythm brings us to the issue of syncopation. If syncopation simply means conflicts between the notes of a piece and the prevailing meter, then it is present—to some degree—in many kinds of music, including much Western music. However, a certain kind of syncopation is found in jazz, rock, and other kinds of recent popu-

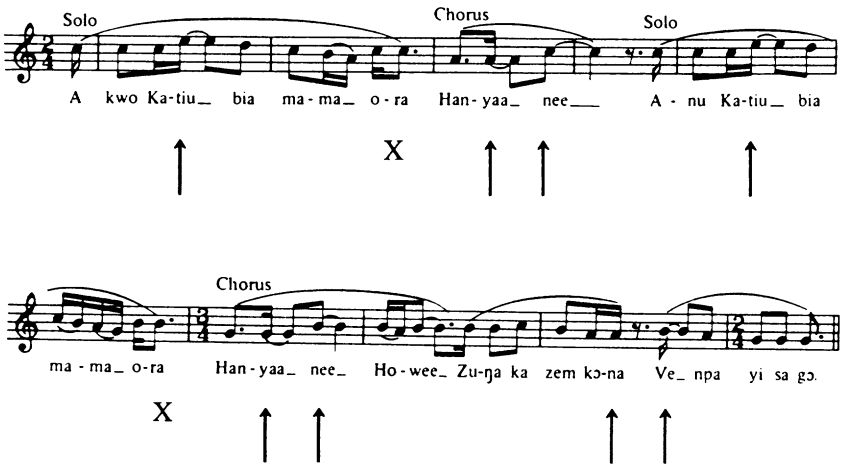
lar music, in which highly accented events (e.g., long notes, stressed syllables) tend to occur on weak beats immediately before a much stronger beat. I have argued elsewhere that, rather than being heard as metrical conflicts, these syncopated events are understood as "belonging" on the beat following their actual beat, and therefore can be seen as reinforcing the prevailing meter rather than conflicting with it (Temperley 1999). Example 7 gives one example—the Beatles' melody "Let it Be," showing the actual performed rhythm and the inferred "deep structure," in which the syncopated events are shifted to the following beats.

Does this kind of syncopation occur in traditional African music? Waterman has suggested that it does (Waterman 1948); beyond this, the studies reviewed here do not address this question. However, some evidence can be found in their transcriptions. If "syncopation shift" were an important aspect of African music, we would expect to find many accented events on weak beats just before strong beats, but not so much just after strong beats. This does, indeed, appear to be a characteristic of some kinds of African music. Consider the melody in Example 8. Notice that several long (and therefore phenomenally-accented) events occur on the fourth sixteenth-note of a quarter-note: one sixteenth before the following quarter-note beat (these are marked with arrows). Notice also the syllable "nee,"

Example 7. "Let it Be," showing the shifting of events according to the "syncopation shift" rule (from Temperley 1999).

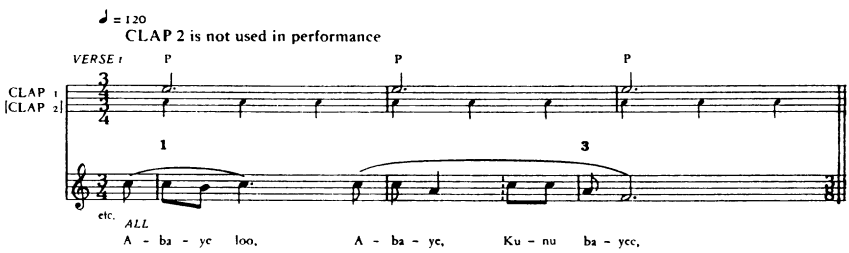


Example 8. A Kasem melody, from Nketia (1974:53). Arrows indicate long notes on the fourth sixteenth of a quarter (or the fourth eighth of a half), supporting the syncopation shift rule. X's indicate long notes on the second sixteenth of a quarter.



which occurs on the fourth eighth-note of a half-note. According to my syncopation shift model, which allows events to be shifted forward by one beat, these events would be understood as belonging on the following beat. Accented events occurring on the fourth sixteenth of a quarter-note are indeed quite common, suggesting that "syncopation shift" may be present in African music. One also occasionally finds accented events on the second sixteenth of a quarter—indeed, there are two examples in this melody (marked with X's), which we would not expect to find under the syncopation shift model; but these are much less common. Example 9, from Jones, shows another kind of evidence for syncopation shift (again, we will assume the upper line represents the underlying meter). Consider the word

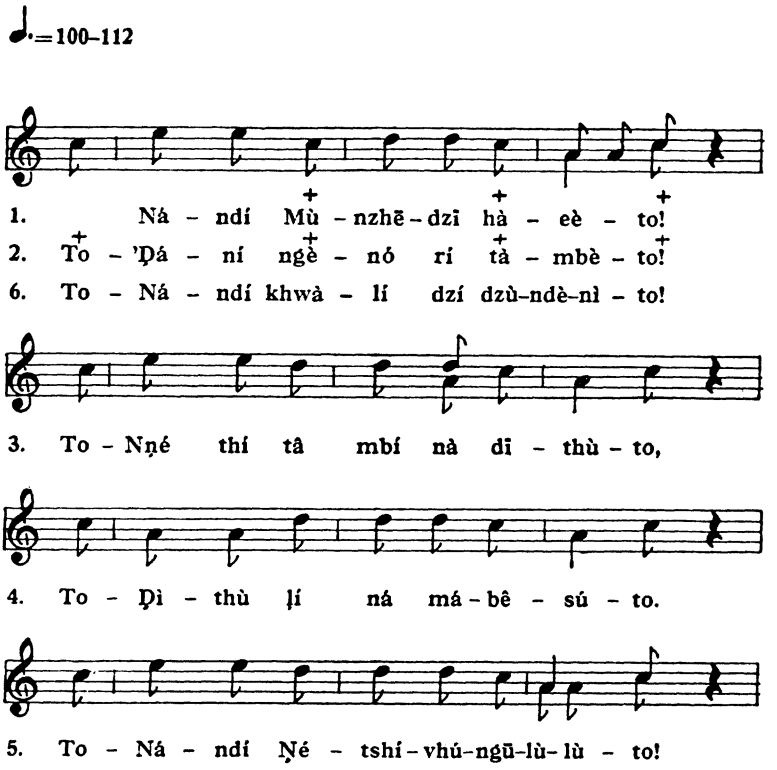
Example 9. Children's Song No. 6 (excerpt), from Jones (1959 II:4).



"A-ba-ye"; according to Jones, the second syllable "ba" is stressed (Jones notes also that "ba-yee" is the same word with the first syllable elided [1959 I:32]). Thus the stressed syllable "ba" is metrically strong in its first two occurrences, metrically weak in the third. But in the third case, the strong syllable occurs just before a strong beat, making the following unstressed syllable metrically strong (this is a common phenomenon in rock as well; consider the line "then you'll begin to make it better" from "Hey Jude," where the syncopation of the final word causes the unstressed syllable "ter" to be metrically strong). Again, by the syncopation shift rule, this word is understood as being shifted over by one beat, and therefore aligned with the meter. Cases like this seem to suggest that some kind of "syncopation shift" is present in African music. If it is, then some of the events in African pieces which initially appear to be conflicting with the prevailing metrical structure may in fact be reinforcing it. But certainly not all syncopations in African music can be explained in this way; many others constitute true metrical conflicts.

A final example presents something of a dilemma. In his studies of Venda children's songs, Blacking notes that, in a number of cases where informants were asked to clap along with melodies (for which there was normally no clapping accompaniment), unexpected results were obtained (1967:157–60). Example 10 gives one case. The meter heard by Blacking was that indicated by his barlines; however, when asked to clap, subjects did so at the points marked by crosses, putting the strong beats one eighth-note earlier than expected. My own interpretation agrees with Blacking's; how can we account for the difference? Blacking's explanation is that the Venda's criteria for strong beats differ from ours: they place a higher priority than us on having each beat aligned with an event. (By Blacking's hearing, not all beats coincide with events; the fourth downbeat—not marked with a barline for some reason—is "empty.") In fact, the Venda interpretation is not implausible by *GTTM*'s rules, since it locates the final long note of each phrase on a strong beat. But the idea that African listeners require events on strong beats more than Western listeners is exactly opposite to our earlier conclusions, and is manifestly untrue. Possibly the Venda simply differ from other Africans.[16] However, there is another possible explanation that we should consider. Perhaps the claps in this case do not coincide with strong beats, but rather occur on the weak beats just before the strong ones. This might be accounted for by the syncopation shift rule, since then each clap is understood as belonging on the following strong beat. In this case the claps reinforce the strong beats felt by Blacking rather than conflicting with them. Or, even if this is not a case of syncopation shift, it might simply be that the claps do not coincide with strong beats. We should be cautious about admitting this possibility, since a ma-

Example 10. "Nandi Munzhedzi Haee" (excerpt). From John Blacking, *Venda Children's Songs*. Johannesburg: Witwatersrand University Press (1967:92).



jor source of our evidence for meter rests on the assumption that informants' clapping—especially elicited clapping that is not usually done—is an indication of (some level of) the meter they perceive. Still, it is quite clear that clapping patterns do not *always* indicate strong beats. In some songs, clapping patterns are irregular (see Jones 1959 II:2); in others, a single clapping pattern may be aligned with the song in different ways (Jones 1959 I:17; Agawu 1995:67–8); in some drum ensemble pieces, several simultaneous and conflicting clapping patterns may be used, despite the general assumption that only one primary meter is present (Jones 1959 I:116). Allowing the possibility that elicited clapping patterns do not always indicate listeners' perceptions of meter adds a major complication to the empirical study of meter; but it is probably something we should consider.

Grouping Structure in African Music

Returning to the *GTTM* model, Lerdahl and Jackendoff draw an important distinction between meter and grouping. Meter, as stated earlier, is simply a framework of beats; it does not imply any segmentation. Yet it is obvious that an important part of music perception is the organization of notes into groups and phrases. Lerdahl and Jackendoff capture this aspect of music in what they call "grouping structure" (1983:36–67). A "legal" grouping structure is simply a hierarchical structure of groups, with smaller groups containing only a few notes and larger ones corresponding to phrases and sections. As with metrical structure, *GTTM* expresses in a series of preference rules the factors that cause us to hear grouping boundaries at certain points (a few of these are shown in Figure 2). For example, we tend to hear grouping boundaries after long notes or at rests (GPR 2); we also prefer to group similar events together, locating grouping boundaries at changes of register, dynamics, and articulation (GPR 3). Parallelism is a factor in grouping, as it is in meter; given a repeated pattern, we prefer to reinforce the pattern with grouping boundaries (GPR 6). An important issue here is the interaction between grouping and meter. In principle, grouping and meter are independent; groups do not necessarily begin and end on strong beats. A commonplace example of this is the "upbeat," a metrically weak note at the beginning of a phrase, such as the first note of the Beethoven sonata discussed earlier (Example 5). However, there is also a preference for grouping and meter to be roughly aligned, so that strong beats occur near the beginning of groups. This is expressed in *GTTM*'s MPR 2, stating that strong beats should occur near the beginnings of groups. I believe it is more correctly expressed as both a grouping and a metrical preference rule: there is a tendency to adjust both grouping and metrical structure to improve the alignment between them. In the

Figure 2. Grouping Preference Rules (Lerdahl and Jackendoff 1983:345–7. Only some rules are shown. The language has been simplified in some cases).

GPR 2 (Proximity) Prefer a grouping structure in which grouping boundaries occur after relatively "long" notes (either notes of long duration, or notes followed by long rests).

GPR 3 (Similarity) Prefer to group notes together that are similar in register, articulation, and dynamics.

GPR 6 (Parallelism) Where two or more segments of the music can be construed as parallel, they preferably form parallel parts of groups.

Beethoven sonata (Example 5), given that measures 1–2 and 3–4 clearly form groups, there is then a preference for hearing the downbeats of measures 1 and 3 as metrically stronger than those of measures 2 and 4, since this locates the stronger beats near the beginnings of the groups. (While the *GTTM* model generates only a single hierarchical grouping structure for a piece, it seems clear that in a polyphonic texture, different lines might have different grouping structures; we will adopt this assumption here.)

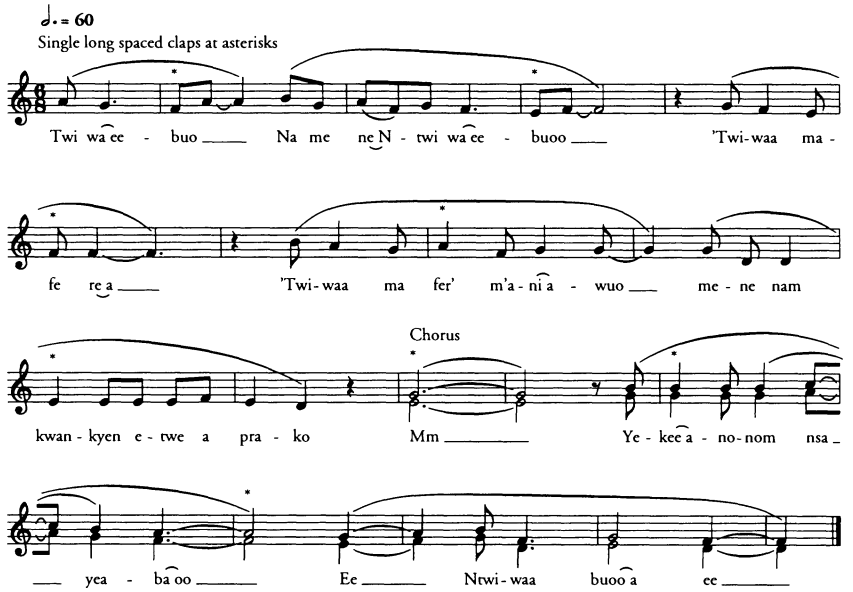
To what extent does Lerdahl and Jackendoff's model of grouping apply to African music? Here, we encounter some serious problems of terminology and notation. Several ethnomusicologists confuse grouping and meter, saying that barlines represent the grouping of notes. Blacking says that "[b]arlines generally mark off the main phrases, and half-bars give some indication of the stresses and the grouping of the notes" (1967:35). Since Blacking clearly indicates elsewhere that his barlines represent meter (1967:162), he would seem to be equating grouping with meter. Agawu, too, claims that his barlines represent grouping (1995:71, 188, 200; see my note 7). The confusion between meter and grouping is also apparent in Jones, not so much in his comments but in the transcriptions themselves. As noted above, the fact that Jones uses differing barlines in different lines of the ensemble can sometimes be explained by taking the barlines as indicators of grouping, not meter. Note the barring of the clapping line in Example 3, for instance. In many cases, however, Jones's barlines do not appear to be aligned with plausible groups; for example, a barline is often placed after the first note of an apparent phrase. It seems more likely that Jones's *slurs* indicate grouping, as they often do in Western music; and these are often not aligned with the barring. I suspect that Jones's barlines indicate sometimes grouping and sometimes metrical implications of individual lines; this is unfortunate, since it is sometimes not obvious how to interpret them.

These confusions between grouping and meter are especially strange, since a number of authors—including some of those just cited—observe that grouping is often *not* aligned with meter in African music. Agawu comments that "in songs, as in drum ensemble music, phrases rarely begin on downbeats" (1995:64; see also 66, 110). Nketia, describing the phrasing of the vocal line in Ghanaian music, says: "It does not appear to follow any definite rule, though there is a marked preference for phrases which begin before and after the main beats of a gong phrase—that is off the regulative beat" (1963:88). Other remarks about the non-alignment of meter and grouping are cited below. In part, the problem may simply be one of terminology: what *GTTM* calls meter, ethnomusicologists (sometimes) call grouping; what *GTTM* calls groups, ethnomusicologists call phrases. There is somewhat more to it than that, however; the ethnomusicologists' termi-

nology implies that meter involves a "grouping" of events, which I would argue is mistaken.

Aside from these general observations, what specific evidence do these authors provide of grouping structures in African music? The best source here is the phrasing slurs used in transcriptions, notably those of Jones, Nketia, and Pressing. It seems reasonable to take these as indications of grouping, as they generally are in Western music. Consider Example 11, an unidentified Ghanaian song from Nketia (1963:90). The grouping here corresponds well with my own intuition about the grouping of this melody, and appears to be accounted for well by the *GTTM* model. (We should note that Nketia's slurs only provide one level of grouping, in contrast to the hierarchical structures posited by *GTTM*.) The main criterion involved here is a simple one: there is a preference for long notes or rests at the ends of groups. Inspection of the phrasing in Nketia and Jones's examples suggests that this is the predominant factor in African melody and ensemble music, as it is in Western music as well (at least at low levels). Occasional evidence can be seen for other *GTTM* rules, such as the similarity rule; in cases where a drum pattern involves alternating runs of two strokes (A-A-A-B-B-B-B-B, for example), there is a tendency to group them accordingly, placing a group boundary at the change of stroke (Jones 1959 II:52, 73–4;

Example 11. From J. H. Kwabena Nketia, *African Music in Ghana* (1963:90). Copyright 1962 Northwestern University Press.



Pressing 1983b:9). There is some evidence for parallelism as well; in Example 3, for instance, the repeated five-beat pattern in the master drum encourages a grouping structure which is aligned with the pattern (see also Pressing 1983b:9).

Perhaps it should not surprise us that the grouping criteria for African and Western music are similar; as Lerdahl and Jackendoff point out, they reflect "gestalt" principles of similarity and proximity which are known to apply to perception in general (1983:40–3). However, there is evidence for one important difference between Western and African grouping. As noted, there is a tendency in Western music to prefer strong beats near the beginning of groups. In African music, however, several authors claim that the reverse is true: the norm is for strong beats to occur at the ends of groups. Chernoff observes that, in African music, "the main beat comes at the end of a dynamic phrase and not at the beginning" (1979:56); Jones notes this tendency as well (1959 I:41, 84, 86, 124). (Nketia's and Agawu's comments about the tendency of phrases not to *begin* on strong beats have already been cited.)[17] Inspection of the phrasing in Jones's and Nketia's transcriptions gives further support to these observations; although there are many exceptions, there is a common tendency for both vocal and instrumental phrases to end on strong beats. Example 11 is representative: if we assume a two-measure level of meter with odd-numbered measures strong (this is supported by the clapping pattern), we find that many phrases end just after two-measure beats, although not all do. This suggests a further modification to the preference rules for African music: there is a preference for strong beats near the end of groups rather than near the beginning. Whether this rule primarily affects meter or grouping is difficult to know; possibly both meter and grouping are sometimes adjusted to improve their alignment, as I suggested was the case for Western music.[18]

Conclusions

I have argued here that based on ethnomusicologists' analyses of African rhythm, African and Western rhythm are profoundly similar. The fundamental cognitive structures involved are the same, and the criteria involved in forming them are largely the same as well. I have also pointed to some differences: the differing weight given to the regularity rule versus the accent rules, and the difference in the preferred alignment between meter and grouping. These differences are certainly important, and they may often lead to quite different musical perceptions and experiences between African and Western listeners. But to my mind they are less striking than the underlying similarities between African and Western rhythm. Admittedly, there are other aspects to rhythm that we have not considered

here. One important part of rhythmic structure not addressed by *GTTM* (or by the current study) is motivic structure: the network of rhythmic patterns in a piece that are heard as similar or related. It would be interesting to compare African and Western rhythm in this regard as well, but this is beyond our scope.[19]

In closing, I wish to address a few criticisms that might be made of the current study. One is my reliance on the conclusions of ethnomusicologists, rather than on my own experience of African music. This should not be seen as a denial of the importance of first-hand ethnomusicological research. On the contrary, it is an acknowledgment that such research provides a kind of musical insight and understanding that cannot be attained in any other way—from transcriptions or recordings, for example. I do assume that, by careful and informed reading of these experts' writings, one can to some extent share in the knowledge and understanding that they have gained; surely this is whole point of ethnomusicological writing. It is true that adding another stage in the interpretive process—from informant to ethnomusicologist to music theorist to reader—increases the probability of misunderstanding or distortion somewhere along the way. But if we are to have any real collaboration between the disciplines, we must allow this kind of division of labor to some extent.

A second criticism one might make of the current study is that it imposes a framework on African rhythm which has no direct support in what African listeners and performers *say* they are doing; Jones's and Chernoff's informants, for example, make no mention of anything like preference rules. That is to say, the framework proposed here is much more "etic" than "emic." While this criticism deserves consideration, there is an important point to be made in response. Lerdahl and Jackendoff's theory of meter purports to describe the hearing of the "experienced listener" to Western art music; this includes many people (both of the past and present) with no formal musical training or knowledge of music theory. Certainly few people of this kind would spontaneously describe their hearing of meter in terms of preference rules (without having studied Lerdahl and Jackendoff's theory), any more than an African listener would. In this sense, the *GTTM* theory is as "etic" for Western listeners as it is for African listeners. Indeed, the whole premise of music cognition—and for that matter cognitive science in general—is that there are processes and structures involved in cognition to which we do not have direct introspective access, but whose reality can be established by other means. To what extent this assumption is valid is an open question; but I see nothing *ethnocentric* about taking this attitude with African listeners, since we take the same attitude with Western listeners as well.

A final criticism one might make is that the current study is extremely

myopic. I have said a great deal about meter and grouping, but have said very little about their role in music, or the role of music in African society. This criticism is entirely valid, and deserves some discussion. While I strongly believe it is worthwhile to focus on the "purely musical" aspects of music (and the content of this paper should give some idea of what I mean by this), I also realize that music theory often goes too far in isolating these aspects from their larger cultural context. To fully understand the role of meter and grouping structures in African music, it is necessary to consider the functions and meanings of that music in African society. In particular, an analysis of meter and grouping—in African music, Western music, or any other kind—tells us nothing, in itself, about why these things are important and how they contribute to the value of music. To these issues, it must be said, the music-theoretical perspective has little to contribute; indeed, it is here that music theory has a great deal to learn from ethnomusicology.

Even so, we should not assume that a music-theoretical approach tells us *nothing* about issues of musical function and value. I will give one example. A number of authors—among them Waterman, Jones, Chernoff, and Agawu—have emphasized the role of meter, and particularly metrical conflict, in the aesthetic value of African music. While there is general agreement that a single underlying meter is maintained throughout a piece, the syncopated patterns of the surface provide conflict and tension, giving the listener the challenge of maintaining this underlying meter without getting lost. Chernoff—whose insightful discussions of African aesthetics deserve special attention—has suggested that there is an optimal degree of rhythmic complexity in African music, which it is the particular responsibility of the lead drummer to maintain; his drumming must not be so repetitive or stable as to be boring, but also must not be so wild and destabilizing as to overthrow the prevailing beat (1979:53–60, especially 58; 98; 121). A preference rule approach might be of some use to us in describing this phenomenon. Let us suppose that any piece receives a certain numerical "score" for a given set of preference rules, indicating how well the piece (or some preferred analysis of the piece) satisfies the rules. These scores could then be taken as an indicator of the rhythmic complexity of the piece. A piece with almost no syncopation, in which all the phenomenal accents corresponded perfectly with strong beats, would score very high; a piece in which the syncopations continually undercut the prevailing meter would score very low. Aesthetically, perhaps, the optimal score is neither very low nor very high, but somewhere in between. In this way a preference rule approach might shed some light on the optimal level of complexity that Chernoff describes.

While aesthetic play of this kind is one aspect of the appeal and value of African music, it is surely only one aspect among many. To fully under-

stand the role of rhythm in African music, and the role of music in African society, the ethnomusicologist's broader perspective is crucial. While music theory can inform ethnomusicology in exploring and understanding individual aspects of the musical puzzle, music theory needs ethnomusicology to show how they all fit together.

Notes

1. Other studies supporting this general view of meter include Schachter 1976, Lester 1986, Kramer 1988, and Rothstein 1989. For somewhat divergent views, see Berry 1983 and Benjamin 1984.

2. A distinction should be made between music in strict rhythm (i.e., with meter) and music in free rhythm (without meter); this distinction is discussed by Nketia (1974:168) and Agawu (1995:73–4). Much African music is in free rhythm; however, the work discussed here is almost entirely concerned with strict rhythm music.

3. At one point Pantaleoni seems to question even the eighth-note pulse, arguing that Ewe dance music is understood directly in terms of the bell pattern, without involving any regular pulse at all (1972a:56–8). But he seems ambivalent about this (see 1972b:8), and clearly assumes an eighth-note pulse in his transcriptions.

4. Lerdahl and Jackendoff propose that the tactus is invariably between 40 and 160 beats per minute, and often close to 70 (1983:70–4). Parncutt found experimentally that the preferred range for the tactus was around 80–90 beats per minute (1994). Apparently, the "typical" African tactus range overlaps with the Western one, but is somewhat faster.

5. See Jones 1959 I:41, 54, 84, 86, 124; Koetting 1970:130–1. Other ethnic groups that use the standard pattern assume different beginning points, as some have pointed out (Pressing 1983a and Rahn 1996); but apparently the pattern always has a definite "beginning" point. While there seems to be no doubt that the X position is metrically strong in Ewe music, there is some question as to whether it is truly the *beginning* of the pattern; see note 17.

6. Two divergent views should be mentioned. Arom accepts the tactus level in African music, but argues strongly against any higher levels (1991:206–7, 229). Kauffman proposes that common rhythmic patterns in African music, such as 3–3–2 and the standard bell pattern, may actually be metrical patterns (1980:407–12). The idea of irregular metrical structures—irregular (but regularly repeating) patterns of accents which are inferred by the listener and then imposed on subsequent events—is not out of the question; but since Kauffman is the only one to suggest it, and gives little evidence for it, I will not pursue it further here.

7. Jones's comments about the conflicting barlines are of little help. He emphasizes that rhythms which conflict with the underlying beat are not "syncopated"—rather, he claims that they are completely independent of this beat; it seems that the independent barlines are designed to convey this (1959 I:20–1, 23, 32). Generally, a syncopation simply refers to musical events which conflict with the prevailing beat; is there anything to be gained by saying that a line goes against the main beat, but is *not* syncopated? Chernoff expresses a similar view to Jones, asserting that different lines of a drum ensemble piece must be given different meters (1979:45). Agawu is also somewhat inconsistent on the issue of meter. Despite his frequent discussions of conflicts between accent and meter, he denies that the time signatures and barlines of his transcriptions represent an "accentual hierarchy"; rather they simply represent "grouping" (1995:71, 187–8, 200). By "accentual hierarchy," I assume he means a metrical framework with beats of varying strength. Surely Agawu is not claiming that such a framework is absent in African music; if so, what does he mean by "conflicts" between meter and surface events? (Agawu's claim that his barlines represent grouping will be discussed below.)

8. We should be cautious in how we interpret these authors' transcriptions. However, as we have seen, there is plenty of support in their writings—Jones included—for the exist-

ence of meter in African music. In general, then, it seems fair to take time signatures and barlines as indicators of the meter that is perceived.

9. It might be argued that the instruments here are heard, to some extent, as forming "resultant" lines rather than individual ones (Kubik 1962; Nketia 1974:133–8); in this case, since a given resultant line may have notes on all or nearly all of the eighth-note beats, it may be loudness—resulting from several instruments playing together—more than the event rule that causes certain beats to be heard as strong.

10. Locke (1982) draws a useful distinction between "offbeat rhythms," which imply a metrical structure of the same period as the underlying meter but different in phase, and "cross rhythms," which imply a metrical structure of a different period.

11. Here I am echoing Agawu, who argues eloquently against exaggerating the differences between Western and African music (1995:4–5, 187–90).

12. There is a common misconception that, in Western music, metrically accented notes are always (or at least normally) indicated as such by being played louder. In Western music, Chernoff remarks, "the rhythm is counted evenly and stressed on the main beat" (1979:42). Arom, similarly, seems to think that meter requires dynamic accents (1991:202–4). This misconception may account for the misgivings of some authors, notably Jones, about using barlines and time signatures in the traditional way. In an early article, Jones explains his reluctance to use a 2/4 time signature in a piece; this would "imply the presence of alternate strong and weak accents. But in our example, and indeed in all cases where clapping is used, the claps are all of equal intensity" (1954:27; see also 1959 I:17, 23). This fear of implying dynamic accents might also explain Agawu's comments, noted earlier, that his barlines do not represent an "accentual hierarchy." But Western metrical notation does not imply that notes on strong beats are dynamically accented. Loudness is one factor in Western meter, as we have seen; and statistically, it has been found that performers (specifically pianists) tend to play metrically strong notes slightly louder than others (Drake and Palmer 1993). But I suspect that loudness is a fairly minor factor in Western meter, and it is certainly not crucial; think of harpsichord or organ music, where no dynamic accenting is possible.

13. Jones discusses this as well, although his "Western" hearing is rather different (Jones 1959 I:19).

14. See also Locke 1982:223. Agawu takes issue with Jones, arguing that the 6/8 meter is primary in such cases (1995:189–91, 193).

15. "Position-finding" has not received much discussion with regard to the rhythm. It is briefly mentioned by Rahn, who uses the term "individuation" (1996:79).

16. We should note that Blacking's claims apply only to the Venda; in fact he mentions that some other Africans (specifically Zulus) agreed with his own interpretations rather than the Venda ones (1967:158).

17. Jones asserts that, in some contexts, even the standard bell pattern itself is regarded as end-accented, that is, ending on the X position shown in Example 1 (1959 I:54). Similarly, Locke notes that, in performance, the standard pattern is most commonly begun on the position just after the X position (Locke 1982:224–5; see also Locke's transcription on p. 220); this, again, suggests an end-accented grouping. In most cases, however—as noted earlier—the X position is described as the beginning of the pattern.

18. An interesting case here is Pressing's study of the kidi patterns in Agbadza, an Ewe drumming piece (1983b). To his credit, Pressing distinguishes clearly between "phrasing" (grouping) and "polyrhythmic sampling" (metrical implications) (9–11). He shows the grouping structures for a number of kidi patterns; he indicates the periods (or "cycles") of the meters implied by those patterns, but unfortunately not the placing of the strong beats (6). Regarding grouping, Pressing notes that parallelism is an important factor (9); he also notes that groups always begin with a bounce beat rather than a mute beat (the bounce beats being much more prominent) (9). Bounce beats are presumably strong phenomenal accents and would tend to be metrically strong (this is the main factor in the metrical implications of patterns, as Pressing implies [10–11]); it is interesting, then, that they tend to mark the *beginnings* of

phrases, rather than the ends, as other authors argue is normative for African music. In cases of several bounce strokes in quick succession, however, the phrase always begins on the first of the series, rather than on the last (6). This is predicted by *GTTM*'s similarity rule for grouping—a grouping boundary occurs at a change from one stroke type to another, grouping the similar ones together. In metrical terms, we would probably expect the *last* bounce stroke of a series to be metrically strongest, since it is in a way the "longest."

19. Several other concepts used in discussions of African rhythm should be briefly mentioned. Nketia and others have suggested that some rhythmic patterns are divisive, formed by divisions of a unit, whereas others are additive, formed by combining units together (Nketia 1974:128–31; Pressing 1983b:10–11). (See also Jones 1959 I:20–1, on the additive nature of African rhythm.) It is unclear what these terms imply from a cognitive viewpoint. One could describe certain metrical structures—and rhythmic patterns that imply them—as additive or divisive: given a regular tactus level, an irregular higher level might be seen as forming an additive structure, while an irregular lower level (with successive tactus beats being divided differently) would be divisive. While there are some patterns in African music that imply such irregular structures, most African rhythmic patterns and polyphonic textures imply regular structures of several levels; in this case it is unclear why they should be regarded divisively or additively (for example, consider the "divisive" patterns shown in Nketia 1974:130). Rhythmic patterns might be considered additive in other ways. Nketia points to the Ewe bell pattern as additive, arguing that it is based on a 5 + 7 structure (1974:129–31). This pattern might be regarded as an additive "5 + 7" pattern in terms of its grouping structure, or in terms of its motivic structure (in that it involves a five-beat pattern followed by a seven-beat variant). However, its metrical structure is clearly not additive (at least in the contexts where it is normally used); strong beats do not occur at intervals of 5 and 7 beats, but rather, occur regularly every third beat.

The terms "polyrhythm" and "polymeter" are also sometimes used. The meaning of these terms is, again, unclear. If polyrhythm simply means the use of multiple rhythmic patterns simultaneously in a piece, then of course it characterizes much Western music as well as African. Arom uses it to mean the combination of rhythms "so as to create an interwoven effect" (1991:216, 272). Most often, I think, it means using patterns which imply different meters taken individually (see Nketia 1974:135–8; Pressing 1983b:10–11). This is indeed an important feature of much African music, and is surely much less common in Western music, although not nonexistent. The same concept is also sometimes denoted by "polymeter." Waterman defines polymeter as "the interplay of two or more metrical frameworks" (1952:212); Chernoff defines it as "the simultaneous use of different meters" (1979:45). What exactly is meant by this? Perhaps these authors are simply referring to simultaneous lines which (taken individually) imply different meters. Or are they implying that, when such lines are combined, several different meters are perceived simultaneously? This cannot be ruled out, although I have argued against it in the case of Western music.

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