

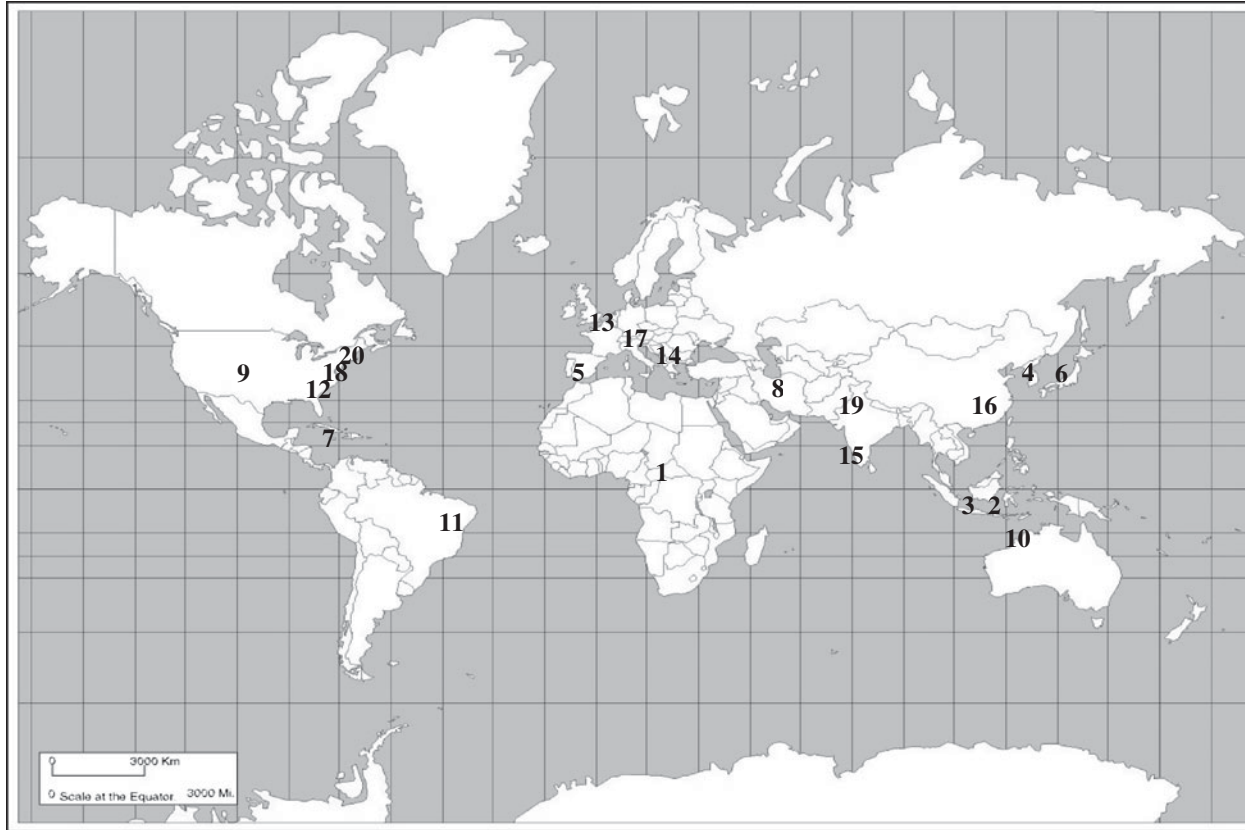
*A Cross-Cultural Topology of Musical Time*  
*Afterword to the Present Book and to Analytical Studies*  
in *World Music* (2006)

MICHAEL TENZER

*Typology and Topology*

Here at the combined conclusion of this volume plus its companion-predecessor *Analytical Studies in World Music* (Tenzer 2006; hereafter *ASWM*), not to strive for a synthetic overview would be to miss a rare opportunity to inquire into a range of features ordering all music.<sup>1</sup> As linguists gather a cross section of languages to search for universals, so we have selected repertoire in the two books to maximize historical and geographic diversity. There has been no intent to define music or to canonize any subset of it, rather to sample broadly. Naturally, the process of choosing leaves room for expansion and improvement, as both past and future unsuspected musical bloodlines and provenances may emerge or be discovered at any time. Many *sui generis* musical regions and families were bypassed because space was limited. Insider knowledge was prerequisite for joining the project, but more experts write analysis for some musics than for others. Nonetheless, this is a start. With all

1. This study is indebted to formulations of contemporary theorists of musical rhythm to the extent that it would be unwieldy to trace and reference the origins of the many concepts and tools marshaled. So as not to impede the flow, and to preserve something of the character of a primer in lieu of a scholarly argument, the decision was taken to eschew citations altogether. Suggested readings are listed at the end. Most are concerned with rhythm and its properties. For discussion of the ontology of musical rhythm as it pertains to categorizations both different and related to that of the present essay, see Tenzer 2011. Molino 2009, Nettl 2001, and Rowell 1983 explore music's ontology more generally.



Frontispiece: Regions of the world represented by the selections studied in the present volume and in Tenzer (2006), numbered as in figure A.1, column 2.

populated continents at least minimally represented there is variety enough to support organizing and testing the corpus as a database for typological study. Yet since the evidence available in this collection is still insufficient to enable more than a quite provisional typology, it is better to think of what follows as a *topology*—a conceptual map of kinds of musical structure, still coarse for the moment, organized according to relations among the structures themselves rather than their geographic or cultural origins.

“Typological study,” of which this effort partakes nevertheless, suggests comparison and a unified perspective on diverse phenomena. It is a worthy effort if the purpose is clear. Yet such a venture may be jarring in its conception for those who love and practice music analysis. The chasm between the microcosm of a given musical instance—that is, the realm of the analyst—and the mere outlines of musical features at many orders of magnitude removed, beyond even the limits of a cultural perspective (except, of course, that of this writer’s), is vast by any reckoning, and perhaps the gap is unbridgeable for the present. Analysis is lifeless without particularity, but typology is inevitably concerned with bird’s-eye features seemingly more relevant to disciplines (neurobiology, cognitive science, anthropology, etc.) that do not address why a given piece inspires its own fascinating and engaging musical experience.

Perhaps at the global order of magnitude the phenomena linking musics together are solely hardwired, reflect evolutionary and cultural needs, or are constrained by limits on perception, memory, and fine motor skills. Alan Lomax suggested as much in the 1970s when he described his Cantometrics system for comparison as concerned not with “songs” but with “singing.” It should be clear that leaving such issues aside for the moment is a gesture of respect for them (although some of these issues, largely invisible here, were foundational in the individual analyses from which the corpus is drawn). But can we ultimately find continuity between the particular and the universal in musical experience?

One way to proceed surely hinges upon insight into music and time. While musico-temporal structure may be perceived in different ways depending on its contexts of production and reception, it is important to strive for analytical language able to bridge these modalities. Consistent with *ASWM*, the present focus is on the nature and variety of musical time flows. Many writers have investigated this topic, but almost always in the context of a culturally delimited repertoire. The current aim is to gloss the processes and relationships generating the flows evident in the global corpus at hand. Of the many dimensions of musical time, I focus on a few of the most important to see how these are evoked and given a particular balance by the structure of each selection. The broad tripartite classification explained on pages 25–32 of *ASWM* and used to group chapters therein (part I: *sectional periodicity*, part II:

*isoperiodicity*, and part III: *linear composition*<sup>2</sup>) serves as a springboard for the ideas developed here.

Three motivations for this venture stand out: a creative urge to tell about the musics as I have learned to hear them in relation to one another; a utopian wish to reconcile and share disparate musical experiences; and fascination with diverse and ingenious constructions of musical architecture. Naturally the perspective I take can only complement—and will never diminish—each music’s profound individuality. But this is not an exercise in the anthropology of time. It is a snapshot of one editor-analyst’s ongoing engagement with features of musical time described in this body of contributors’ work. Perhaps we can later learn to extend downward from the glosses to reconnect with individual works in greater detail “on the ground,” integrating the many other layers of significance that a time-based perspective seems naturally to want to accommodate. For the present it is enough to observe, note, and take inventory, and rely on the books’ chapter-length analyses to provide their particular varieties of detail separately.

The expertise of the assembled authors is assumed to validate the cultural relevance of the data supporting my analysis. The repertoire items vary widely in length, texture, the fixity of structural identities, and social contexts and functions, but all such factors are set aside—or, rather, taken as having neutralized one another—to zero in on strategies of temporal organization. Cultures have multiple approaches to time that do not neatly sum up in any single musical example or concept.<sup>3</sup> Thus while the selections may represent their cultures, they are not intended to stand for them: they are individual expressions irreducible to norms, mere instances among many and presumably diverse others. Ultimately we stand a better chance of producing a more thorough typology with this culture-blind approach.

More significantly, like time in all realms, each instance of musical time is always multiple, with layered, contradictory qualities. Its complexity (however defined) need not vary proportionally with any other musical or social parameter. Time is experience, which takes shape and shape-shifts once it enters the imagination. In both experience and reflection upon experience, days can be as concentrated as moments, private experiences as rich

2. These broad categories have mainly given way to more focused terminology below. *Isoperiodicity* is described using the terms *cycle* and *ostinato cycle*, and the word *linear* has been dropped to avoid its connotations of teleology and progress.

3. It is simplistic to say, for example, that “Balinese time is circular” or “Western time is linear.” Although it may seem like splitting hairs to substitute (as I do below) similar formulations such as “cyclical” and “transformative,” the latter two at least have the virtue of suggesting temporal experience rather than spatial geometry.

as public ones, simple materials are apt to generate intricacy, and intricacy can cross a perceptual threshold back to simplicity.<sup>4</sup> Familiarity may greatly clarify such unstable perception; here is where expert knowledge provides the compass we need.

The following discussion condenses and interprets the collected analyses, reorienting them to the purpose at hand, which often supplements the authors' original purposes. After an exposition of analytic parameters and terms, the twenty repertoire selections in the corpus are then categorized and described with reference to this lexicon of time organization and temporality types. In chapters where multiple selections were analyzed, only one was chosen for inclusion here.<sup>5</sup> The categories proposed describe only the music in the corpus; no universal completeness is presumed. Detail may be added in the future with the accretion of more examples.

I stress the qualitative nature of this project. It is intended to inspire interpretations about which the artistically inclined may argue, not dispense case-closers.

### *I. Pure Parameters and Their Continua*

Sections I.1, I.2, and I.3 review common concepts of musical temporality in a theoretical vein: *time organization* (mental constructions of time through which we cognize musical rhythm); *configuration* (how we understand musical events to be grouped); and *formal continuity* (the overarching quality of temporal process). Each topic concludes with one or more focus questions that guide later discussion of the corpus. Closely related terms are given in parentheses. Section I.4 considers overlaps between categories and other contingencies.

#### *I.1. Time Organization (Figure A.1, Column 5)*

*Keywords: unmeasured rhythm, pulsation (beat), meter (metric periodicity), cycle, ostinato cycle; open and closed time.*

4. One musical example: it should be intuitively clear that for insiders to each culture, one of Anton Webern's terse *Five Pieces for Orchestra*, lasting less than a minute, may present as rich a temporal experience as a nightlong vocalization of an epic poem from the Sulu archipelago.

5. For example, Blum and Buchanan/Folse in Tenzer 2006 and Nettle/Levine and Barwick here (see figure A.1 for selections). The choices were subjectively made. The music on which the comparative analyses in Tenzer and Arom/Martin were based (this volume) was also excluded.

1. Temporal Category	2. Author (volume <sup>a</sup> and chapter)	3. Origin and Genre	4. Selection Title	5. Time Organization	6. Place of Articulation	7. Formal Continuity
A. “Pure” ostinato-cyclic	1. Fürniss (ASWM 5)	Central African song	<i>Dikòbò dàmù dá sòmbé</i>	Ostinato cycle	Cycle boundaries	Cyclic
B. Cyclic—discursive	2. Tenzer (ASWM 6)	Balinese gamelan	<i>Oleg Tumulilingan</i>	Ostinato cycle and expansions	Metacycle boundaries	Through-composed with cycles
	3. Sutton/Vetter (ASWM 7)	Javanese gamelan	<i>Ladrang Pangkur</i>			
C. “Pure” hybrid (transformative/sectional/cyclic)	4. Hesselink (ACCSWM 7)	Korean <i>p’ungmul</i>	<i>P’an Kut</i>	Succession of ostinato cycles	Metacycle boundaries	Sectional
D. Sectional with ostinato cycle basis	5. Manuel (ASWM 3)	Spanish <i>flamenco</i>	<i>A Quién le Contaré Yo</i>	Ostinato cycle layer, metered layer	Metacycle boundaries	Sectional
	6. Terauchi (ACCSWM 1)	Japanese <i>gagaku</i>	<i>Etenraku</i>			
	7. Moore/Sayre (ASWM 4)	Cuban <i>batá</i>	<i>Obatalá</i>			
E. Sectional with nonmetric (pulsed, unmeasured rhythm) basis	8. Blum (ASWM 1)	Xorasaní <i>navā’i</i>	<i>Sāqi-nāme</i> of Qomrī	Unmetered/measured/cyclic	Configured group boundaries	Sectional/cyclic
	9. Levine/Nettl (ACCSWM 8)	<i>Arapaho</i> song	<i>Wolf Dance Song</i>			
	10. Barwick (ACCSWM 9)	Murriny Patha <i>djanba</i>	<i>Kunyibinyi Tjingarru</i>			
F. Sectional—cyclic	11. Stanyek/Oliveira (ACCSWM 3)	Brazilian <i>samba pagode</i>	<i>Sorriso Aberto</i>	Metered/cyclic	Configured group boundaries	Cyclic
	12. Ziporyn/Tenzer (ACCSWM 4)	American jazz	<i>I Should Care</i>			
	13. Leach (ACCSWM 2)	French medieval <i>balade</i>	<i>De Petit Po</i>			

Figure A.1. The corpus and its parameters.

G. Sectional—metered	14. Buchanan/Folse (ASWM 2)	Bulgarian <i>horo</i>	<i>Georgi, le Lyubile</i>	Metered/cyclic	Configured group boundaries	Through-composed with sectional articulations
	15. Morris (ASWM 9)	S. Indian <i>varnam</i>	<i>Valachi Vacchi</i>			
H. Transformative—sectional	16. Stock (ASWM 8)	Chinese <i>huju</i>	<i>Jin Yuan Seeks Her Son</i>	Metered	Configured group boundaries	through-composed with sectional articulations
	17. Benjamin (ASWM 10)	European <i>piano concerto</i>	<i>Concerto 17 in G Major, K. 453, I</i>			
I. Open transformative	18. Roeder (ASWM 11)	American <i>chamber music</i>	<i>Enchanted Preludes</i>	Multiply-pulsed free rhythm/ <i>unmeasured</i> rhythm	Configured group boundaries	Through-composed with sectional articulations
	19. Widdess (ACCSWM 5)	North Indian <i>ālāp</i>	<i>rāg Pūriyā-Kalyān</i>			
J. “Pure” transformative	20. Bunk (ACCSWM 6)	American “ <i>timbre-and-form</i> ”	<i>Phoneme (3)</i>	<i>Unmeasured</i> rhythm	(Weakly) configured group boundaries	Through-composed with weak sectional articulations

<sup>a</sup> ASWM = *Analytical Studies in World Music* (Tenzer 2006); ACCSWM = *Analytical and Cross-Cultural Studies in World Music* (current volume)

Figure A.i. (Continued)

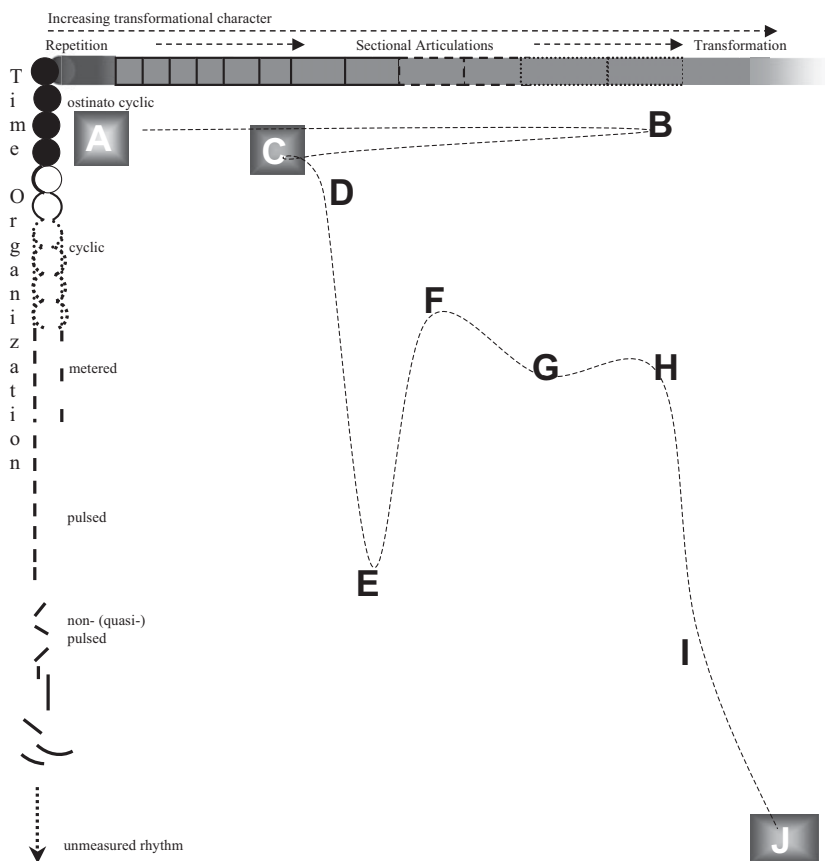


Figure A.2. A cross-cultural topology of musical time in this corpus, based on the temporal categories in column I of figure A.1.

The five terms *unmeasured rhythm*, *pulsation*, *meter*, *cycle*, and *ostinato cycle* describe a continuum of diachronic frameworks along which time is perceived as increasingly regulated and constrained by equidistant pulsations (beats) and by repetition of content. The frameworks enable us to create a mental construct of how time is organized, a construct naturally shaped by cultural and individual agency. Moving along the continuum, our minds increasingly rely on two cognitive universals: the neural capacity to entrain and synchronize different streams of pulsation,<sup>6</sup> and the ability to compare two sound events in terms of relations such as difference, similarity, and repetition.

6. In general, we can entrain pulsations that repeat durations of between 100 and 1500 microseconds.



These stimulate the listener to predict the recurrence of similar events at similar temporal intervals. This quality of predictability, which becomes more intense in each subsequent type of organization, is inherent to what we call musical *periodicity*.<sup>7</sup>

- When the timing of sound events is largely unpredictable because they are too fast, slow, multilayered, or otherwise complex, their rhythm is *unmeasured*.<sup>8</sup>
- When time intervals between events are related by simple proportions without exhibiting higher-order regularity, we feel them to be calibrated by a stream of equidistant *pulsations*. Such a stream organizes perception of the timing and duration of local events, and through it we are more able to anticipate when (and only a bit of what) near-future events will occur.
- When events *do* suggest higher-order regularity, we can track two or more synchronized streams as long as the pulsations' durations are related by sufficiently elementary ratios. This is the framework of *meter*. This multidimensional perceptual field allows more long-range prediction of content. A time span has *metric periodicity* if one can predict when (i.e., at what regular time intervals and rates coinciding with the pulsations) events will recur and, in a general way, what they will be.
- A *cycle* is a metric time span whose specific content and periodicity repeat in coordination, possibly with variation in either.<sup>9</sup> Events that appear at equivalent positions in different statements of a cycle play equivalent roles in the musical processes of the cycle.<sup>10</sup>

7. Note the distinction between this usage of *period* and that in European art music, where the term connotes a balanced antecedent-consequent phrase pair. Note also that the use of *meter* to mean “notated time signature” is avoided throughout.

8. A special case of unpredictability arises from concurrent pulsation streams not coordinated by simple ratios. See the discussion of ASWM's chapter 11 under “I. Open Transformative” on pages 437–438 below.

9. Cycles with unmeasured (hence unmetred) rhythm occur but none are in this corpus. Cycles with only a single pulsation stream are probably not possible because the repetition itself marks a second level of periodicity.

10. As with the Thelonious Monk selection, the *iūmsae II* pattern in Hesselink's analysis of Korean drumming (both in this volume), certain kinds of gamelan music, plus other examples, a cultural expectation for immediate repetition can suffice to qualify a time span as a cycle or ostinato cycle, even if it does not actually repeat in a given instance.

- An *ostinato cycle* is a cycle with a duration that approximates the psychological present, usually repeated many times. Ostinato cycles are brief, such that our attention grasps the entirety.

In the first three types, in which content need not repeat, time organization may be said to be *open*, whereas in the last two, which involve cyclic recurrence, it is *closed*. But as befits a continuum it is important to see the progression through the five categories as gradual. Moving from simple pulsation to meter to cycle, both time organization and content gradually bring repetition to the fore. But repetition and its lack are elusive to pin down: they are manifestations of sameness and difference, a duality permanently underlying all experience. Experience is multidimensional and repetition always coexists with change. What we observe moving through the continuum is the emergence of the former and the gradual (but never full) retreat of the latter.

For example, in unmeasured rhythm we might understand repetition simply as the continuation of something already begun, without expectation of specific timing for change. Only when change comes can we measure the distinctiveness of what was before. With simple pulsation, timing plays a role, and we begin to cognize relationships of sameness between events because by entraining them we regularize and compare them. In meter we may expect still more, such as a certain *kind* of event—say, the arrival of a new harmony—at predictable moments. In a cyclic recurrence we would expect not only a harmony change but a particular harmony; and in an ostinato cycle a brief series of such changes fuse into an insistent unit.

In some textures we can perceive multiple, interacting types of time organization, possibly dislodging the sense of directed progression from type to type depicted here. Rhythm configurations interpretable in terms of open frameworks—unmeasured, pulsed, or metered—may extend over and be parsed in terms of shorter cycles that are present simultaneously. Such layers, if in different meters or pulsation rates (*tempi*), are perceived as independent in proportion to the complexity of the ratios of their pulsation speeds.

*Focus: Toward which of the five kinds of time organization does a music tend, and to what extent does it move among or layer them?*

### *I.2. Configuration (Figure A.1, Column 6)*

*Keywords: configuration, mark, group, identity, variation, section, metacycle.*

A series of sounds may be *marked* by contrasts in rhythm, tone color (including pitch, harmony, timbre, etc.), or loudness; it may contain recognizable patterns and repetitions that have beginnings and endings. Marks and patterns configure sound series into *groups* (such as motives and phrases).

Groups have multifaceted *identities* determined by listener expectation, cultural norm, compositional theory, performance practice, and other codes. We perceive them as arranged hierarchically, so that groups can nest in larger groups, or be segmented into smaller groups.

*Group* is a general term that denotes the mere presence of marks, but says nothing about repetitiveness or transformation. Naturally, the music in a group can repeat that of a previous group, with or without *variation* in content and duration. Groups are thus linked, via the concept of repetition, to cycles, and are often synchronized with them but should not be confused with them. Groups are defined by marks and by repeated or varied content, not consistency of duration.

#### I.2A. LARGE GROUP TYPES: SECTION, METACYCLE

- *Sections* are groups that are so long and distinctive that the changes from one to the next are perceived as the most important formal divisions of the music. As with groups, sensations of cadence or “reset” prevail at section boundaries, but not necessarily repetition/periodicity.
- *Metacycles* are a special case of sections in cyclic and ostinato cyclic contexts. They emerge when a configuration pattern spans two or more cycles, beginning and ending at their boundaries.

#### I.2B. PROCESSES THAT ARTICULATE SECTIONS AND METACYCLES

The following processes, deriving from the basic types of mark mentioned above, are among those at work in the corpus. Not all are operative in any given music.

- *Melodic (or textual) articulation*: An idiomatic melodic ending, beginning, or return, possibly aligned with a textual boundary, such as the end of a strophe or refrain.
- *Harmonic articulation*: A harmonic arrival of significance within its particular system.
- *Modal shift*: Articulation via shift from one pitch mode to another.
- *Instrument change*: Change of instrumentation, orchestration, predominant timbre, or featured instrument.
- *Structural tempo change*: In other words, not merely an inflection.
- *Change of time organization*: Movement among different kinds of time organization (as above).
- Others such as registral shift, dynamic contrast, and so on.

When groups transform, we use memory to check the identity of an unfolding group against those previously heard. Acculturated listeners

track a group's transformation, follow which dimensions are intrinsic to its identity, and can perceive which of its dimensions are preserved, varied, or jettisoned.

*Focus: Which configuration techniques are present, and how do they form sections and/or metacycles?*

### *I.3. Formal Continuity (Figure A.I, Column 7)*

*Keywords: stasis (repetition, cyclicity), transformation (through-composition), rupture (alternation), sectionality.*

Musical time may be *static* in some aspects (e.g., harmony or sectional content) and simultaneously *transformative* in others (e.g., timbre or density of events), and then suddenly *rupture* into something new. The relative predominance of these qualities is always fluctuating and contextual. In evaluating this balance we consider the nature of the events themselves, their durations and proportions with respect to one another and to sections or wholes, and the degree of contrast or continuity between them. These terms are meant to be value-neutral and not to connote “progress” or “timelessness” or other culturally coded terms; indeed, any music can be static *or* transformational and at the same time be experienced viscerally (or not) as dynamic, engaging, calm, dramatic, spiritual, vulgar, and so on.

Prolonged stasis and continual transformation are really only ideals, since *repetition* can only approach the limit of actual stasis, and its lack can merely suggest continuous change. In their “pure” forms, we can imagine stasis as  $!A!$ , that is, a continual repetition of an unvarying group, and transformation as  $A \rightarrow B$  (the arrow can be read as “leads to”), that is, the presentation of a distinctive group (or section) followed by a contrasting one. That the “pure” states are hypothetical may be seen by reflecting that they are in permanent dialog: our proclivity to anticipate the future can give a directedness to unvarying repetition, while change that constantly thwarts expectation can make time seem undirected.

For example, repetition with incremental variation ( $A \rightarrow A' \rightarrow A''$ , etc.) generates different stasis than a single exact iteration ( $A \rightarrow A$ ), yet even the latter contains transformative aspects because the iteration is heard in the fresh context of coming *after* its initial statement. A chain of strongly contrasting groups ( $A \rightarrow B \rightarrow C$ , etc.) is differently transformative than an incremental one ( $A \rightarrow A' \rightarrow A''$ , etc.), but the latter of this pair also suggests stasis (as stated). The engine of the ambiguity lies equally in the formulation  $A \rightarrow A'$  which denotes both change and stasis, and in the fact that different such processes may be occurring simultaneously in different synchronic dimensions.

Definitive *alternation* between qualities creates hybrids. Perhaps the most forceful (“purest”) action of this sort is the change from one kind of repetition to another, as in  $\parallel:A:\parallel \rightarrow \parallel:B:\parallel$ . Sometimes repetition gives way to transformation ( $\parallel:A:\parallel \rightarrow B \rightarrow C$ ), or vice versa ( $A \rightarrow B \rightarrow \parallel:C:\parallel$ ), or switches from one kind (or rate) of repetition or transformation to another ( $A \rightarrow A' \rightarrow B \rightarrow C$ ). An  $A \rightarrow B$  transformation suggests rupture to the extent that the articulating moment is clearly marked, and the segments before and after are relatively stable and contrasting. Alternation happens in an instant but its effect ripples ahead in anticipation and back through memory.

A music’s *sectionality* is the aspect of its form that emerges through these and other related processes of forming sections (or metacycles). For the present we are concerned with those comprising relatively larger proportions of the whole. In the corpus we identify *cyclical*, *sectional*, and *through-composed* (i.e., consistently transformational at the sectional level) formal continuities.

*Focus: To what extent is each of the three temporal qualities present, and how does sectionality shape them?*

#### I.4. Ambiguities and Overlaps

Understanding the relationship between the formal continuities just introduced, their three associated qualities (stasis, transformation, rupture), and time organization requires the practical reconciliation of contrasts and the overlapping of nominally distinct categories. The following conundrums—conceptual, cultural, and cognitive—may help disabuse those for whom the illusion persists that the categories described thus far are discrete.

##### CONCEPTUAL

Repetition may be only a mental framework in some situations. If what recurs is a conceptual referent or model (as it is for many kinds of improvisation and variation), sound may be manifest externally as transformative, sometimes radically so. Only in some cases (repeating rhythms, cyclical harmonic progressions, etc.) are these kinds of time organization materialized. Thus, for example, the conditions specified above for *ostinato cycles*—brevity and repetition—might, if the repetition is only in the mind of the performer, suggest (mere) meter to a listener. As stated, the boundaries between the kinds of time organization are easily blurred.

Duration and scale further blur our perceptions of cycle and meter. How long is too long for a cycle to be understood or felt as a recurring structure? As such structures extend in duration, our awareness may focus on local events with noncyclic properties; the cyclic enclosure receding out of immediate sensory experience and into conceptual awareness.

Irregularity is another conceptual gray area. In meters where all pulse streams are merely isochronous (i.e., relatively featureless), meter may be felt as a regulating, calibrating action, not an actual rhythmic entity. But at what point does a distinctive metric periodicity of (for example) seven pulses organized  $2 + 2 + 3$  become perceived as an actual pattern in the musical flow, and at what point does it cause the flow to be heard as an ostinato cycle? Context, of course, is all.

## CULTURAL

Cultural and historical patterns are always shifting, but people of all eras and places acculturate to particular ways of listening. Human communities of the past, more mutually isolated and exposed to fewer kinds of rhythm, perhaps recognized correspondingly fewer rhythms as musical. What was reported as cacophony in earlier cross-cultural encounters might well be called sublime today, but can ever be misheard in cultural terms. What may sound like unmeasured rhythm to one may relate to pulse for another, or be generated by a performer in relation to an internal, unstated pulse or cycle. The organization of densely layered, intensely cyclic music (as in many sub-Saharan instances) can be impenetrable to the outsider's ear. And the ability to perceive long-range harmonic relationships such as in European classical music clearly requires extensive training.

## COGNITIVE

Cognition as shaped by human evolution acutely shapes perception. Age, experience, and training all play roles in refining innate capacities. Bodily impulse to entrain is strong. It may cause listeners or performers to group sounds in terms of a pulsation (breath, pulse, heartbeat) even when none is meant. Or, in the case of some kinds of complexity (e.g., Roeder, *ASWM II*) *not* to perceive pulsation even though it is a necessary calibrator for performers. Each musical instance is its own special case; separation of concepts is equal parts necessity and convenience. This, again, is why analysis thrives on particulars rather than generalities.

## *II. Orientation in the Repertoire through Analysis of Sections*

In figure A.1 the corpus has been sorted into ten temporality categories, named in the leftmost column of each row. Figure A.2 displays the categories as a topology. Most of these ten evolve into one another as if moving from the most cyclically constrained to the freest and most aperiodic—as if from a concentrated, strictly bounded field to an unbounded, transformational, quasi-free liberty of movement. We must distinguish the categories

themselves—intended as a higher-order system of temporalities with its own useful anatomy—from the subjective musical *experiences* they provide. Within each category the items from the corpus (if more than one) are ordered to illustrate a certain gradation within the category. But in figure A.2, categories B and E lurch out in another direction, as will be explained. Each category is treated separately below; the corpus is referenced by chapter number (*ASWM* or *ACCSWM* [the current volume]) and author. The focus questions introduced above comprise core concerns and are repeated here for convenience:

- *Toward which of the five kinds of time organization does a music tend, and to what extent does it move among or layer them?*
- *Which configuration techniques are present, and how do they form sections and/or metacycles?*
- *To what extent is each of the three temporal qualities (stasis, transformation and rapture) present, and how does sectionality shape them?*

#### THE EXTREMES

Consistent with I.3 above,<sup>11</sup> three items in the corpus are seen as approaching the “pure” states of stasis and transformation and the “pure hybrid” of rapture more closely than any others. They are, respectively, the Aka Pygmy song *Dikòbò dàmù dá sòmbé*, the “timbre-and-form” music of the BSC’s *Phoneme* (3); and the Korean *p’ungmul p’an kut* (categories A, J, and C, boxed and shaded in figure A.2).

##### A. “PURE” OSTINATO CYCLIC: I. FÜRNISS (*ASWM*, CH. 5)

*Dikòbò dàmù dá sòmbé* never departs from a twelve-pulsation (thirty-six-subdivision) ostinato cycle in which, by definition, each position in the pulse stream is considered structurally equivalent to its counterparts in subsequent cycles. The unchanging identity of the four constituent melodic parts, as understood by the musicians, generates the music’s static aspects. Given the Aka’s flexible approach to the actual realization of the four parts, each ostinato cycle may in fact sound partly transformed and can also be experienced in terms of this change. The flow is nonetheless |:A:| because although there is some variation, it is limited compared to other ostinato cyclic music (see category B). Nevertheless, the four contrapuntal parts are in constant fluctuating motion; there is no default state. In this performance

II. . . . and with *ASWM*’s three supercategories isoperiodicity, sectionality, and linear composition.

each group begins with, and lasts as long as, an ostinato cycle. Sections are thus marked by those same boundaries, and there are no metacycles (see Fűrnis figure 5.2).

B. CYCLIC—DISCURSIVE: 2. TENZER (ASWM, CH. 6);

3. SUTTON/VETTER (ASWM, CH. 7)

The term *discursive cyclicity* suggests a transformative temporality anchored by a permanent cycle. How is this possible? These analyses depict a cycle that, as it repeats over and over, draws a basic melodic structure through a series of transformations in elaboration and (particularly striking) radical tempo changes that create a through-composed whole. This disturbs neither the identity of the underlying melody nor the duration of the cycle as measured in number of pulsations—however much the pulsations may slow down or accelerate.

In the Balinese gamelan example, the initial melody is brief, configured with an unchanging sequence of skeletal tones—literally stated among the many sound layers—and marked with a fixed pattern of gong strokes. The Javanese example is also made that way, except that the duration of its initial melody exceeds the psychological present (lasting nineteen seconds, from 0:07 to 0:26), so that strictly speaking it is a cycle and not an ostinato cycle. But for this category the distinction recedes in importance. What matters is that essential features of the initial structure recur unchanged (as in all cyclic music) but the duration of the cycle constantly varies, constructing an idiosyncratically elastic temporality. These strong affinities, combined with the appearance of a true ostinato cycle in the Balinese example (and the fact of their existence in other Javanese examples), explain their coexistence within a single category, and the location of the category in the topology.

In both examples a series of metacycles occurs at irregular intervals of two or more cycles, articulated by changing melodic elaborations and tempi. The interaction here among stasis, transformation, and rupture is perhaps the most balanced in the corpus. But their unique integration in this music interrupts the flow of the temporal categories in column 1 of figure A.1; hence the shifting of “B” all the way to the right (under “transformation”) in figure A.2. To have placed the music farther down in column one (perhaps near G) would have prioritized the transformational aspects of the music over the cyclic ones and insufficiently weighted the deep structural anchor the cycle provides. Here, at its designated position, the specific nature of the transformation is clarified by stressing its debt to the cycle.

My analysis of Balinese music shows a mainly nonrepetitive overall structure with a few elements of large-scale formal return (or at least parallelisms; see Tenzer figure 6.6). But Sutton/Vetter’s Javanese selection goes further,



ending at a tempo vastly slower than that with which the music began, exploring melodic permutations distantly related to the basic melody, with exponentially greater rhythmic density; and even interpolating small segments in unmeasured rhythm that nearly undermine the cyclic frame (see Sutton/Vetter figure 7.1). The selection begins as a rushing stream of cyclic regularity but is overtaken by an enormous, diffuse deceleration, descending through several levels of formal expansion and rhythmic multiplication. For both pieces, an appropriate representation of the overall form could be  $A \rightarrow A' \rightarrow A''$ , and so on, with each letter corresponding to a cycle.

C. “PURE” HYBRID (TRANSFORMATIONAL/SECTIONAL/CYCLIC): 4.  
 HESSELINK (ACCSWM, CH. 7).

In the Korean *p'an kut*, a series of ostinato cycles unfolds. Their rhythms strongly contrasted to an acculturated ear, most are reinforced through unvaried repetition, and they occur without transitions between them. A few progress to the next ostinato after only a single statement, nonetheless retaining cyclic character in this context. Instrumental layers closely reinforce one another and the clarity of the structure. The temporal process thus comprises passage through a series of static spans, with each repeating ostinato cycle ultimately leading to rupture. The flow could be described as  $l:A:l \rightarrow l:B:l \rightarrow \dots \rightarrow l:n:l$ , each  $l:x:l$  corresponding to a metacycle comprising all the repetitions of each ostinato cycle. Since in this music transformation equals rupture and occurs exclusively at metacycle boundaries, stasis is juxtaposed with transformation more bluntly here than in any other selection in the corpus (see Hesselink figure 7.4).

D. SECTIONAL WITH OSTINATO CYCLE BASIS: 5. MANUEL (ASWM, CH. 3); 6.  
 TERAUCHI (ACCSWM, CH. 1); 7. MOORE/SAYRE (ASWM, CH. 4).

Categories D to F are mainly concerned with song and the setting of texts, or at least with succinct and self-contained melodies. Selections in D are related to those in B in that all have an ostinato cycle layer regulating other musical action: the repeating *compás* pattern in Manuel's chapter on *flamenco*, the *haya yo-hyôshi* drum-and-gong layer in Terauchi's discussion of *gagaku*, and the implicit *clave* of Moore/Sayre's Cuban *batá* analysis. Layered above each we find metacycles delineated by various means. In *flamenco* they form at the junctions of the strophic *copla* (sung verses) and the *falseta* (guitar interludes) with which they alternate (see Manuel figure 3.2). In *gagaku* it is the borders between three 8-“measure” melodies, each immediately repeated, and then returning together later in a fixed order (see Terauchi figure 1.17). In *batá* sections form when a series of drum patterns and songs shifts one to the next, sometimes the two layers in tandem, sometimes not (see Moore/Sayre figure 4.6).

Of these three selections it is the *flamenco* that has the most static conception in its upper layers (i.e., apart from the *compás*). Although there is plenty of melodic variation and slight through-composed change in the harmony (a few mild chordal tributaries and a different final cadence) the alternation between voice and guitar preserves a binary  $A \rightarrow B \rightarrow A' \rightarrow B'$  and so on sectionality (each letter is one section). *Gagaku* is more transformative because it comprises exactly three distinct melodies, the third of which undergoes a modal shift:  $\parallel:A:\parallel \rightarrow \parallel:B:\parallel \rightarrow \parallel:C:\parallel$  etc. (see Terauchi figure 1.17). The *batá* selection has the most transformative construction because it uses five different drum patterns layered with seven songs, none of which recurs after it is replaced by another (i.e.,  $\parallel:a:\parallel \rightarrow \parallel:b:\parallel \rightarrow \dots \rightarrow \parallel:e:\parallel$  concurrently with  $\parallel:A:\parallel \rightarrow \parallel:B:\parallel \rightarrow \dots \rightarrow \parallel:G:\parallel$ ). Moreover a trajectory of growing drum complexity overlays the whole.

E. SECTIONAL WITH NONMETRIC (PULSED OR UNMEASURED RHYTHM)

BASIS: 8. BLUM (ASWM, CH. 1; SĀQI-NĀME OF QOMRI); 9.

NETTL/LEVINE (ACCSWM, CH. 8; ARAPAHO WOLF DANCE SONG);

10. BARWICK (ACCSWM, CH. 9; KUNYIBINYI TJINGARRU).

This category is positioned between D and F to bridge the *ostinati* girding the former and the expanded cycles in the latter. Here is repetition (or near-repetition) of medium-sized internal structures. The selections' time organization includes cycles, single-stream pulsation, and in some spots unmeasured rhythm—hence the category's anomalous position in figure A.2. The difference between D and E in *how* sections are articulated is that in the latter it is only the grouping configurations of the melodic elements themselves that form boundaries. There is no repeating pattern allowing for the proportional segmentation of time. In these examples melodic grouping depends in turn upon the structuring of text (or vocable), but there is considerable freedom and irregularity in how text, melody, and pulsation work together.

Both pulse and unmeasured rhythm inform the structure of the Xorasan *Navā'i* analyzed by Blum, distinguishing it from the *flamenco* treated by Manuel. Both have an  $A \rightarrow B \rightarrow A' \rightarrow B'$  sectionality (see Blum figure 1.10b), but where the guitar and vocal sections in *flamenco* are calibrated by the repeating *compás*, in the *Navā'i* irregularly accented strummed phrases with changing pulsation on the two-string *dotār* alternate repeatedly with a *capella* vocals declaimed in mainly unmeasured rhythm. In a slightly more intricate sectionality, the Arapaho song in Nettl/Levine's analysis is organized as  $\parallel:A\parallel \rightarrow B \rightarrow A':\parallel$  (see Nettl/Levine figure 8.2). The highly irregular rhythms comprise an initial motive, followed by a transitional passage and the motive's varied restatement in a lower register. Though a steady drum pulsation underlies the whole, none of the beats are stressed and the idea of a shared pulse between the parts is difficult to substantiate. Barwick's analysis of *Kunyibinyi Tjingarru's* form as

repeated AAAABBAAA reduces for current purposes to  $!:A \rightarrow B \rightarrow A':!$  (the second A is prime since it is shorter than the first; see Barwick figure 9.15). Here there is a clear alignment of clapstick and singers, and consequently an easily perceptible number of beats in each vocal phrase. But the sequence of durations (7, 9, 7, 9, 8, 8, 7, 7, and 6 beats) is too inconsistent for meter to be present.

Unlike in Xorasanī song, the music and text in the Arapaho and Murriny Patha songs repeat verbatim, and are hence cyclic at that level. The irregular internal structure in both songs acquires metric periodicity only through this repetition. In this way they come to bear a resemblance to the expanded, fully metricized cyclic structures in F. The clear alignment of pulsation and vocal rhythm explains why the Barwick selection is placed last here, bumping up against the wall of that category.

F. SECTIONAL—CYCLIC: II. STANYEK/OLIVEIRA (ACCSWM, CH. 3); 12.  
ZIPORYN/TENZER (ACCSWM, CH. 4); 13. LEACH (ACCSWM, CH. 2).

Temporality in this category is distinguished by the presence of relatively extended cycles of fixed length and identity that comprise the complete extent of the musical action. There is nothing outside the cyclic structure, either synchronically or diachronically; and although metacycles are possible, there are none in this sample. While all the music in the previous two categories had clear sectionality and often literal recurrence of melodies, it only approximated fully metricized cyclicity. In D, the smallest unit of repetition was the ostinato cycle, but other kinds of groupings were layered with it. In E, ostinato cycles vanished, ceding control to these larger, irregular groups, which correspond to lines of poetry or text repetitions. In F, each text strophe is coterminous with a cycle, analogous to these processes in E. But in F's comparatively extended cycles the irregularity reorganizes into hierarchically arranged internal sections.

Stasis is naturally evident at the level of the repeating cycle. Internally, there is transformation as we move through the variously contrasted sections internal to the cycle. In Stanyek and Oliveira's chapter the song *Sorriso Aberto*'s full cyclic span is 98 two-beat metric units (measures) with internal divisions of  $28 + 24 + 18 + 28$ . The two outer units are identical, the second a slightly truncated version of the same, but the third one is different; the sectionality is thus  $!:A \rightarrow A' \rightarrow B \rightarrow A':!$ . The song *I Should Care* has 32 four-beat measures divided  $8 + 8 + 8 + 8$  with sectionality  $!:A \rightarrow B \rightarrow A \rightarrow C:!$ .<sup>12</sup> Leach describes 56 three-beat units (i.e., "perfections") in her analysis of *De Petit Po*, organized into  $18 + 18 + (13 + 7)$  with sectionality  $!:A \rightarrow A' \rightarrow (B \rightarrow C):!$  (see Stanyek/Oliveira figure 3.2, Ziporyn/Tenzer figure 4.1, and Leach figure 2.4). The three selections are ordered within the category in this way because *Sorriso Aberto* has the most internal repetition, hence is the most static overall, while *De Petit Po* is both sectionally irregular and most internally through-composed. The asymmetrical

syllable counts of the text lines and their melismatic treatment intensify this, making this music most transformative of the three. Note that in *pagode* and the medieval *balade* it is the texts themselves that mandate an action of strophic return. Without them, as in *I Should Care* (of course the song has words, but they are not sung in Thelonious Monk's performance) it is evident that each cycle has its own harmonic closure and *could* stand alone without repetition. Figure A.3 graphs a generalized comparison of categories D, E, and F.

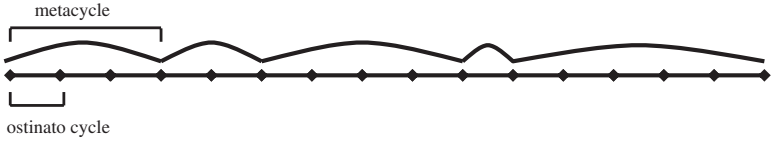
G. SECTIONAL—METERED: 14. BUCHANAN/FOLSE (ASWM, CH. 2; GEORGI LE, LYUBILE); 15. MORRIS (ASWM, CH. 9).

This is music with metric time organization during which there are instances of internal repetition mixed with through-composed sections.<sup>13</sup> In these two pieces sections are built up from metric units ("measures," per the transcriptions), with melodic articulations aligned with beginnings and endings of these—just as melodies began and ended with the boundaries of a series of ostinato cycles in category D. But if sections repeat, they do so only once before moving on, sometimes (as in *Georgi le, Lyubile*) returning with a fully parallel structure that diverges only at the moment of cadence, or (as in the South Indian *varnam*) reappearing again later in the manner of a refrain, or simply cosmetically altered with subtle new filigree. Despite the temporary state of cyclicity such recurrences contribute, the music is not repetitive at any large scale. Melody develops throughout, traversing a long course to conclude somewhere quite different from the point of origin. The overall quality is more transformational than any category since B.

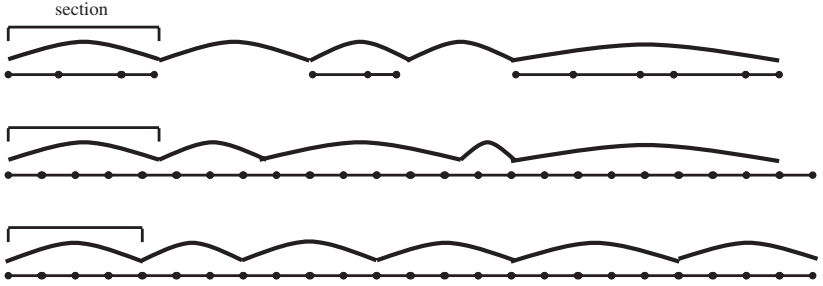
Buchanan and Folse's analysis of the song *Georgi le, Lyubile* describes two large sections of similar proportions, each further subdivided. The first contains four interior groups, the initial two of which immediately repeat verbatim, while the second two immediately repeat with modified ending cadences. The second large section contains a paired group with a modified second

12. See the chapter analysis for why this music can be treated as cyclic and metered even though in the performance analyzed there is neither a cyclic repetition nor a steady pulse. If treated as unmeasured rhythm, it could be argued that this music should appear in category E or I; if metric (not cyclic), in category G.

13. In *ASWM* the *horo* analyzed by Buchanan and Folse was classified under "Sectional Periodicities" and the music analyzed by Morris under "Linear Composition in Periodic Contexts." Their regrouping here is rationalized in these paragraphs. Note that the metric unit referred to here in relation to Morris's chapter is actually the 8-beat South Indian *Adi tāla*. It is commonplace to classify *tāla* as cycles both because of the importance of cyclicity in Indian culture and the recurring hand gestures that mark them. Here, however, I classify *tāla* as meters because repetition of the sounding music is neither expected nor required in many cases, and in particular this case.

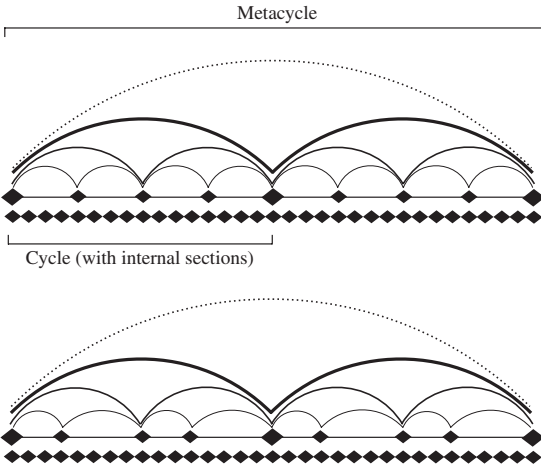


(a) Category D. An ostinato cycle layer, grouped by configuration in other layers into metacycles (i.e., beginning and ending at ostinato cycle boundaries) of irregular duration.



(b) Category E. Pulsation (or unmeasured rhythm) grouped by configuration into sections of irregular duration.

- Top: irregular pulsation alternating with unmeasured rhythm (e.g., Blum, #8).
- Middle: regular pulsation not aligned with rhythm (e.g., Nettl/Levine, #9).
- Bottom: regular pulsation aligned with rhythm (e.g., Barwick, #10).



(c) Category F. Cycles of consistent length with hierarchically organized interior sections that begin and end at cycle boundaries (potential metacycle shown with dotted line).

Figure A.3. Time organization and sectionality in categories D, E, and F of figure A.1

ending that repeats as a pair right away, followed by two longer phrases that are through-composed. With repeating pairs separated by commas, the whole is (6, 6 + 6, 6 + 4, 4' + 4, 4') + (ll:4, 4':ll + 8 + 8) measures. Thus the song expands in group length and eschews exact repetition more and more as it proceeds (see Buchanana/Folse figure 2.19).

The twenty-nine metric units (*tāla*) in the South Indian *varnam* analyzed by Morris also split into two large sections, apportioned 13 + 16 as follows: (4 + 4 + (2 + 3)) + (3 + 3 + 3 + 5 + 2). The two initial four-*tāla* units further divide into an aabb internal structure, while all components in the second section begin with a refrain (the *carana*) lasting one metric unit. Thus there is a strong and growing transforming trajectory culminating in the through-composed five-*tāla* unit that begins at the twenty-third *tāla* (see Morris figure 9.4).

In both of these pieces sectional articulations are marked not only with new melody but usually also change of mode. Painted in broad strokes their sectionality is A → B, but those sections subdivide into a wealth of smaller parts as described.

H. TRANSFORMATIVE—SECTIONAL: 16. STOCK (ASWM, CH. 8); 17.  
BENJAMIN (ASWM, CH. 10).

These musics comprise extended forms with metric time organization, shaped by variety of lower-level periodicities and clear sectionality at a high level. Except for some very local events, nothing that recurs completes itself in the same way it does the first time it is heard. This integrated mixture of varied repetition, changing group lengths, and through-composition weakens the potential for cyclicity and greatly strengthens transformational quality to an intensity similar to that of the music in category B, below which this category is placed in figure A.2. In the Shanghai opera excerpt analyzed by Stock, the three consecutive large sections addressed (out of eight that comprise the complete opera scene) are of unequal length and articulated from one another by changes of mode, meter, register, tempo, and dramatic action. Within each, changing group durations and a call-and-response between singer and instruments create a constantly evolving and irregular flow (see Stock figures 8.2 and 8.7). Benjamin's analysis of the first movement of the Mozart concerto K. 453 shows the music to have six large sections of irregular length, distinguished by harmonic motion, opposition of piano and orchestra, thematic function, and many other features (Benjamin figure 10.2).

High-level sectionality can be represented as A → B → C for the Shanghai opera excerpt and A → B → A' → C → B' → A'' for the Mozart movement, but these skeletal formulations, significant as they are for even expert listeners, give no inkling of the constant transformational momentum working at lower levels. (The variants of A and B in Benjamin's analysis retain a

certain identity with their original versions, for example, but are thoroughly transformed by other processes at work.) Indeed, here in this category, for the first time in the topology, the notion of *grouping ambiguity* emerges. In categories A through F cycles exert control over section boundaries, and while they may have irregular internal structure there can never be doubt about where they start and stop. Their complete absence in this category means there can be many ways to interpret groups' beginning and ending points, especially in terms of how they link hierarchically at several levels of periodicity. In Benjamin's analysis especially the notion of *elision*—the overlapping of one group ending with another's beginning—can render metric periodicities unstable, their identities elusive.

I. OPEN TRANSFORMATIVE: 18. ROEDER (ASWM, CH. 11); 19. WIDDESS  
(ACCSWM, CH. 5).

Here are two kinds of specialized art music in which the gap between how the performer (or composer) and even an acculturated listener perceive the time organization can potentially be large. Both present long-range rhythmic trajectories that are intense and complex to parse in terms of a pulse, except for the dedicated and adept. The general classification scheme I am using hews to experts' perceptions, but this particular music exhibits an especially conceptual relationship between pulsation and rhythm. The music makers are pushing at the limits of what our entrainment capacities allow, and the authors of these chapters try to explain that perspective. But even experienced listeners may not feel the pulsations. So which experts should we heed? Perhaps the more salient factor justifying the chosen position in the topology is the music's complex and nearly unperiodic rhythmic surface, which is apparent to all.

The stark contrast between these two examples softens when viewed from the vantage point of this position in the topology. The Elliott Carter piece analyzed by Roeder is actually notated with straightforward time signatures allowing the performers to coordinate, but the musical patterns presented suggest a much more complex scheme of pulse streams and tempi unrelated by simple ratios. Similarly, sitarist Mukherjee, in Widdess's account, may possibly have referenced an inner pulse. But what most will experience, and what is perhaps intended in both cases, is a rhythm intricate enough to verge on the perceptually unmeasured, and such intricacy's frequent handmaiden, constant transformation. There are nonetheless emphatic articulations in these musics and with these one experiences ruptures among more and less intense qualities of change. Sections arise from the internal logic and shaping of configured patterns and not from any expectation of when changes should occur (except, in the case of the *ālāp*, a cultural understanding that a greater range of pitches will come into play as the music unfolds.)

Roeder's analysis of Carter's tightly scripted music as having eight sections ( $A \rightarrow B \rightarrow \dots H$ ; *ASWM*, pp. 388–390) shows how the varied construction of local climaxes and nadirs defines sectionality in a new way at each moment of articulation. Widdess's figure 5.10 shows the  $A \rightarrow B \rightarrow C$  sectionality emerging from the slow climb through low, middle, and high registers. Without pulse, section junctures are not ambiguous in relationship to any periodic frame, as they were in the previous category—they emerge from the patterning of the configured sounds themselves.

J. "PURE" TRANSFORMATIVE: 20. BUNK (ACCSWM, CH. 6).

As if in the far reaches of the musical cosmos, *Phoneme (3)* evolves continually in a sparse unmeasured rhythm with only local, very approximate repetition of fragments, challenging our capacity to group events and edging provocatively close to a horizon of stasis as a result. Indeed the music's performers describe the stillness they value in it. Throughout, section-like components are articulated with varying degrees of intensity and clarity by ad hoc configurations, each further divided into smaller parts. Part of the delicacy of sectional change comes from the always changing layer formations. At the level of the three large sections identified in the chapter, the flow could be described as  $A \rightarrow B \rightarrow C$ , but with numerous subsections (see Bunk figure 6.2).

\* \* \* \*

The foregoing categorization is incomplete, though hopefully not fatally, and I have been mindful of its limitations. Further into the universe of music than we have been able to go, and beyond that at the borders of music and sound, must lie a range of other temporalities that we cannot name until we have isolated and felt them. Back in the very first sentence I spoke of "all music," aware that *music* is just a word, an evolving construct redefined each time we interact in a state of awareness with sound and time. Sound and our impermanent bodies are the media we have for experiencing time, and in so doing we cannot suppress the mimetic urgency of musical transformation and stasis, with whatever philosophical, aesthetic or spiritual dimensions they may have for the body and soul in one's particular historical or cultural position. Composer François-Bernard Mâche advised me to ask my students to always reflect that every musical utterance is a meditation on death, simply because its time will end. What he slyly didn't say is that each one is a celebration of life, and the varieties of music a catalog of ways to live.



## Related Reading

- Arom, Simha. 1991. *African Polyphony and Polyrhythm: Musical Structure and Methodology*. Cambridge: Cambridge University Press.
- Bar-Yosef, Amatzia. 2007. "A Cross-Cultural Structural Analogy between Pitch and Time Organizations." *Music Perception* 24(3): 265–280.
- Barry, Barbara. 1990. *Musical Time: The Sense of Order*. New York: Pendragon Press.
- Benjamin, William. 1984. "A Theory of Musical Meter." *Music Perception* 1(4): 355–413.
- Clayton, Martin. 1996. "Free Rhythm: Ethnomusicology and the Study of Music without Metre." *Bulletin of the School of Oriental and African Studies* 59(2): 323–332.
- Hasty, Christopher. 1997. *Meter as Rhythm*. New York: Oxford University Press.
- Kramer, Jonathan D. 1988. *The Time of Music: New Meanings, New Temporalities, New Listening Strategies*. New York: Schirmer.
- London, Justin. 2004. *Hearing in Time: Psychological Aspects of Musical Meter*. New York: Oxford University Press.
- Molino, Jean. 2009. *Le Singe Musicien: Essais de Sémiologie et d'anthropologie de la Musique*. Paris: Broché.
- Nettl, Bruno. 2001. "Music." In *Grove Music Online*. *Oxford Music Online*, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/40476> (accessed November 24, 2010).
- Parncutt, Richard. 1994. "A Perceptual Model of Pulse Salience and Metrical Accent in Musical Rhythms." *Music Perception* 11(4): 409–464.
- Pressing, Jeff. 1993. "Relations Between Musical and Scientific Properties of Time." *Contemporary Music Review* 7(2): 105–122.
- Rahn, John. 1993. "Repetition." *Contemporary Music Review* 7(2): 49–57.
- Rowell, Lewis. 1992. *Music and Musical Thought in Early India*. Chicago: University of Chicago Press.
- . 1983. *Thinking About Music: An Introduction to the Philosophy of Music*. Amherst: University of Massachusetts.
- Temperley, David. 2001. *The Cognition of Basic Musical Structures*. Cambridge, MA: MIT Press.
- Tenzer, Michael. 2011. "Generalized Representations of Musical Time and Periodic Structures." *Ethnomusicology* 55/3: 369–386.
- . 2000. *Gamelan Gong Kebyar: The Art of 20th Century Balinese Music*. Chicago: University of Chicago Press.
- Tenzer, Michael, ed. 2006. *Analytical Studies in World Music*. New York: Oxford University Press.
- Zuckermandl, Victor. 1956. *Sound and Symbol: Music and the External World*. Trans. Willard R. Trask. New York: Pantheon Books.