Rhythmic Elasticity and Metric Transformation in Tunisian *Ṣṭambēlī*

Richard C. Jankowsky

The study of musical microtiming, that is, the analysis of the actual durations of rhythmic events in performance, has gained considerable momentum over the past decade.[1] Of particular interest to scholars working among a diversity of global musical traditions has been the issue of non-isochronous beat subdivision. This issue has brought music theorists and ethnomusicologists into productive discussion and has produced a corpus of case studies ranging from jazz (Benadon 2006), Viennese waltz (Gabrielsson, Bengtsson, and Gabrielsson 1983), and Scandinavian dance music (Kvifte 2007) to Brazilian samba (Gerischer 2006), Baluchi folk music (During 1997), and Malian jembe drumming (Polak 2010). These case studies put considerable pressure on the widespread assumption that an isochronous "common fast pulse" must serve as the lowest metric referent level (see Kvifte 2007). As the data on rhythmic timing accumulates, it is becoming clear that many styles of music around the world rely on rhythmic structures that do not subdivide the beat into nominally equidistant pulses. Rather, they are based on timing patterns that, although structurally consistent, are not reducible to rational binary and ternary subdivisions. Rainer Polak's (2010) quantitative study of Malian jembe rhythms, for instance, shows that jembe timing patterns do not conform to the kind of isochronous beat subdivisions advanced by much of the literature on West African meter.

[1] An earlier, condensed version of this article was presented at the conference "Musical Metre in Comparative Perspective," April 4–6, 2013, in Köln, Germany. I would like to thank Rainer Polak and Richard Cohn for their insightful feedback on the written version.

Instead, jembe features several distinct rhythmic "feels" comprised of various combinations of short (S), medium (M), and long (L) pulses (e.g., LSLS, SMLM, SML, LSS). Significantly, Polak shows that these non-isochronous patterns remain consistent over a wide range of tempos. However, applying such a classificatory scheme to other non-isochronous musics can prove challenging when there is a continuous tempo change that gradually alters the relative spacing of subpulses over the course of performance.

In this article, I examine the metric consequences of continuous tempo change on non-isochronous subpulses through an analysis of the rhythmic system of *sṭambēlī*, a trance healing music developed by the sub-Saharan diaspora in Tunisia. For many Tunisians, *sṭambēlī* is marked by a distinct sense of otherness, evident in the sub-Saharan identities of spirits that possess *sṭambēlī* dancers, the enduring presence in some song lyrics of words from Hausa, Songhay, Kanuri, and other African languages, not to mention the sub-Saharan heritage of many *sṭambēlī* musicians. While Tunisians inside and outside the *sṭambēlī* community commonly describe the tradition as "sub-Saharan" (*sūdānī*) and "non-Arab" (*ʿajmī*), it should be emphasized that *sṭambēlī* is not the product of a simple transfer of specific sub-Saharan musical practices to Tunisia. Rather, *sṭambēlī* emerged from the interaction of multiple ritual traditions carried northward across the Sahara Desert over the course of about three hundred years, during which time they consolidated and developed into a distinct musical system with no direct equivalent in sub-Saharan Africa. In the context of Tunisia, *sṭambēlī*'s main instrumentation of the *gumbrī* (three-stringed lute) and *shqāshiq* (handheld iron clappers; see Figure 1), as well as the music's incessant cyclicity, distinctive metallic timbre, and a texture that layers sound over tone, are largely limited to the *sṭambēlī* ritual context and have not been

widely appropriated in other musical domains. The designation of *sṭambēlī* as "sub-Saharan" and "non-Arab," while evoking the distant and complex historical sources of the tradition, also defines the *sṭambēlī* aesthetic in contradistinction to most other Tunisian musics, which largely adhere to Arab modal musical principles.

Figure 1. Photo of *Sṭambēlī* Troupe. Salah Ouergli plays the *gumbrī* (three-stringed lute); *shqāshiq* players (l-r): Belhassen Mihoub, Noureddine Soudani, Amine Ouertani, Lotfi Hamemi.

One of the most prominent components of this *sṭambēlī* aesthetic is its rhythmic-metric system, which has two distinguishing and interrelated features that differentiate it from other Tunisian musics: 1) a metric framework of non-isochronous beat subdivisions, and 2) a gradual and normative rhythmic cycle compression that gradually transforms the non-isochronous beat subdivisions into nearly isochronous ones as the tempo increases. I refer to this simultaneous contraction of the rhythmic cycle and expansion of the relative spacing between rhythmic events as rhythmic elasticity. Each of *sṭambēlī*'s four rhythmic

modes exhibits these features to varying degrees (see Table 1).[2] In what follows, I present a chronometric analysis of each of the four rhythmic modes and propose a set of musical and ritual conditions that contribute to rhythmic elasticity. In doing so, I also suggest that music analysis may open up productive lines of inquiry into sociocultural considerations such as the cultural dynamics of self and other.

Table 1. Overview of the *Sṭambēlī* Rhythmic System

Rhythm	Number of IOIs	Percentage of Songs	Rhythmic Elasticity
Sūdānī	3	43	High
Muthallith	4	31	Moderate
Sʿadāwī	4	15	Low
Bū Sʿadiyya	5	11	Very Low

There is scant scholarly literature on rhythmic elasticity in North Africa. One exception is Bernard Lortat-Jacob's study of the *aḥwash* ceremony of the Berbers from Morocco's High Atlas Mountains. In that context, he argues that through the course of tempo acceleration, the rhythmic cycle compresses, creating a change in meter (Lortat-Jacob 1980, 122).[3] In the context of North Africa, such elasticity appears to be most prominent in musical traditions associated with or influenced by sub-Saharans and

[2] *Sṭambēlī* musicians do not classify rhythmic patterns according to degree of elasticity, nor do they have a vocabulary that identifies or addresses rhythmic elasticity; these are etic distinctions.

[3] Arguing against previous scholarship that interpreted the meter as transforming from 4/4 to 6/8, Lortat-Jacob (1980, 123, fn1) asserts that close listening reveals that the result of this compression is a rhythmic cell that transforms from eight beats (8/8) to seven beats (7/8). He did not employ chronometric analysis, and it is unclear whether the shift is the result of continuous gradual tempo increase. My own spot measurements of the brief audio example he provides suggest that the transformation leads not to 7/8 but rather to a nominally ternary meter pattern with interonset interval ratios of 33:18:15:34. However, without a broader data set and appropriate ethnographic and performative experience of *aḥwash*, I make no definitive claims about the metric transformation Lortat-Jacob describes.

Berbers, that is, in traditions that do not adhere to the rhythmic systems of the more prevalent Arab musical styles, whose beats are conceptualized as divisible into equal durations. More research is needed to assess how widespread this phenomenon is, both in the context of North Africa and among the sub-Saharan spirit possession musics that are among *sṭambēlī*'s precursors.

OVERVIEW AND METHODOLOGY

One of the most immediately striking features of *sṭambēlī* is the incessant, prominent sound of the *shqāshiq*, which play a short, indivisible, continuously repeating rhythmic pattern throughout the entirety of every song in the repertoire. Each song uses only one of the four *sṭambēlī* cyclic patterns, which consist of three, four, or five attacks. Although each rhythm feels distinctive, all four rhythms feature a long articulation (attack 1, or A1) that is followed by a shorter, slightly accented one (A2). This accent has three dimensions. First, it is sometimes rhythmically agogic: by virtue of its exposure due to its placement within the cyclic pattern, it may be perceived as more pronounced. Second, it is also the attack that aligns with the common practice of the *shqāshiq* players repeatedly extending their arms toward the dancer, thus creating accentuation via physical proximity from the dancer's perspective. Third, it is the only onset that may be articulated by striking the domes of the *shqāshiq* together, which creates a noticeable dynamic and timbral accentuation.

There are no terms in musicians' discourse that reveal a sense of downbeat. However, the long A1 that precedes the shorter A2 reliably serves as a musical and

corporeal point of arrival: the most forceful and repetitive dance steps and downward bodily motions of trancers consistently emphasize this attack.

The sense of arrival is reinforced by the strong sense of tonicity in the melodies of the vocals and *gumbrī*, the three-stringed bass-register lute that is said to "speak to the spirits." Vamps on, and tonal resolutions to, the lowest open string (which for the sake of convenience I refer to as the tonic) establish a strong tonal reference. Moreover, *sṭambēlī* melodies adhere to a hemitonic pentatonic modal structure that often features a descending minor second leading to a tonic arrival on A1, which is often reinforced by striking an open string that sounds an octave above the tonic.

The rhythmic analysis pursued below should not be construed as limiting the perceptual possibilities of this music. Indeed, *sṭambēlī*'s pentatonicism capitalizes on the potential equivocality of intervals of fourths and fifths, and A2 may rival A1 as a metric anchor, especially at fast tempos and for listeners situated outside the circle of musicians and dancers (for whom the gumbri is less audible), potentially producing multiple perceptual possibilities that may be magnified or transformed during the course of performance.

The musical analysis that follows is based on recordings from three possession healing ceremonies performed by the same troupe within a four-week span in April and May 2009. The troupe consisted of Salah Ouergli on *gumbrī* and vocals, and Belhassan Mihoub, Noureddine Soudani, and Noureddine Jouini on *shqāshiq* and vocals. On one occasion Amine Ouertani joined the group on *shqāshiq* and Noureddine Jouini was replaced by Lotfi Hamemi. There are only about five *sṭambēlī* troupes in the greater Tunis area today, and many *shqāshiq* players perform with several troupes. This troupe is the

successor to that led by Bābā Majīd Barnāwī, the late leader of the troupe of Dār Bārnū, the last remaining "communal house" in Tunis where members of the sub-Saharan diaspora gathered for ritual and social activities. Dār Bārnū produced a wide constellation of musicians active in the *sṭambēlī* scene. My extensive experience studying at Dār Bārnū under Bābā Majīd and my previous analyses of his performances give me confidence in presenting the timing patterns and ritual structures described here as representative of the influential Dār Bārnū tradition. However, I do not claim that they are necessarily representative of all *sṭambēlī* troupes in Tunis, though my limited experience among other troupes suggests that, at the very least, the general principles of temporal transformation apply broadly.

Recordings were made on a Fostex FR-2 hard disk field recorder with an Audio-Technica AT825 stereo microphone. The microphone was positioned immediately in front of the *gumbrī*, and thus flanked by *shqāshiq* on either side, to approximate the location and listening experience of the dancer, who is the main object of musical activity. I selected representative songs in each of the four *sṭambēlī* rhythmic modes that were performed, unless otherwise indicated, in each of the three ceremonies. Using the waveform display of Peak Pro 5.2 software, I identified and manually marked each rhythmic articulation, calculating the IOIs (interonset intervals: the distances between successive rhythmic events) for the rhythmic patterns at the beginning, middle, and end of each of the three versions of the song. I measured twenty-seven rhythmic cycles per example, which were averaged and presented as ratios representing relative percentages of the rhythmic cycle (e.g., in a three-stroke rhythm, IOI1:IOI2:IOI3 = 100).

I should note that while these numbers give the impression of measured exactitude, ambiguities sometimes arose in the identification of the onset of sonic events, especially in cases where the *gumbrī* slightly anticipated the *shqāshiq* and its waveform enshrouded that of the *shqāshiq*. On occasion, there were slight temporal gaps between *shqāshiq* players recorded on the right and left channels, requiring compromises (e.g., situating a marker between them) or decisions to be made regarding which one constituted the main attack. Moreover, *shqāshiq* articulations are not crisp, staccato events but rather are inherently (and deliberately) dense, overlapping, and expansive. Proper *shqāshiq* technique demands that the metal plates do not line up exactly, which would trap air and produce a muffled sound. Rather, they are played slightly askew and with the inside edges of the pair (i.e., those closest to the palm) closing just before those on the outside. That at least three musicians each play two pairs of *shqāshiq* in unison magnifies the envelope of sound produced by the instrument. However, the sheer aural dominance and incessant regularity of the *shqāshiq* made it possible to identify their onset peaks with some confidence, and close listening, informed by participatory ethnographic experience and facilitated by the technological capacity to slow down and loop difficult passages, enabled me to fine tune each marker location. Thus, despite the trappings of computer-aided analysis, the act of measuring and analyzing IOIs was both painstaking and subjective. At any rate, what interests me most are not the exact measurements per se, but rather the transformational contours they reveal when viewed from the perspective of the entirety of the performance, as a gradual yet often substantial increase in tempo has taken place. These increases in tempo are neither disjointed, abrupt jumps nor fully continuous gradual transformations occurring in equal increments over time. Typically, songs begin

Figure 2. Tempo Graph of *Sūdānī* Rhythm

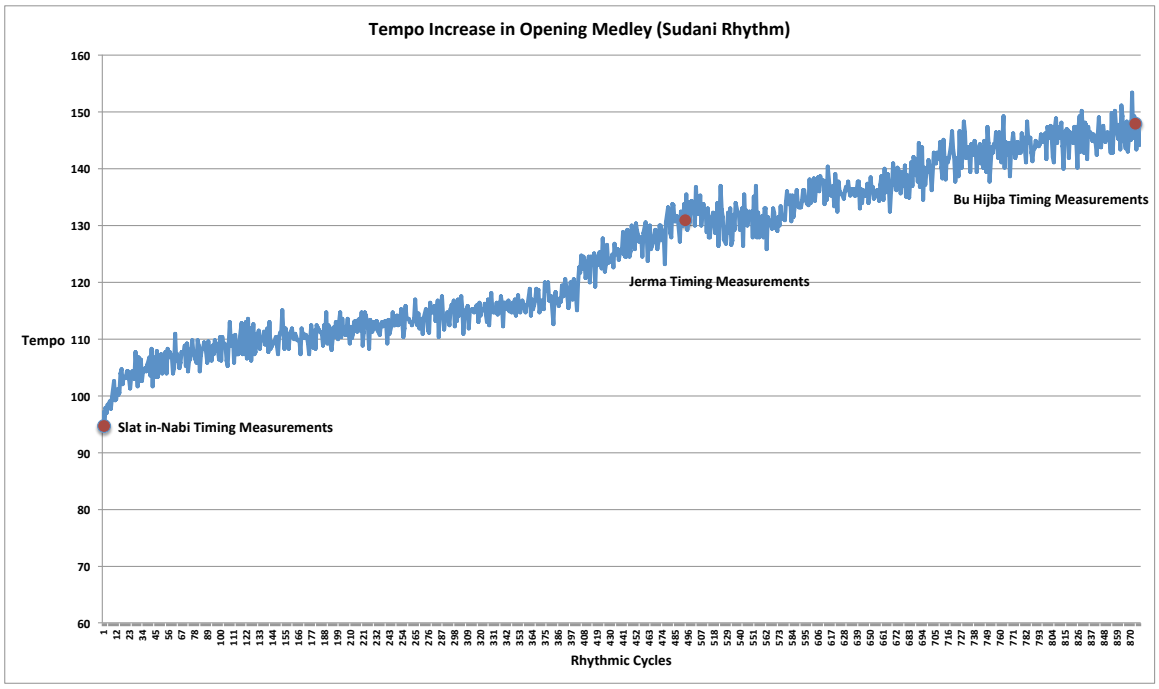
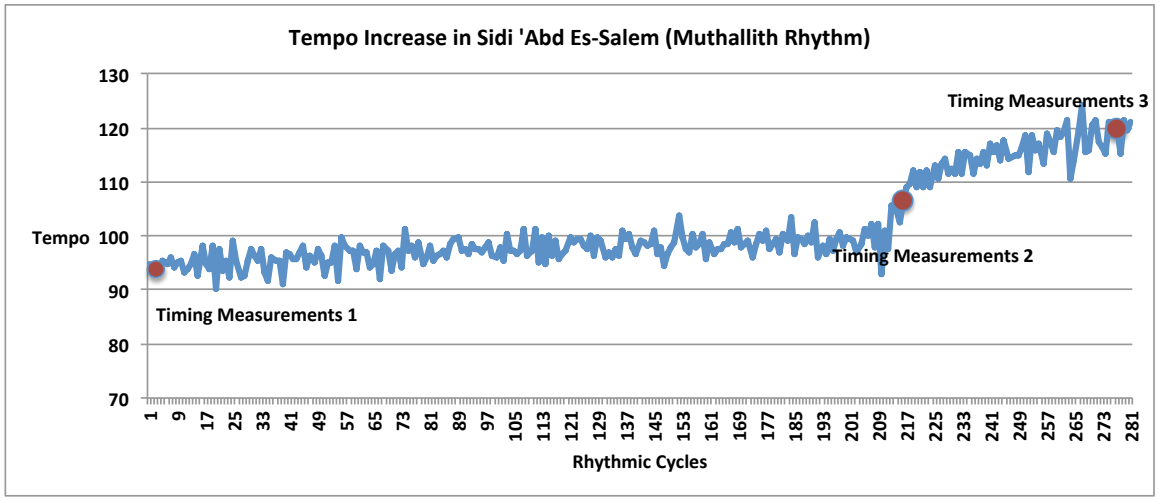


Figure 3. Tempo Graph of *Muthallith* Rhythm



with vocal sections that are plateaus of relative stability that undergo very gradual increases in tempo, while subsequent vocal or instrumental sections, and the transitions between them, exhibit more marked, yet still gradual, tempo increases. Figures 2 and 3

above illustrate the tempo increases for the two songs analyzed in the following two sections; the red dots indicate the temporal location of the rhythmic cycles that were measured and subjected to chronometric analysis below.

RHYTHM 1: *SŪDĀNĪ*

Sūdānī (lit. "sub-Saharan") is the most prevalent *sṭambēlī* rhythm. It consists of a three-stroke rhythmic pattern that exhibits the most elasticity of the four *sṭambēlī* rhythms. This aesthetic is firmly established at the beginning of every *sṭambēlī* ceremony, as it is the rhythm of the opening piece, a medley of three songs joined together seamlessly. The first song is *Ṣlāt in-Nabī*, or "Prophet's Prayer," a praise song to the Prophet Muḥammed. Immediately following it, without stopping, is *Jerma*, a song in praise of Bilāl, a man of African heritage who was one of the Prophet's companions and the first caller-to-prayer in the history of Islam. This song is followed—again, without stopping—by *Bū Ḥijba*, a song in praise of a Tunisian Muslim saint of that name. These songs are never performed independently of each other. In being chained together, the three songs function rhythmically like a single, long song analogous to any of the "stand-alone" songs for the saints analyzed below.

Measurements of the rhythmic patterns performed at the beginning of *Ṣlāt in-Nabī* (Audio Example 1. *Ṣlāt in-Nabī*, beginning)[4] reveal an average IOI ratio of 44:18:38 and an initial tempo of 96 rhythmic cycles per minute[5] (cpm) for the three performances of the

[4] Because the rhythmic and tempo measurements I present are the *averages* culled from three performances of the same song, those numbers may differ slightly from the values of the single audio example chosen to illustrate each case.

[5] I adopt the terminology "cycles per minute" instead of the more common "beats per minute" in order to preserve the entire rhythmic cycle as the unit of analysis. This is necessary to avoid potential confusion

song under analysis here.[6] That is, the space between the first and second attacks takes up 44 percent of the cycle, the space between the second and third attacks takes up 18 percent of the cycle, and the space between the third attack and the first attack of the following cycle is 38 percent.

Because the rhythmic cycle is not divided into equidistant underlying pulses, it defies unequivocal representation in conventional metric terms that rely on duple or triple subdivisions. The second attack (A2) of the cycle does not fall close enough to a hypothetical ternary (around the 33.3 percent mark) or binary (either 50 percent to equally divide the cycle, or 37.5 percent if represented as the fourth sixteenth note) subdivision to assign it to one or the other (see Figure 4 below). Significantly, A2 is consistently less than 70 milliseconds away from the nearest hypothetical binary or ternary subdivisions. The result is that listeners accustomed to hearing isochronous subdivisions might cognitively adjust the pulse, interpreting it as falling on one or the other subdivision. A3, on average, takes up the last 38 percent of the cycle; it too falls in between hypothetical binary and ternary subdivisions.

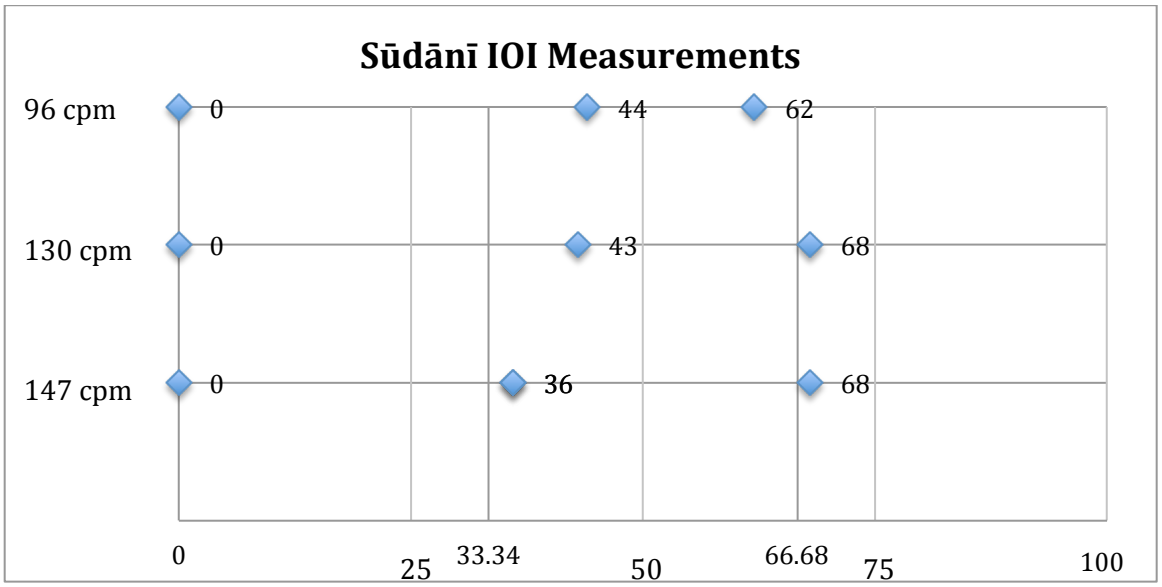
As *Ṣlāt in-Nabī* ends and the next song, *Jerma*, begins, the average tempo has reached 130 cpm and the rhythmic cycle IOI ratios have transformed from 44:18:38 to 43:25:32 (Audio Example 2. *Jerma*, beginning).[7] With higher standard deviations than those of the ratios of *Ṣlāt in-Nabī* and *Bū Ḥijba*, the actual measurements at this point are the most prone to variation, as this stage of the song is situated in between the relative

caused by rhythmic cycles, such as *muthallith* and *bū sʿadiyya*, which may be perceived as having two "beats," especially at slower tempos.

[6] The standard deviations of the mean values 44:18:38 are 1.5:1.9:1.7. Standard deviations indicate how close the set of individual values are to the mean. Higher standard deviations indicate more variability among measurements, while lower standard deviations indicate more uniformity.

[7] The standard deviations of the mean values 43:35:32 are 2.3:2.1:1.6.

Figure 4. Transformation of IOI timing patterns in *sūdānī* rhythm. The *y* axis represents tempo, while the *x* axis indicates the percentile point of the cycle at which sonic events occur (with hypothetical binary and ternary subdivisions).



stability of both the song's initial rhythmic pattern and the eventual final pattern. When that final pattern occurs (at the end of *Bū Ḥijba*—that is, by the end of this "chain" of songs), the tempo reaches 147 cpm and the average IOI ratio has transformed further to 36:32:32, almost equidistant but maintaining a slightly elongated first IOI (Audio Example 3. *Bū Ḥijba*, end).[8]

Taken together, these IOI ratios reveal a rhythmic cycle undergoing a process of temporal compression and a transition from non-isochronous to nearly isochronous timing patterns, from:

44:18:38 to
43:25:32 to
36:32:32.

[8] The standard deviations of the mean values 36:32:32 are 1.1:1.3:1.2.

Taking each IOI individually, A1 and A3 decrease (44 to 43 to 36 and 38 to 32 to 32, respectively) while A2 increases (18 to 25 to 32). Figure 4 provides a graphic illustration of this transformation (note that the plot values in the graph are not IOI ratios but are rather the *x*-axis locations at which the sonic events occur). Even though the relative temporal spacing between rhythmic attacks changes as the tempo increases, it is still considered the "same" rhythm. Put somewhat differently, the concept of the *sūdānī* rhythm includes, and is indeed defined by, this transformational potential. Yet these are gradual transitions. They do not just "switch" the feel; for much of the song the rhythm is in-between those two ends of the spectrum, hinting at both.

These non-isochronous subdivisions are too uneven and too unstable over time to assign a single (even non-isochronous) meter. The *sūdānī* rhythmic cycle cannot be accurately or consistently divided into halves or thirds. Even if we posited that the initial *sūdānī* pattern was nominally binary, and that "expressive timing" explained the 44 percent initial IOI, this interpretation no longer holds true by the end of the song. And even if we allowed that, at the end of the song, the meter had shifted to a ternary subdivision, we would still be hard pressed to account for the middle of the performance, when the feel is between these two extremes. In the context of a continuous tempo increase, it is impossible to locate a specific point at which this supposed metric shift occurs. This normative transformational process, as well as its non-isochronous timing patterns, poses a substantial challenge to representing songs in the *sūdānī* rhythm in staff notation, and points to the need for alternative forms of metric categorization and representation, a point to which I shall return.

RHYTHM 2: *MUTHALLITH*

A similar, though less drastic, compression of the rhythmic cell occurs in songs employing the rhythmic pattern called *muthallith*. This example is a song in honor of the Muslim saint named Sīdī ʿAbd es-Salēm. Figure 3 (above) illustrates the tempo trajectory in a relatively short (2' 49") performance of this song. Over the course of the first 214 cycles of the song, the tempo increases gradually from 94 to 100 cpm. Then, as the song transitions to the second and final section of vocals, the rate of acceleration increases so that the tempo speeds up from ca. 100 to 121 cpm during the remaining sixty-six cycles.

At the beginning of the song, the average IOI ratio is 33:15:24:28 (Audio Example 4. *Sīdī ʿAbd es-Salēm*, beginning).[9] This pattern eludes definitive representation in either fully binary or ternary subdivisions, as the contours do not approximate those of the hypothetical 37.5-12.5-25-25 or 33.3-16.7-16.7-33.3 ratios of binary or ternary subdivisions, respectively. Instead, it could be construed as approximating a combination of both: the first half of the cell is closer to the ternary subdivision measurements while the second half of the cell approaches the binary subdivision measurements (see Figure 5).

After the gradual acceleration during the main vocal section of the song, the rate of acceleration increases markedly (see Figure 3 above); during this transition to the second vocal section, the tempo reaches ca. 110 cpm and the average IOI ratio transforms to 31:19:23:27 (Audio Example 5. *Sīdī ʿAbd es-Salēm*, middle).[10] By the end of the song, the tempo has reached an average of 121 cpm and the average IOI ratio has transformed further to 30:22:22:26 (Audio Example 6. *Sīdī ʿAbd es-Salēm*, end).[11]

[9] The standard deviations of the mean values 33:15:24:28 are 1.4:1.7:1.4:1.0.
[10] The standard deviations of the mean values 31:19:23:27 are 1.2:1.2:1.2:1.0.
[11] The standard deviations of the mean values 30:22:22:26 are 1.2:1.5:1.2:1.2.

The total transformation is thus from:

33:15:24:27 to
31:19:23:27 to
30:22:22:26.

The IOIs of A1, A3, and A4 decrease slightly while A2 increases substantially, in a manner similar to the transformational contour of the *sūdānī* rhythm. Like those in the *sūdānī* example, the rhythmic events in this song have undergone a marked but incomplete transformation such that they are spaced further apart and more equally so relative to the starting pattern. In both cases, the rhythmic trajectory is toward relative evenness while maintaining a longer A1 (see Figure 5).

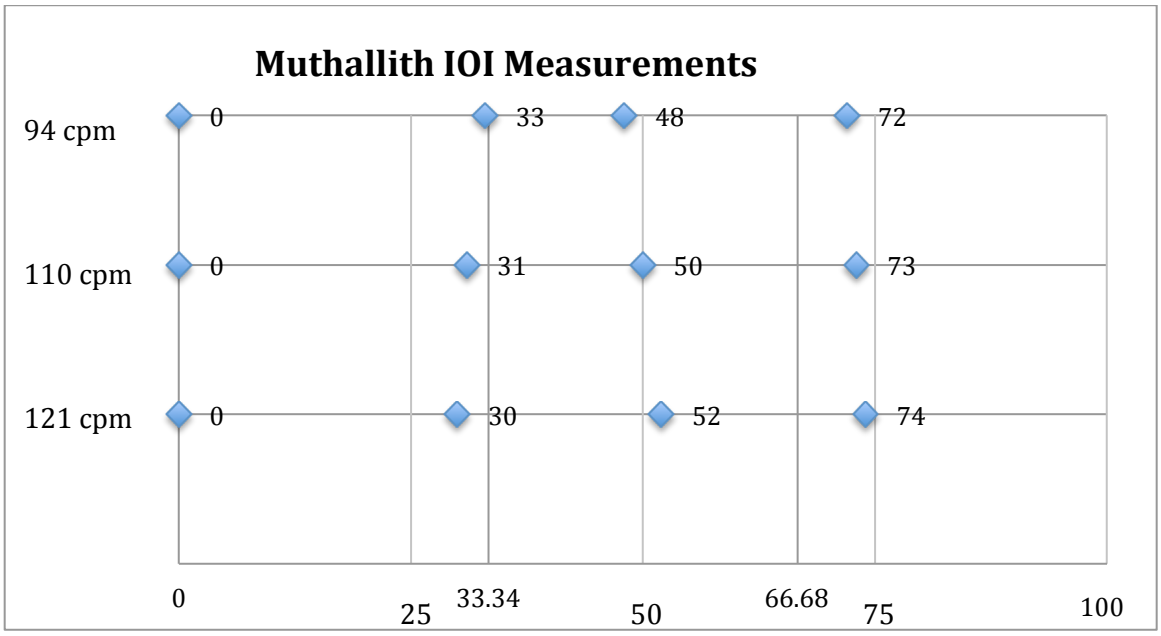
Songs in the *sūdānī* and *muthallith* rhythms comprise 74 percent of the *sṭambēlī* repertoire. Thus, this rhythmic elasticity is a fundamental feature of the *sṭambēlī* aesthetic experience. The remaining songs employ two rhythms that exhibit significantly less rhythmic elasticity, but have other distinguishing rhythmic dynamics.

RHYTHM 3: *SʿADĀWĪ*

The *sʿadāwī* rhythm, like *muthallith*, is a four-note pattern. In the three performances of the song for the saint Sīdī ʿAbd el-Qāder, at an initial tempo of 80–85 cpm, the average IOI ratios are 31:16:22:30 (Audio Example 7. *Sīdī ʿAbd el-Qāder*, beginning).[12] While these microrhythmic measurements are similar to those of *muthallith* at medium tempo, they differ in that the first and last IOIs (i.e., those of A1 and A4) of the *sʿadāwī* rhythmic cycle tend to be identical or nearly the same, such that the rhythm

[12] The standard deviations of the mean values 31:16:22:30 are 1.3:1.3:1.7:1.2.

Figure 5. Transformation of IOI timing patterns in *muthallith* rhythm. The *y* axis represents tempo, the *x* axis indicates the percentage of the cycle at which sonic events occur (with hypothetical binary and ternary subdivisions).



approaches a Long- Short-Short-Long symmetry. Songs in the *sʿadāwī* rhythm also tend to be markedly slower than those in *muthallith* and the tempo is more stable. *Shqāshiq* players will also often play a variation that emphasizes a ternary feel by accenting A1, A2, and A4. These factors contribute to the distinct hemiola-like feel of the rhythm. Indeed, *sʿadāwī*, unlike other *sṭambēlī* rhythms, shares its name with another Tunisian rhythm, a 12/8 rhythmic pattern most commonly heard in *mizwid* music,[13] which capitalizes on the simultaneity of binary and ternary subdivisions.

Toward the end of the song, at an average tempo of nearly 100 cpm, the average IOI ratios have transformed only slightly to 31:18:22:29 (Audio Example 8. *Sīdī ʿAbd el-*

[13] *Mizwid* is a Tunisian urban popular music named after its signature instrument, the double-reed bagpipe.

Qāder, end).[14] Only one of the three recorded versions of this song accelerated further; it is a relatively long performance (over seven minutes long), and it reaches a tempo of 110 cpm (Audio Example 9. *Sīdī ʿAbd el-Qāder*, fastest). The timing ratios transform to an average of 30:20:21:29,[15] bringing it closer to the average ratios for the *muthallith* rhythm at high tempo reported above (i.e., 30:22:22:26). The result is a transformation from:

31:16:22:30 to
31:18:22:29 to
30:20:21:29.

Like the *sūdānī* and *muthallith* ratios, the most marked transformation in this rhythmic pattern occurs in A2. However, the difference between the upper and lower range of A2 is only four percentage points, while A1, A3, and A4 decline by only a single percentage point. Thus, *sʿadāwī* exhibits a low degree of rhythmic elasticity, due to its relative stability; moreover, when its IOI ratios do transform at higher tempos, they become nearly indistinguishable from those of the *muthallith* rhythm.

RHYTHM 4: *BŪ SʿADIYYA*

The five-note pattern called *bū sʿadiyya* is distinctive not only in its relative metric clarity and lack of elasticity, but also because it is associated with—and named after—a song in the *sṭambēlī* tradition that is *not* expected to produce trance: it is the masked dance of *Bū Sʿadiyya*, the legendary "first musician" of *sṭambēlī*. It is also the main rhythm that is used for songs to local Tunisian saints that were recently (most likely in the early and mid-twentieth century) introduced into the *sṭambēlī* pantheon, such as the songs for Sīdī Belḥassen or Sayda Manūbiyya, which do engender trance. The lyrics and vocal melodies

[14] The standard deviations of the mean values 31:18:22:29 are 1.4:1.6:1.4:0.9.
[15] The standard deviations of the mean values 30:20:21:29 are 1.8:1.8:1.2:0.9.

for these songs are often taken from or closely related to their counterparts in another tradition; in this case, they are adopted from a *madḥ*, a genre of folk song praising a saint. Such songs are usually performed toward the end of a *sṭambēlī* ceremony; they fall outside the ritual structural dichotomy of saints and spirits (see next section). Importantly, these songs invite the participation of non-initiates in *sṭambēlī* ceremonies. Many women outside the *sṭambēlī* community know of, have heard, or have danced to songs for Sayda Manūbiyya at one of her two shrines in the greater Tunis area, and the song for Sīdī Belḥassen, perhaps the most famous praise song for a saint in the country, is familiar to Tunisians regardless of their participation in saint veneration traditions. Indeed, these songs are often performed for dancers who have experience in other Tunisian ritual trance practices. Significantly, the rhythmic systems of these other traditions, like the *bū sʿadiyya* rhythmic mode itself, do not feature the kind of rhythmic elasticity that characterizes the other *sṭambēlī* rhythmic modes.

This song for Sīdī Belḥassen was performed at only two of the three ceremonies considered here. It is the only song for the saints performed at any of these ceremonies that uses the *bū sʿadiyya* rhythmic mode. At the beginning of the song, at a tempo of 65–69 cpm, the IOI ratio is 31:18:15:16:20 (Audio Example 10. *Sīdī Belḥassen*, beginning).[16] Both performances last just over four minutes and undergo a modest increase in tempo, to 71–75 cpm, and exhibit a very slight transformation of IOIs to 32:17:16:16:19 (Audio Example 11. *Sīdī Belḥassen*, end).[17] No IOI ratio changed by more than one percentage point, making this the most stable rhythmic pattern in the *sṭambēlī* system.

[16] The standard deviations of the mean values 31:18:15:16:20 are 1.1:1.4:1.4:1.1:1.3.
[17] The standard deviations of the mean values 32:17:16:16:19 are 1.6:1.1:0.9:1.6:1.6.

SONG TYPE, DURATION, AND DEGREE OF TRANSFORMATION

Trance dancing is the final stage of an elaborate process of diagnosis and treatment for affliction by one of the unseen beings of the *sṭambēlī* pantheon. The goal of the trance is to placate the saint or spirit by giving him or her the rare opportunity to descend into the world of humans, take control of a human body, and engage in the pleasures of listening to music and dancing. The act of yielding one's body to a possessing entity for trance dance is considered an offering on the part of the dancer, one that is expected to please the spirit enough that he or she will leave the dancer in peace for the remainder of the year (*sṭambēlī* healing ceremonies are meant to be repeated annually).

Sṭambēlī ritual performances are roughly divided into two parts: songs for the saints (also called the whites) and songs for the spirits (also called the blacks).[18] Every saint and every spirit has his or her own eponymous song. Thus far, all the songs discussed and analyzed in this article have been songs from the first half of a *sṭambēlī* ceremony, that is, songs for the saints. The saints were once living beings identified as having a divine blessing (*baraka*) and, after their death, as having the power to intercede in people's lives. Those who trance to songs for the saints generally dance to only one, or sometimes two, songs. This kind of trance is called *jedba* (lit. "attraction"), a state of altered being in which the saint is said to take the trancer away from her own body. *Jedba* dance movements tend to involve continual, forceful up and down bends at the waist that intensify along with the music. The goal of each song is to bring the trance to its climax,

[18] This white/black dichotomy is common to many African spirit possession traditions and, despite the racial discourse that sometimes surrounds *sṭambēlī*, should not be construed as reflecting racial categories (see Jankowsky 2010, chapter 3).

culminating in the therapeutic fainting of the dancer. Thus, these songs are played for a relatively long time and undergo substantial, if gradual, increases in tempo.

Songs for the spirits, in contrast, are more rigidly connected together within longer "chains" (*silsilāt*; sing. *silsila*) of songs and tend to be shorter.[19] The spirits, unlike the saints, were never living beings and were brought to Tunisia from sub-Saharan Africa. The trance state is not *jedba*, but rather spirit possession. Possession involves a spirit entering and taking over the body of the dancer. Each dancer becomes possessed by numerous spirits of the same family in succession. Each spirit has his or her specific dance movements. Because there is a hierarchy within each spirit family, the songs for the most powerful spirits tend to be longer in duration than those for the less powerful spirits. Moreover, the transition from one spirit's song to the next sometimes involves an abrupt change in rhythm. Even when two successive songs are in the same rhythm, there may be an interruption as the *shqāshiq* stop while the *gumbrī* sets a new (usually slower) tempo for the second song. The goal, therefore, is not to produce a long, sustained, gradually intensifying trance, performed to a single rhythmic mode, as is the case for songs for the saints. Rather, the goal is to bring the dancer through successive possessions by numerous spirits, which typically involves spirit-specific dance movements and multiple changes in rhythmic mode.

What are the implications for rhythmic elasticity in the context of these shorter songs? A brief analysis of the songs for the spirit family Bānū Kūrī is illustrative (see

[19] The average duration for a song for a spirit is just over half of that for a saint: the average length of the thirty-two songs for saints recorded during these ceremonies was about four minutes, while the average of the fifty-four songs for the spirits was two minutes fifteen seconds.

Table 2. Songs for the Banu Kuri Spirits

Song	Rhythm	Duration	Tempo (initial/end)	IOI Ratio (initial/end)
Kūrī	*Sūdānī*	4' 28"	131/156	41:25:34/36:32:32
Migzu	*Sūdānī*	0' 46"	134/149	40:26:34/37:31:32
Jamarkay	*Muthallith*	0' 58"	99/100	33:17:22:28/31:18:22:29
Baba Magojay	*Muthallith*	1' 35"	106/125	31:18:22:29/28:23:23:26
Danilya	*Sūdānī*	0' 54"	131/139	41:23:36/35:32:33

Table 2).[20] In this chain of songs, the head of the family, Kūrī, has a song in the *sūdānī* rhythm that lasts 4' 28". At a tempo of 131 cpm, the average IOI ratio at the beginning of the song is 41:25:34 (Audio Example 12. *Kūrī,* beginning).[21] By the end of the performance, at a tempo of 156 cpm, the ratios have transformed to 36:32:32 (Audio Example 13. *Kūrī*, end).[22] At the end of the song, the *shqāshiq* players pause briefly as the *gumbrī* signals the next song, for the spirit Migzu. While this song is also in the *sūdānī* rhythm, the tempo has been "reset" back to 134, and the IOI ratio has reverted to 40:26:34 (Audio Example 14. *Migzu,* beginning).[23] Just forty seconds later, the song ends with the tempo reaching 149 cpm and the IOI ratio transforming to 37:31:32 (Audio Example 15. *Migzu*, end).[24]

Immediately thereafter, the song for Jamarkay begins. The *gumbrī* introduces the melody as the *shqāshiq* players pause before commencing the *muthallith* rhythm, with an initial IOI of 33:17:22:28 at a tempo of 99 cpm (Audio Example 16. *Jamarkay,* beginning).[25] Fifty-five seconds later the song ends with a very slight increase in tempo

[20] This series of songs was only performed at one ceremony; thus, the ratios presented here represent only a single performance.
[21] The standard deviations of the mean values 41:25:34 are 1.5:1.8:2.0.
[22] The standard deviations of the mean values 36:32:32 are 1.2:1.1:1.1.
[23] The standard deviations of the mean values 40:26:34 are 1.4:1.0:1.2.
[24] The standard deviations of the mean values 37:31:32 are 2.6:1.8:2.0.
[25] The standard deviations of the mean values 33:17:22:28 are 1.7:1.5:0.6:1.5.

(to 100 cpm) and a modest transformation in IOI ratio to 31:18:22:29;[26] the *muthallith* rhythm continues as the following song, *Baba Magojay*, begins, marked by a small step up in tempo to 106 cpm (Audio Example 17. End of *Jamarkay* and beginning of *Baba Magojay*). After 1' 35", at an ending tempo of 125 cpm, the IOI ratio has transformed to 28:23:23:26 (Audio Example 18. *Baba Magojay*, end).[27] The final song in this chain, *Danilya*, begins with an abrupt return to the *sūdānī* rhythm. *Danilya* begins at 131 cpm with an IOI ratio of 41:23:36 (Audio Example 19. *Danilya*, beginning).[28] and transforms to 41:27:32 as the tempo increases to 139 cpm;[29] the average IOI ratio reaches its maximum level of evenness during the final six cycles, at 35:32:33 despite virtually no further increase in tempo (Audio Example 20. *Danilya*, end).[30] That these final two average ratios differ at the same tempo suggest that, although there is a strong correlation between tempo and IOI ratio, the relationship is not necessarily proportional. Contextual factors, such as the musicians' realization that the song—and in this case, the entire chain of songs—is nearing the end, may also play a role in the final, if brief, adoption of maximally even timing patterns.

The two shortest songs, *Migzu* and *Jamarkay*, reveal that song duration is less significant than tempo change in determining the degree of rhythmic elasticity of a given song, and that substantial tempo increase can take place within a relatively short period of time. *Migzu* exhibits considerable rhythmic elasticity relative to its short duration, while *Jamarkay* undergoes very little change. However, *Jamarkay*'s location within the chain of songs is important: it precedes the song of *Baba Magojay*, which is in the same rhythmic

[26] The standard deviations of the mean values 31:18:22:29 are 1.1:2.1:1.6:0.5.
[27] The standard deviations of the mean values 28:23:23:26 are 2.2:2.1:2.2:1.1.
[28] The standard deviations of the mean values 41:23:36 are 2.6:3.2:1.4.
[29] The standard deviations of the mean values 41:27:32 are 1.3:2.0:2.2.
[30] The standard deviations of the mean values 35:32:33 are 0.8:1.3:1.3.

mode. Most short songs in the *sūdānī* and *muthallith* rhythms exhibit at least moderate rhythmic cycle compression and rhythmic elasticity unless they precede another song in the same rhythm, in which case the elasticity may be more evident in the successive song. Songs for the spirits, then, do not always undergo the same kind of extended, unidirectional intensification of a single rhythmic mode as exhibited by songs for the saints. But they usually do involve at least one substantial intensification (often to the head of the spirit family) followed by several closely linked, shorter episodes of intensification that involve different rhythms. Trancers, therefore, will inevitably experience this rhythmic elasticity, regardless of whether they dance to songs for the saints or the spirits.

THE REPRESENTATIONAL ISSUE

I have suggested that conventional metric categories, such as those that rely on duple or triple subdivisions, and the standard notation on which they depend are inadequate to the task of characterizing or representing *ṣṭambēlī* rhythmic modes, particularly the *sūdānī* and *muthallith* patterns that account for nearly three-fourths of the *ṣṭambēlī* rhythmic experience in performance. How, then, could we best describe and represent these rhythms, their metric frameworks, and their transformational properties?

Following Bengtsson (1987) and Kvifte (2007), I aver that the ultimate goal of such an undertaking should be to present such rhythmic patterns and metric systems not as deviations from a mechanical or hypothetical norm, but as the norms themselves. A major obstacle to achieving that goal is the current lack of shared vocabulary to describe such norms. Tellef Kvifte (2007) has taken a productive step forward by distinguishing

between categorical and metric timing pattern (MTP) models of meter. Categorical models—i.e., those with which Western music scholars are most familiar—assume a lowest metric level of nominally isochronous pulses and are well suited to representation in time signatures, while MTP models are structured upon a norm of timing patterns that are not necessarily reducible to isochronous pulses and elude consistent categorization into time signatures. This distinction does not solve the problem of representing or categorizing MTP models, however, as Kvifte makes clear. Although the growing body of data indicates that MTP models may be widespread globally, we do not yet have a taxonomy of MTP structures or a common set of terminology to describe them. Instead, the scholarship on timing patterns presents a diversity of genres, each with its own distinguishing structural principles, sometimes described in evocative metaphorical terms such as the "rubber band-like quality" of beat durations in Swedish polska (Johansson 2013) and the "ovoid" character of beat groupings in Baluchi folk music (During 1997). However, it is difficult to discern to what extent these and other MTPs are genre-specific or whether they may be applied productively to other styles of music.

Beyond verbal descriptions associated with genre names, two notable approaches to representing MTPs are visual illustrations and what I refer to as L-S systems. L-S systems apply labels of relative duration, such as Long, Medium, Short, and Flexible, to IOIs (see Polak 2010). Such an approach has the advantage of being clear, intuitive, and potentially applicable cross-culturally. However, the attempt to apply the system to *sṭambēlī* is immediately faced with methodological difficulties. Taking the *sūdānī* IOI ratios as an example, the transition from 44:18:38 to 43:25:32 would be represented as L-S-M to L-S-M; that is, as showing no change. Moreover, the final ratio of 36:32:32

presents the analyst with the problem of needing to choose between a strict application of the system (L-S-S) or a more subjective interpretation (S-S-S) that evokes the broader entropic tendency of this transformation. The L-S system, then, can obscure those rhythmic dynamics that have been emphasized in the present analysis.

Graphic illustrations are perhaps the most evocative and efficient means of presenting MTP models, and constitute the approach championed by Kvifte (2013) and applied by many others. I have provided two calculation-based examples in this article (Figures 4 and 5). I have also created more interpretive visual representations such as Figures 6 and 7 below, which provide alternative graphic illustrations of the *sūdānī* rhythmic transformation.

Figure 6. A visual representation of the metric transformation of the *sūdānī* rhythmic mode.

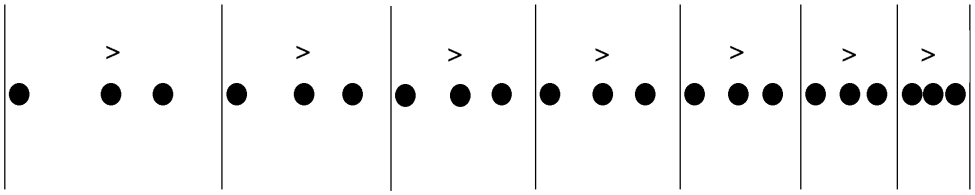
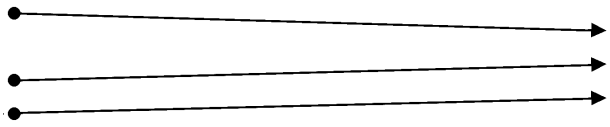


Figure 7. An alternative visual representation of the metric transformation of the *sūdānī* rhythmic mode.



When properly contextualized, such graphic illustrations—even those based on measurements and calculations—are also useful because they can highlight the fact that these timing patterns are concerned with groove and flow rather than strict adherence to

measured precision, or, in Kvifte's (2007, 81) terms, they encourage us to see "the process of entraining to a meter more as a pattern-recognition task than a computational task." At the moment, however, such illustrations remain genre-specific, and the task of globally categorizing MTPs remains unrealized.

ELASTICITY, MULTIDIMENSIONALITY, AND TELEOLOGY

The *sṭambēlī* rhythmic-metric system also adds another dimension to our understanding of "African" rhythm and meter. *Sṭambēlī* rhythmic multidimensionality is of a different order than, say, that of West African musics, such as the Ewe traditions of Ghana. David Locke (2011, 55) has recently theorized Ewe ensemble drumming as characterized by a "simultaneous multidimensionality" in which ternary and quaternary patterns coexist as an "inseparable twinning of two complementary feelings of time." Ewe drumming produces multiple layers of potential metric feels happening at once, with phrases in three and in two that "frequently draw … upon motion toward the resolving, cadential moment when the two streams temporarily coincide" (ibid., 56). For heuristic purposes, if we think of Ewe rhythm as vertical, that is, as simultaneous layers of individual drum ensemble parts fitting within a polyphonic whole, we could describe *sṭambēlī* rhythm, in contrast, as monophonic and horizontal—that is, as single, unison patterns that shift gradually through time, though to differing degrees depending on the rhythm employed and its ritual context.

Several specific conditions for rhythmic elasticity can be drawn from the foregoing discussion. First, there is an inverse correlation between the number of IOIs in a rhythmic pattern and its degree of elasticity: the fewer sonic events there are in a pattern, the more

elasticity it is likely to exhibit. Second, the greater the tempo increases, the greater the elasticity and the closer the pattern will come to reaching a maximally even separation of IOIs. Third, shorter duration does not necessarily equate to less elasticity as long as there is substantial tempo change.

This elasticity takes a very specific, predictable, and goal-directed form: as the rhythmic cycle compresses, the attacks within it gradually spread out, trending toward equidistance. There is thus a musical teleology—the tempo-driven evening out of pulses—that accompanies and facilitates ritual teleology, the intensification of trance to bring it to its therapeutic climax. The experiential force of the *sṭambēlī* rhythmic cycle is not reducible to the process of merely oversaturating the listener with repetition or sensory overload, as is commonly thought of trance musics. Rather, a combination of cyclic repetition and progressive intensification through continuous tempo change and gradual rhythmic transformation towards uniformity are essential structural features of the *sṭambēlī* musical and spiritual experience. The smaller percentage of songs that do not exhibit such elasticity are equally successful in encouraging trance states, but usually involve trancers with prior experience in other Tunisian trance traditions that do not feature such elasticity. Moreover, these less elastic rhythms connect to other domains of Tunisian musical activity, suggesting that *sṭambēlī* not only cultivates rhythmic and metric "otherness," but also creates a space for inclusivity and making connections beyond the ritual to other Tunisian spiritual traditions.

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