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MTO 20.1 Examples: Polak and London, Timing and Meter in Mande Drumming

(Note: audio, video, and other interactive examples are only available online)

<http://www.mtosmt.org/issues/mto.14.20.1/mto.14.20.1.polak-london.php>

Video 1.1. Lansina Diakite Trio plays Ngòn Fariman, a standard piece of the Segu Bambara drumming tradition

[Video Link](#)

Video 2.1. Ngòn masquerade performance in Kirango, Mali. Videographer: Elisabeth den Otter (2006); taken from the DVD *Fête de Circoncision/Fête des Masques Bozo, Kirango (Mali)*

[Video Link](#)

Video 2.2. Jeli Dòn dance performance in Mahina, Mali

[Video Link](#)

Table 2.1. Corpus of analyzed recordings

Piece	Performance	Ensemble	Instrumentation	Performers
Ngòn (Bamana bòn music)	1.1	Drissa Diakite Quartet	1. bòn 2. bòn cunba ngangan	Drissa Diakite Amadou Traole Sidiki Diarra Boukader Coulibaly
	1.2 1.3	Lansina Diakite Quartet & Party	1. bòn 2. bòn cunba ngangan	Lansina Diakite Amadou Traole Sidiki Diarra Boukader Coulibaly
			song and dance	Maisatou Coulibaly, Fatoumata Doumbia, Aminata Diarra, Assitan Keita
	1.4	Lansina Diakite Trio	bòn cunba ngangan	Boukader Coulibaly Lansina Diakite Amadou Traole
	1.5	Lansina Diakite Trio	bòn cunba ngangan	Sidiki Diarra Lansina Diakite Amadou Traole
	1.6	Adama Boare Quartet & Party	1. bòn 2. bòn cunba ngangan	Adama Boare Sajo Diakite Soungalo Tangara Bakary Diakite
song			Assitan Keita, Fatoumata Dogora, Fatoumata Diakite, Aminata Diarra	
dance			Moulay Coulibaly, Sadio Traole, Lansina Diarra, Ousmane Diakite	
Piece	Performance	Ensemble	Role	Performers
Bire (Khasonka dundunba music)	2.1	Koly Sacko Duet	1. dundunba 2. dundunba	Koly Sacko Toutou Sacko
	2.2	Koly Sacko Trio	1. dundunba 2. dundunba jembe	Koly Sacko Toutou Sacko Sambou Kante
	2.3	Toutou Sacko Duet	1. dundunba 2. dundunba	Toutou Sacko Koly Sacko
	2.4	Toutou Sacko Trio	1. dundunba 2. dundunba jembe	Toutou Sacko Koly Sacko Sambou Kante

Figure 2.1. Screenshot of four-track audio of one randomly chosen four-beat cycle containing twelve subdivision elements

Vertical orange-color markers define the onsets of the drum strokes of the bottom track (in blue), which represents the accompaniment part; IOIs between markers are given in milliseconds. A significant non-alignment in the lead drum is circled in red; a flam is circled in black

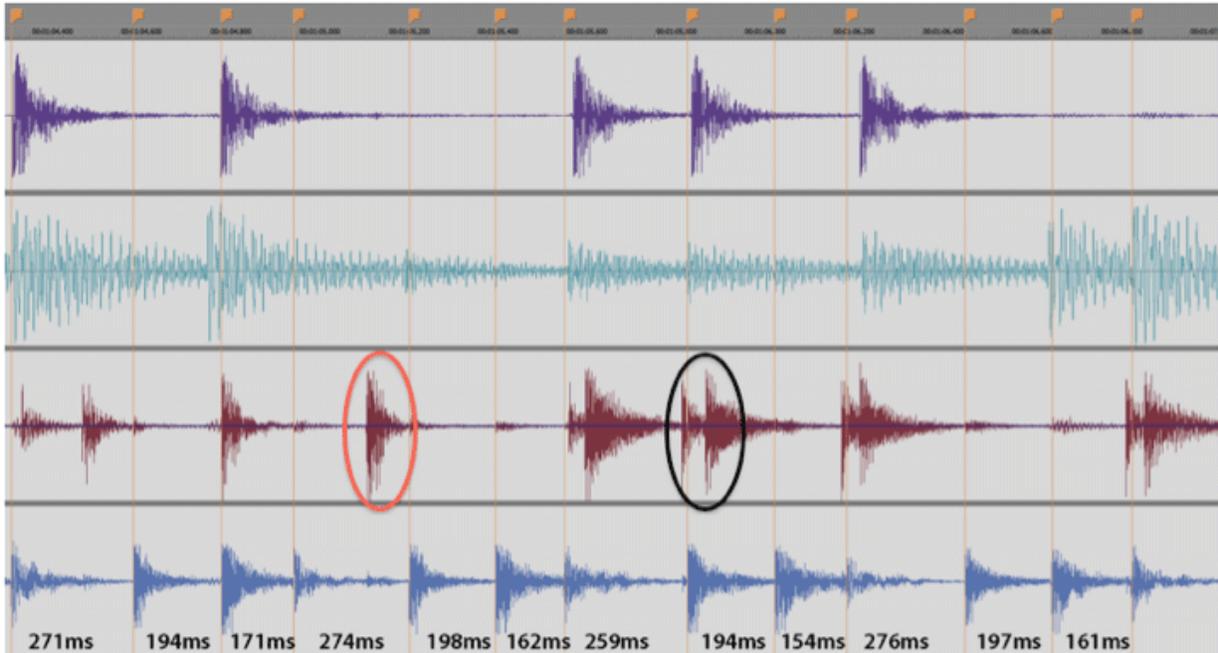


Table 2.2. Beat tempo acceleration in analyzed recordings (in bpm)

Piece	Recording	Beginning of performance	End of performance	Mean tempo	Rate of acceleration (in percent of the original tempo)
Ngôn	1.1	74	132	109	78%
	1.2	76	135	107	78%
	1.3	64	137	94	114%
	1.4	74	147	116	99%
	1.5	73	152	114	108%
	1.6	56	143	106	155%
Bire	2.1	84	128	118	52%
	2.2	86	144	117	67%
	2.3	90	113	106	26%
	2.4	96	138	121	44%

Video 3.1. Kèngèbu accompaniment; three excerpts taken from Video 1.1 are put together, with the kèngèbu part isolated from the ensemble

[Video Link](#)

Figure 3.1. Kèngèbu accompaniment of the second bòn in Segu Bamana drumming

1			2			3			4			metric cycle
Bu	Kèn	Gè	syllabification									

Figure 3.2. Bell accompaniment of the second dundunba for the Khasonka piece Bire

1			2			3			4			metric cycle
X		X	X		X	X		X	X		X	bell motive

Figure 3.3. Composite hook theme for Ngòn. O=cunba; X=ngangan; optional anacrusic strokes marked grey

1			2			3			4			
O		O				X	X	O	O	O		
Bu	Kèn	Gè										
5			6			7			8			
O		O				X	X		X		O	
Bu	Kèn	Gè										

Video 3.2a. Trio drum ensemble performance of Ngòn: cunba (hook), ngangan (hook) and bòn (kèngèbu accompaniment); the excerpt is taken from Video 1.1

[Video Link](#)

Video 3.2b. Video 3.2a, with clicktrack

[Video Link](#)

Figure 3.4. Basic eight-beat footstep pattern for dancing Ngòn (R=right, L=left) in phase with the eight-beat cycle emerging from the hook theme

1				2				3				4			
R				L				R				L	R		
O			O					X	X	O		O	O	O	
Bu	Kèn	Gè		Bu	Kèn	Gè		Bu	Kèn	Gè		Bu	Kèn	Gè	
5				6				7				8			
L				R				L				R	L		
O			O					X	X			X			O
Bu	Kèn	Gè		Bu	Kèn	Gè		Bu	Kèn	Gè		Bu	Kèn	Gè	

Video 3.3. Basic eight-beat footstep pattern for dancing Ngon (slow motion); the excerpt is taken from Video 2.1, above. Videographer: Elisabeth den Otter (2006). Captions indicating metric beat numbers and corresponding footsteps added by the authors

[Video Link](#)

Figure 3.5. Second dundunba hook phrase and bell accompaniment in Bire. O=open dundunba stroke; °=closed dundunba stroke. Downward arrow marks the beginning of the hook phrase.

1				2		↓		3				4				metric cycle
O						O				°				O		drum
X		X	X			X	X			X	X			X		bell

Video 3.4a. Dundunba hook and accompaniment bell theme in the piece Bire

[Video Link](#)

Video 3.4b. Video 3.4a, with clicktrack

[Video Link](#)

Figure 3.6. Basic lead part phrase for Ngòn; offbeat cell in red, and response cell in in blue

1				2				3				4				metric cycle
	X		X			X		X	X			X				first bòn (lead)
Bu	Kèn	Gè		Bu	Kèn	Gè		Bu	Kèn	Gè		Bu	Kèn	Gè		second bòn (accomp.)

Video 3.5a. Basic lead part phrase (first bòn: left) with kèngèbu accompaniment (second bòn: right). An eight-beat-cycle

is looped several times. The looped excerpt is taken from a quartet performance (Recording 1.1 of our sample; given below as Video 3.6); the cunba and ngangán parts are muted

[Video Link](#)

Video 3.5b. Video 3.5a, with clicktrack

[Video Link](#)

Video 3.6. Quartet drum ensemble performance of Ngòn (Recording 1.1 of our sample)

[Video Link](#)

Figure 3.7. Basic L-S swing theme of the lead part (first dundunba) for Bire
 O = open dundunba stroke, ° = closed dundunba stroke

1			2			3			4			metric cycle
O		O	(O)					O	O		°	drum
X		X	X		X	X		X	X		X	bell

Figure 3.8. Compound ensemble melody of the basic duplet theme for Bire

Top row: metric cycle. Second row: compound melody of the open tones of the first and second dundunba. The higher tuned first dundunba's tones are placed above the lower tuned second dundunba's ones; this is meant to symbolically represent their melodic relationship. Bottom row: bell rhythm

1			2			3			4			1			2			3			4		
O		O						O	O			O		O	O				O	O			
O				O					O			O				O							O
X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Video 3.7a. L-S swing theme for Bire. The excerpt is taken from a duet performance (Recording 2.1; given below as Video 3.8)

[Video Link](#)

Video 3.7b. Video 3.7a, with clicktrack

[Video Link](#)

Video 3.8. Duet drum ensemble performance of Bire (Recording 2.1 of our sample)

[Video Link](#)

Figure 3.9. Opening phrase of the lead part (first dundunba) for Bire

1			2			3			4			metric cycle
X		X	X		X	X		X	X		X	L-S bell accomp.
X	X	X	X	X	X	X	X	X	X	X	X	lead bell
O	O		O	O		O	O		O	O		lead drum

Video 3.9a. Opening phrase for Bire. An excerpt taken from Recording 2.1 (given above as Video 3.8) is looped three times

[Video Link](#)

Video 3.9b. Video 3.9a, with clicktrack

[Video Link](#)

Figure 4.1. Boxplot of the grand average for beat timing (as percentage of the local cycle duration) based on the accompaniment parts in all six performances of Ngòn

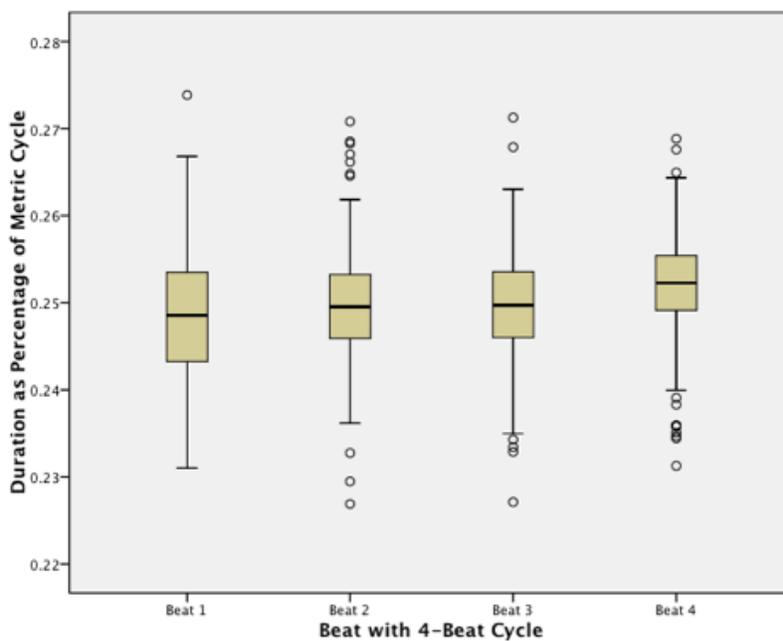


Figure 4.2. Boxplot of the grand average timing ratio for the kèngèbù accompaniment pattern

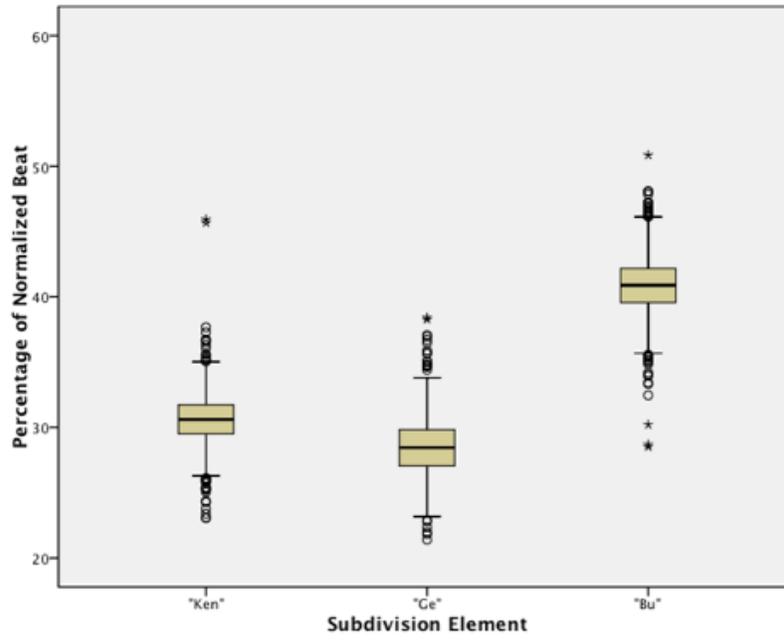


Figure 4.3. Boxplot of kèngèbù timing profiles by ensemble

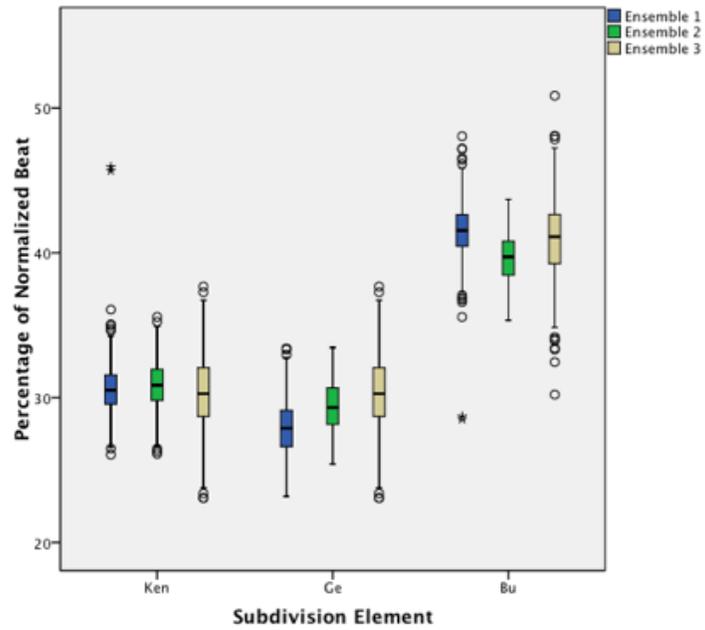


Figure 4.4. Boxplot of kèngèbù timings in the three performances by Ensemble 1

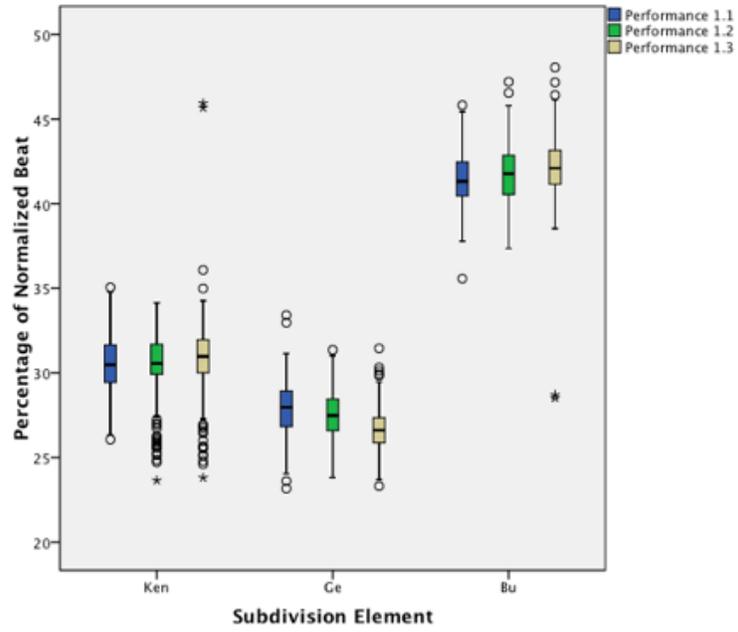


Figure 4.5a. Boxplot of kèngèbù X Beat in Performance 1.1 (Ensemble 1)

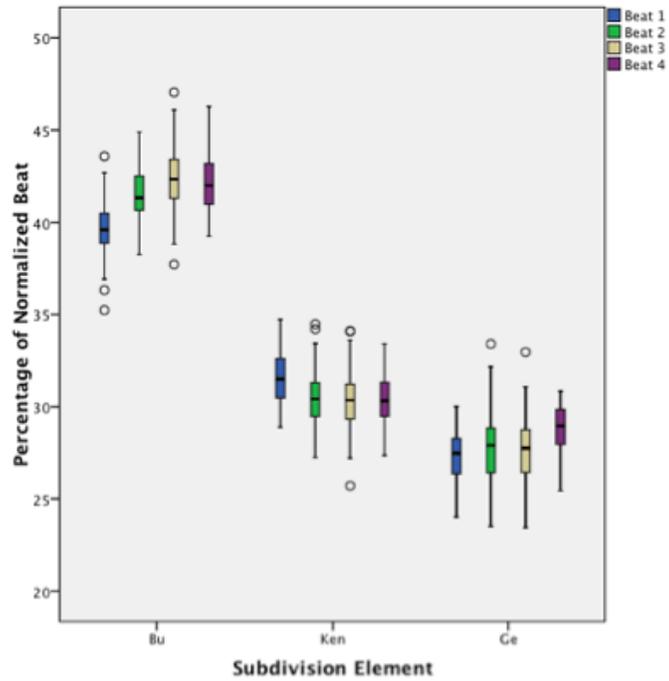


Figure 4.5b. Boxplot of kèngèbù X Beat in Performance 1.4 (Ensemble 2)

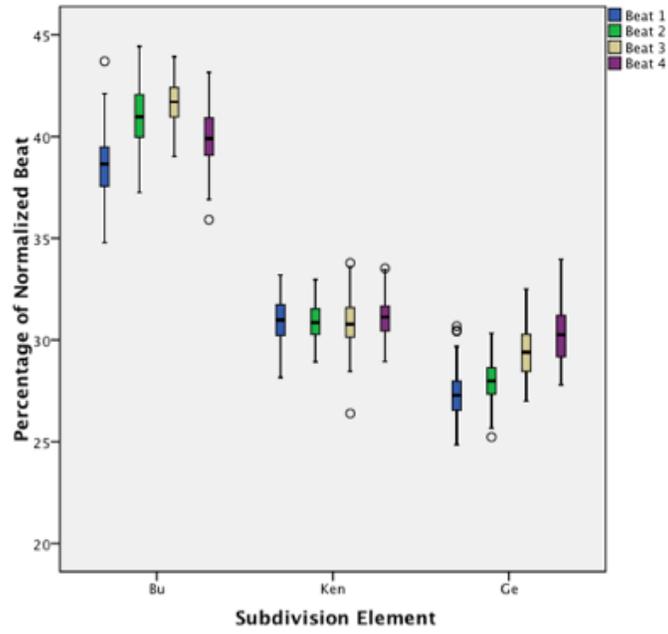


Figure 4.5c. Boxplot of kèngèbù X Beat in Performance 1.6 (Ensemble 3)

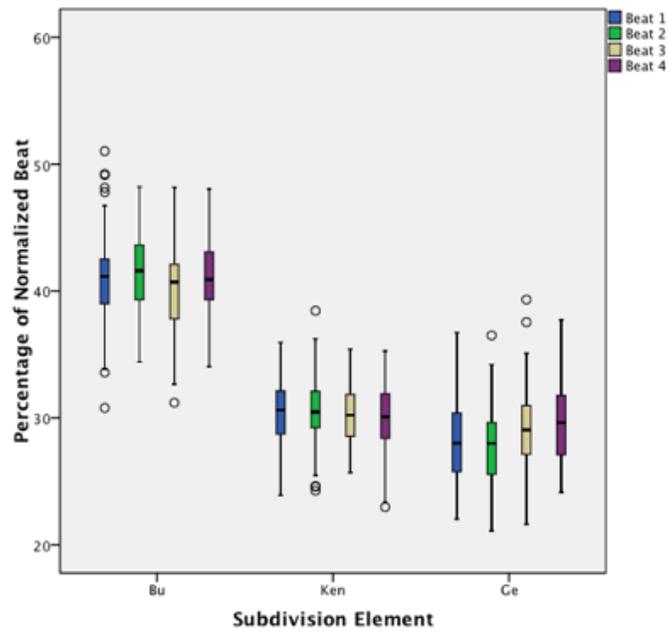


Figure 4.6a. Tempo curve in Performance 1.1. Y-axis = tempo in BPM; X-axis = metric cycle

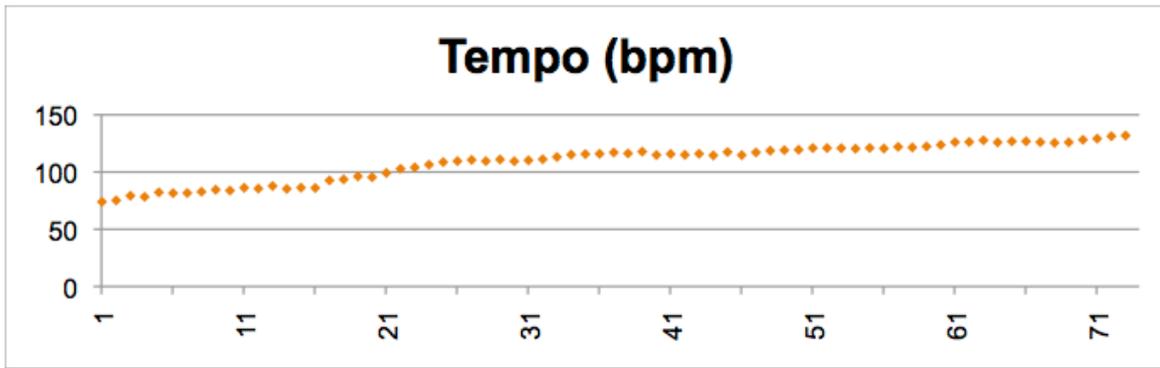


Figure 4.6b. Timing ratio change over the course of Performance 1.1. Y-axis= kèngèbu element timing as % of beat duration. X axis = metric cycle

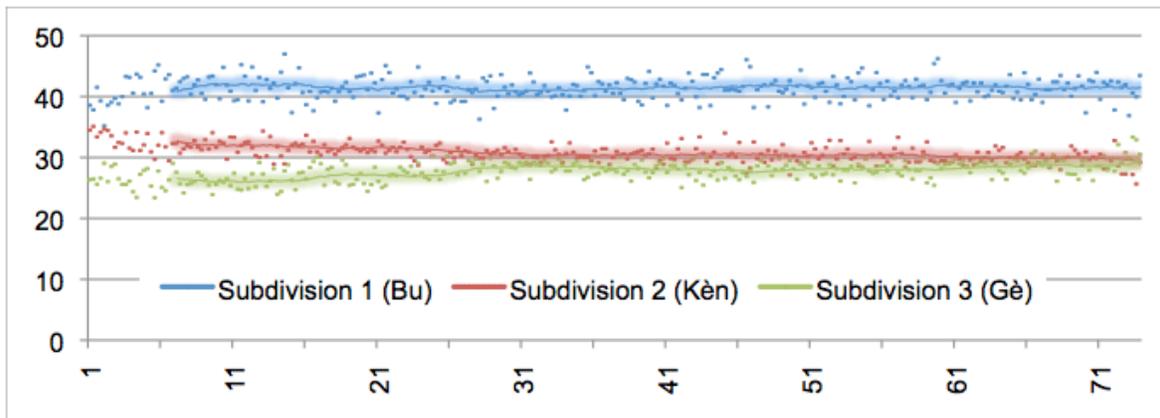


Figure 4.7a. Tempo curve in Performance 1.4. Y-axis = tempo in BPM; X-axis = metric cycle

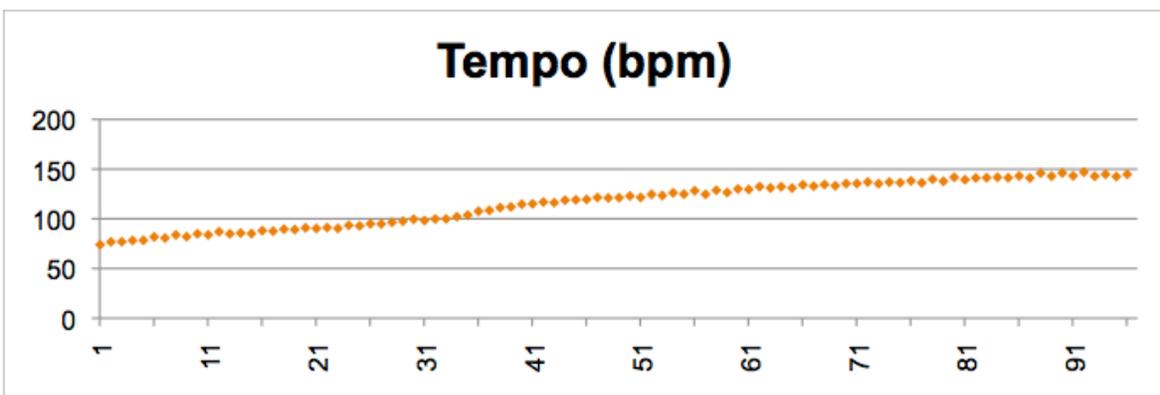


Figure 4.7b. Timing ratio change over the course of Performance 1.4. Y axis= kèngèbu element timing as % of beat duration. X axis = metric cycle

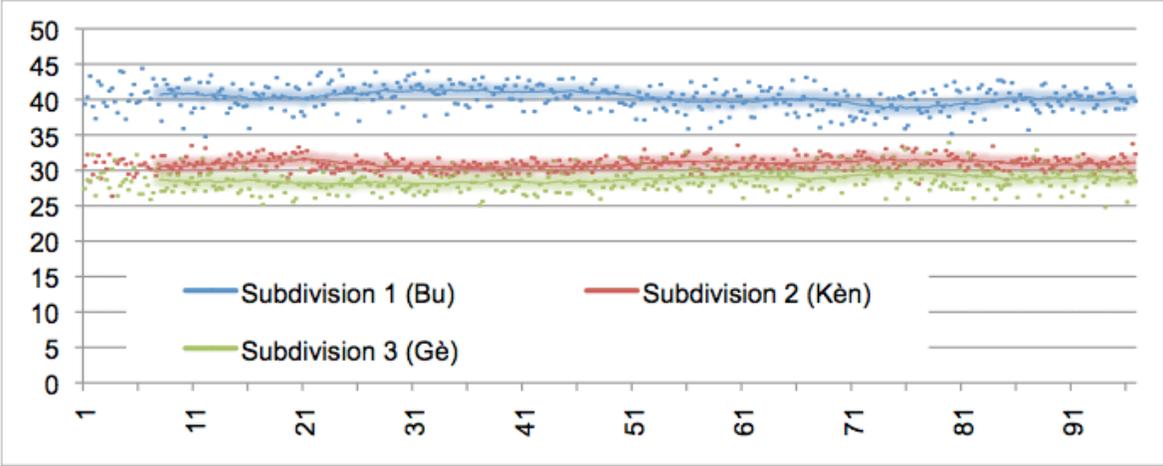


Figure 4.8. Boxplot of Beat Duration (relative to 4-beat cycle) X Performance for Bire

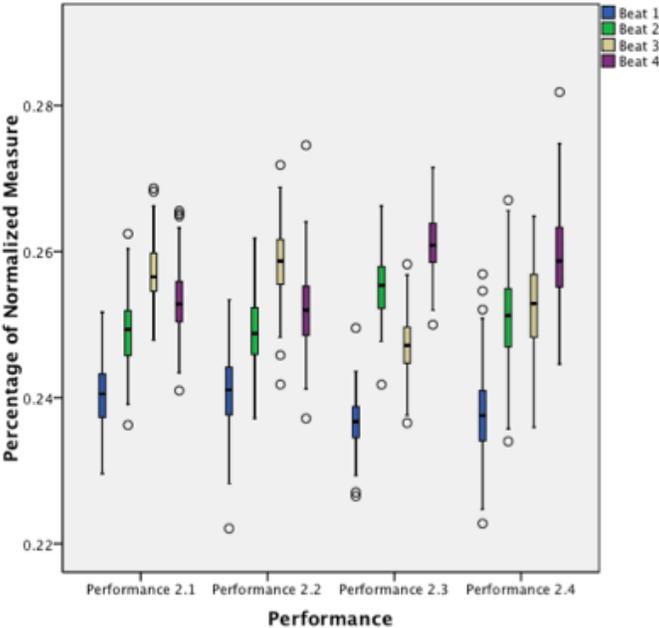


Figure 4.9. Boxplot of Short element of the L-S accompaniment figure in Bire

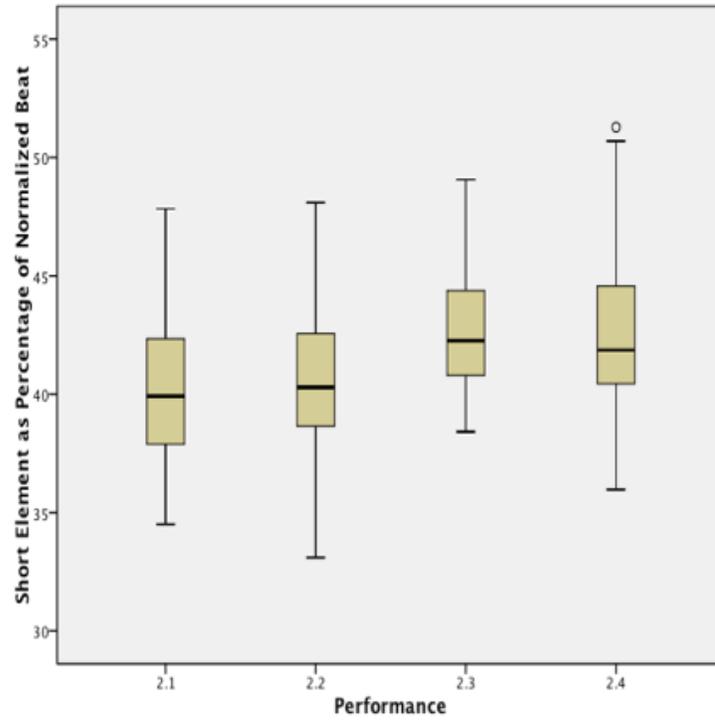


Figure 4.10a. Time-series plot of the accompaniment ratio in Performance 2.1. Y axis = subdivision proportions as % of beat duration; X axis = metric cycle

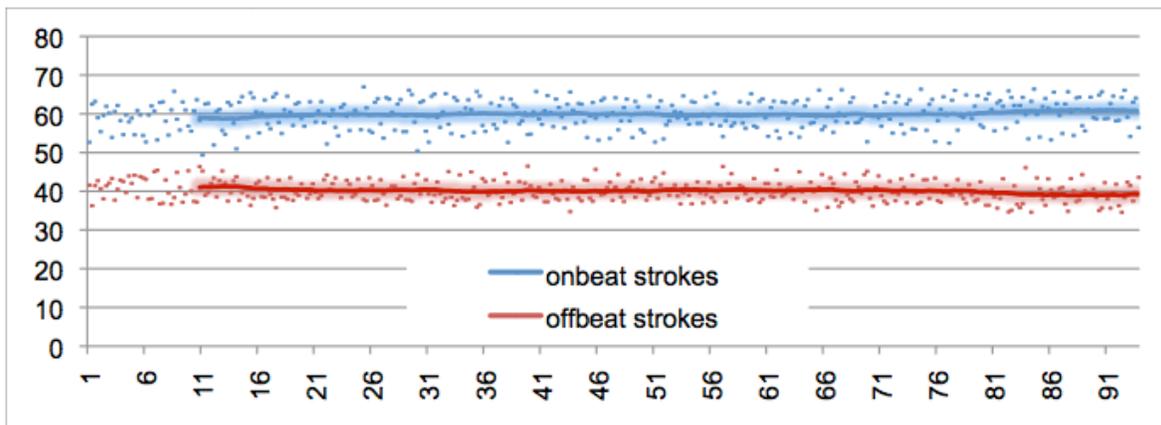


Figure 4.10b. Time-series plot of the accompaniment ratio in Performance 2.3. Y axis = subdivision proportions as % of beat duration; X axis = metric cycle

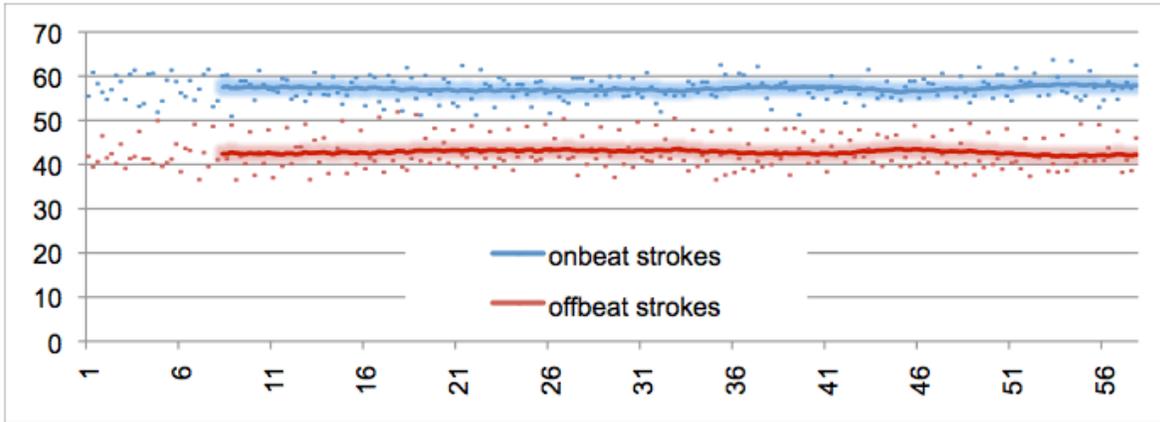


Figure 4.11. Scatterplot of bell vs. jembe timings in Performances 2.3 and 2.4; comparisons are made between corresponding IOIs rather than beat-normalized ratios

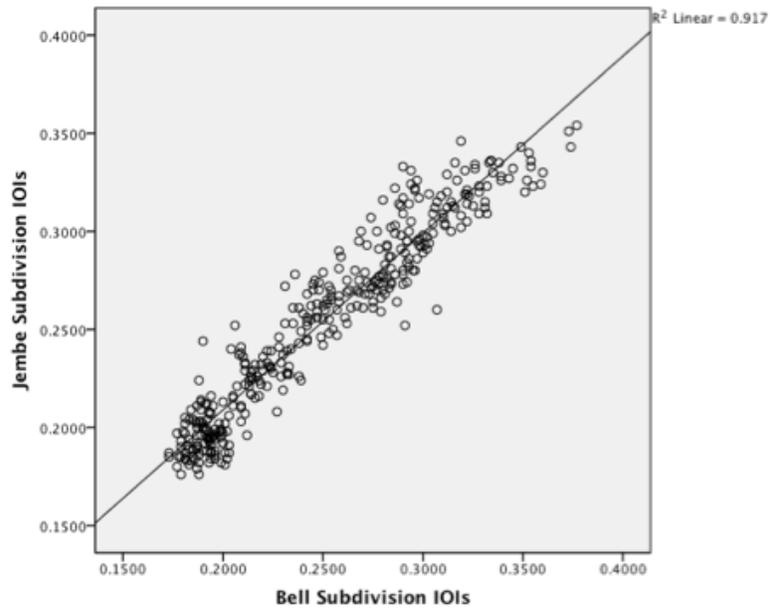


Figure 5.1. Boxplot of cunba invariant hook motive in all six performances of Ngòn

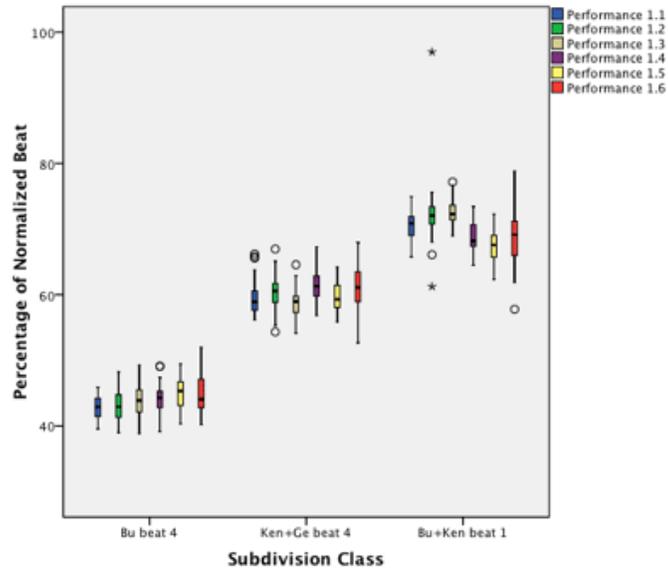


Figure 5.2. Composite hook theme for Ngòn, with ngangan offbeat variation highlighted in orange frame

O=cunba; X=ngangan.

1			2			3			4			5			6
						X	X				X	X	X		
O		O							O	O		O		O	
Bu	Kèn	Gè	Bu												

Figure 5.3. Screenshot of the audio waveform of the ngangan variation (top) and kèngèbu accompaniment (bottom) in Ngòn. The vertical orange lines mark the eight onbeat positions, as defined by the accompaniment. Green dots highlight the alignment of ngangan variation strokes with kèngèbu accompaniment strokes, whereas the red dot highlights a ngangan note not having a counterpart in the accompaniment

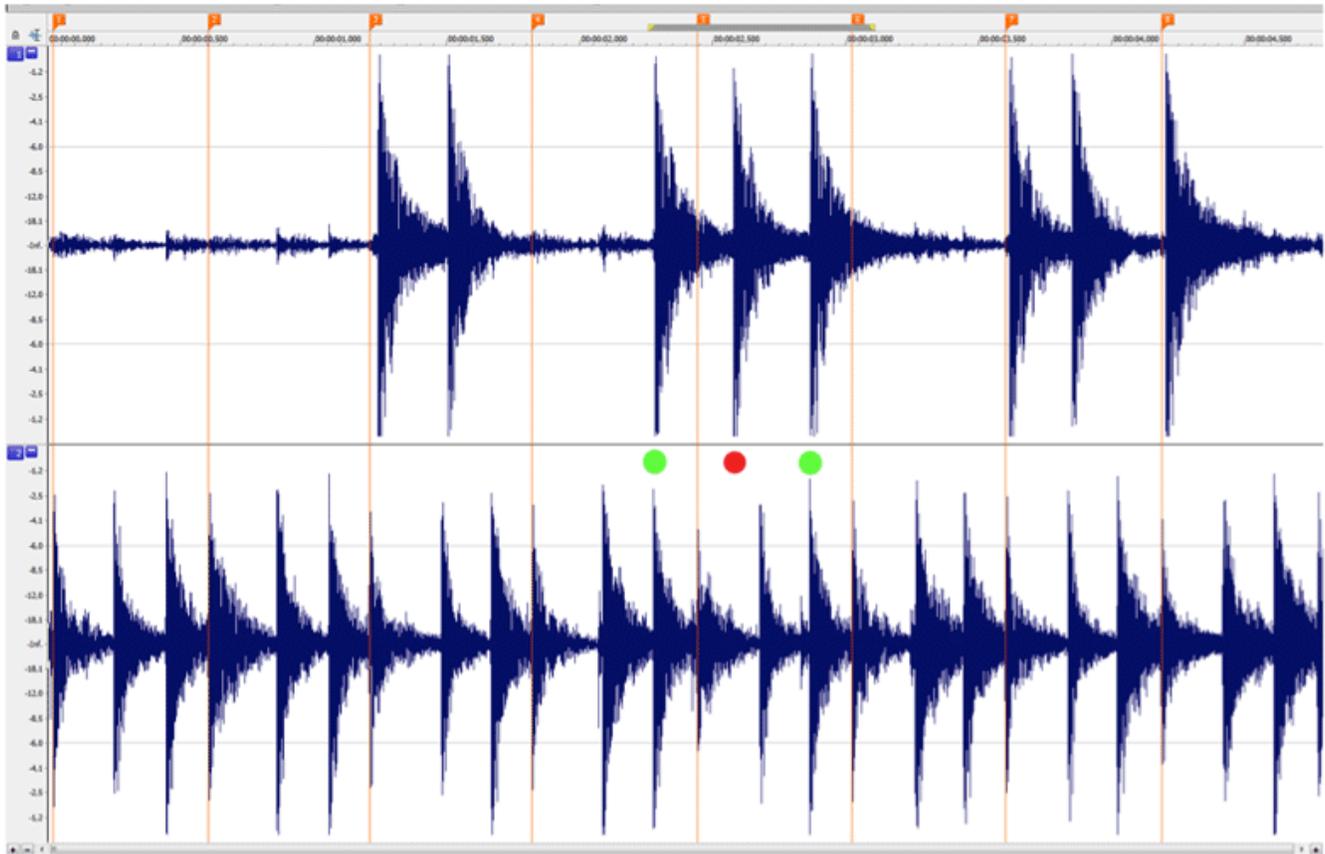


Table 5.2. Bire hook theme performance timing (in percent of the beat duration [normalized by cycle])

1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	metric cy
O					O			X			O	hook phr
158					100			98			44	Perf. 2.1
157					100			98.5			44.5	Perf. 2.2
155					100			98			46	Perf. 2.3
157					100			98			45	Grand A
X		X	X		X	X		X	X		X	bell acco

Figure 5.4. Boxplot of the timings of the dundunba hook part in three performances

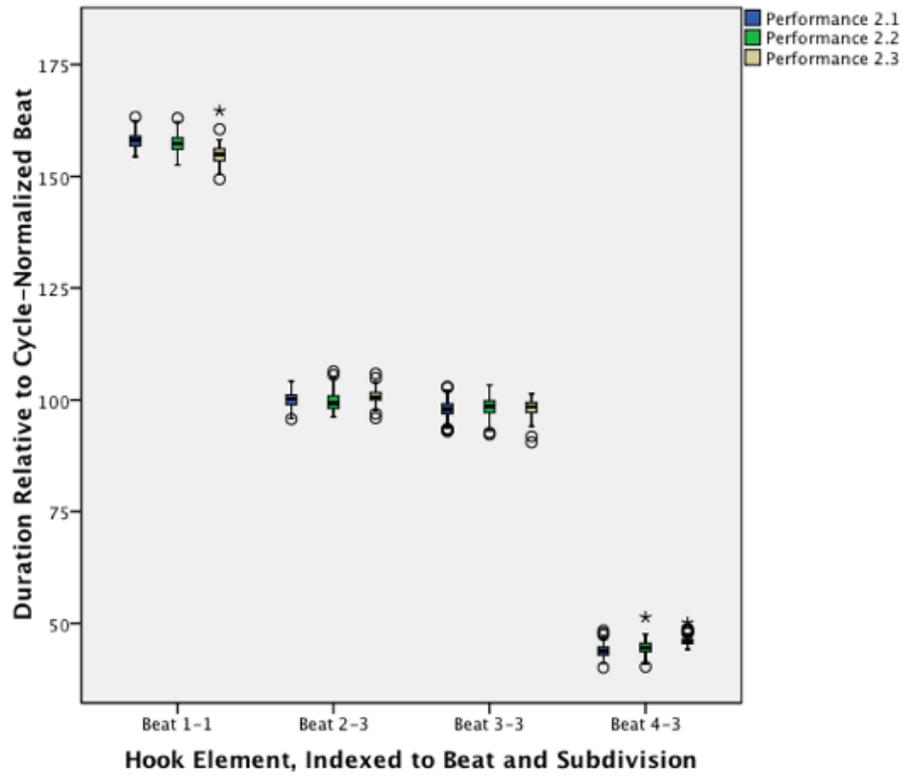


Figure 6.1. Rhythmic figure of the lead part's basic phrase (top) and kèngèbu accompaniment (bottom) for Ngòn

X=offbeat motive; X=response motive.

1			2			3			4		
	X		X			X		X		X	
Bu		Kèn	Gè	Bu		Kèn	Gè	Bu		Kèn	Gè

Figure 6.2. Boxplot of the “Offbeat Motive” from lead drum, Performances 1.1–1.3

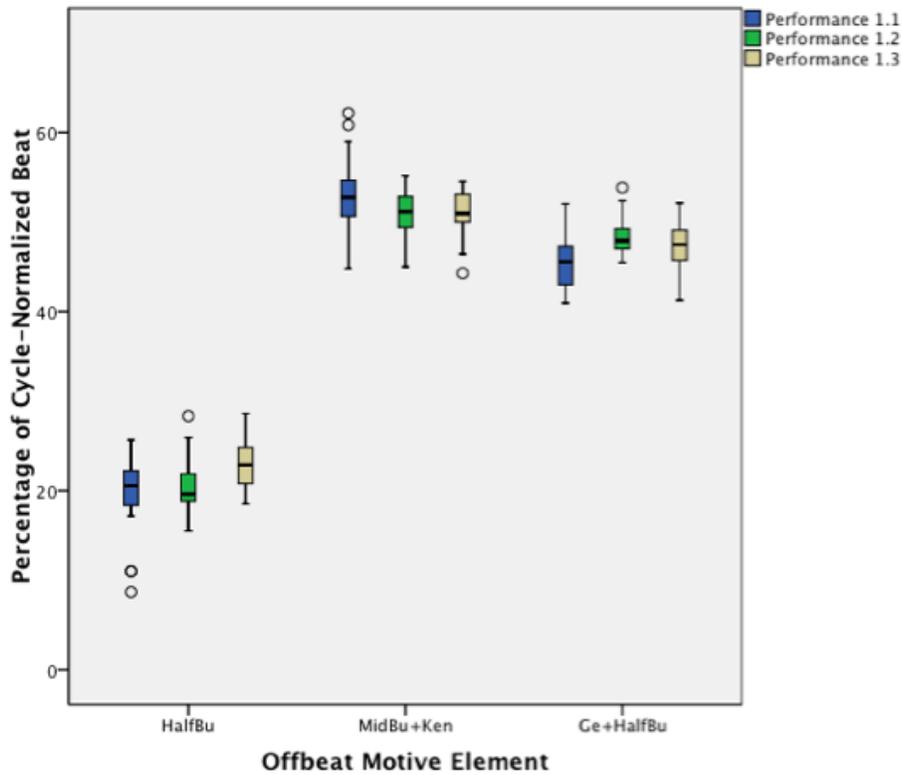


Figure 6.3. IOIs (in grey) and running timing (bold black), both in ms, of the lead drum playing a continuous series of offbeats (two top rows) and the second bòn playing kèngèbu accompaniment (two bottom rows) in one eight-beat cycle of Performance 1.1 (Video 3.6, 1:21–1:26). The running timings are calculated as distance from the accompaniment downbeat (time-point 0).

1			2			3			4					
	283		245		304		261		307		278	281	246	
	121		404		649		953		1214		1521	1799	2080	
215		177	154	229		179	154	238		164	153	226	161	167
0		215	392	546		775	954	1108		1346	1510	1663	1889	2050
Bu		Kèn	Gè	Bu		Kèn	Gè	Bu		Kèn	Gè	Bu	Kèn	Gè
5			6			7			8					
	290		250		283		251		298		271	274	253	
	2326		2616		2866		3149		3400		3698	3969	4243	
214		169	159	216		164	160	237		173	149	215	166	169
2217		2431	2600	2759		2975	3139	3299		3536	3709	3858	4073	4239
Bu		Kèn	Gè	Bu		Kèn	Gè	Bu		Kèn	Gè	Bu	Kèn	Gè

Table 6.2. Mean timing ratio (in percent of the beat duration) in the “swing duplet” lead drum phrase for Bire

	lead bell “Short”	lead drum “Short”	accompaniment bell “Short”
Performance 2.1	41.3	42.7	40.1
Performance 2.2	42.2	43.2	41.1
Performance 2.3	39.8	42.0	42.7
Performance 2.4	40.6	41.3	42.6
Grand Average	41.7	42.7	41.4

Figure 6.4. Boxplot comparing subdivision elements in Bire lead and accompaniment parts

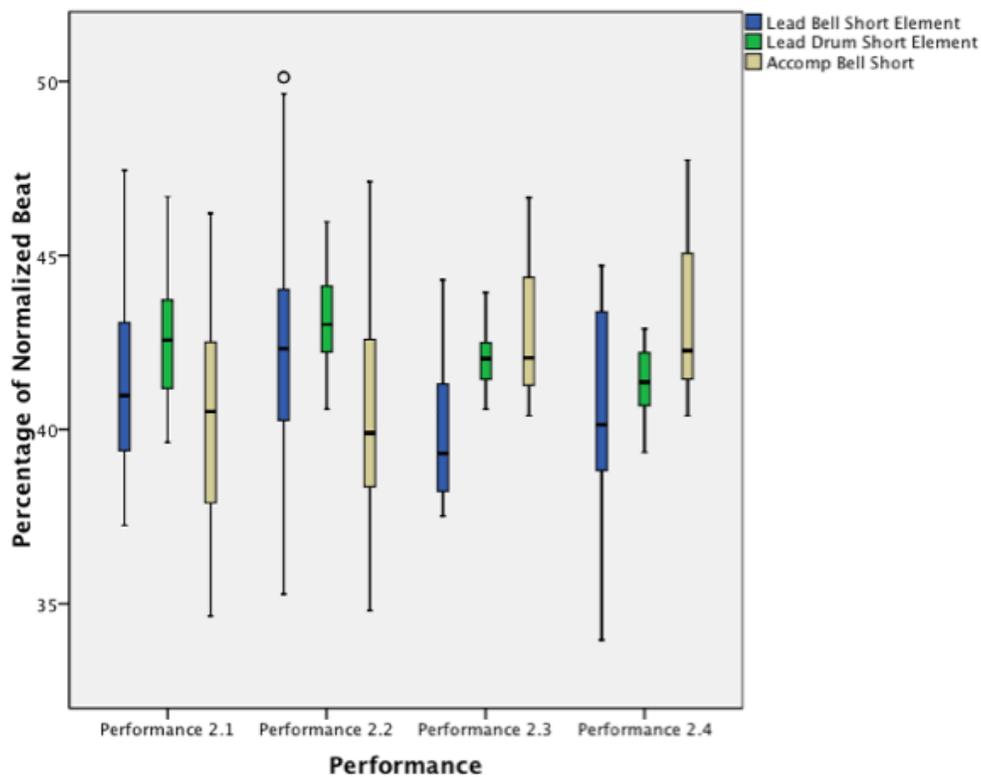


Table 6.3. Grand average of timing ratios (in percentages of the beat duration) in the lead drum and bell parts which open Bire (Recordings 2.1, 2.3 and 2.4)

L		S	LS subdivision, as in the second dundunba’s bell accompaniment
59		41	
25.5	34.1	40.4	lead bell
22.4	77.6		lead drum

Figure 6.5. Screenshot of the accompaniment (top track) and lead part (bottom track) bell strokes in the opening of

Figure 7.2b. Bifurcated and non-bifurcated pathways through the long element in Bire as alternate forms of N-cycle continuity

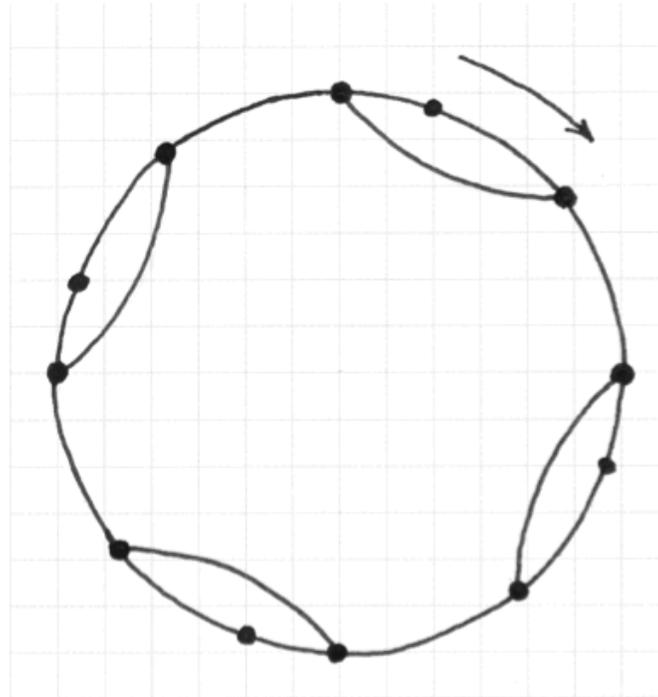


Table 7.1. All possible permutations of isochronous and non-isochronous metrical layers

(Note that this list is not meant to essentialize particular musical forms as characteristic or definitive of some metric systems, but merely to note some regional or stylistic clusters of rather well-known musical forms, that—as far as we can see—can, and in some historically, regionally, and stylistically specific realizations typically do, feature certain aspects of metric structure)

Type	Cycle	Beat	Sub-division	Example Genres/Regions/Styles/Concepts
1	I	I	I	Western (Classical, Pop); “Pygmy” (Central Africa); Classical Indian; Classical Arabic; etc.
2	I	I	NI	Mande (West Africa), Maghrib (North Africa), Samba (Brazil), Jazz (North America)
3	I	NI	I	Aksak (South-East Europe, Anatolia), Zwiefacher (Southern Germany), Tala (Indian subcontinent), Timeline (West Africa), Clave (Caribbean)
4	NI	I	I	--
5	NI	NI	I	--
6	NI	I	NI	--
7	I	NI	NI	Springar, Polska (Scandinavian folk dance)
8	NI	NI	NI	--