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DIPLOMARBEIT

Titel der Diplomarbeit

“... porque sem um *caixa*, a gente não dá o *suingue* ao tempo da música.”

Microrhythmic Analyses of *Caixa* Recordings from *Maracatu-Nação*

Verfasser

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Chapter 1

Introduction

1.1 Maracawho?

I first came in contact with *maracatu-nação* during an excursion of the Institute for Musicology of the University of Vienna to the carnival of Recife (Pernambuco, Brazil) in 2010. Prior to the preparations to this field trip, I had never heard of *maracatu*. In Recife, I was instantly impressed by the powerful music of the large percussion ensembles that are an integral part of the *maracatu* groups. Being percussionist myself, I always felt inclined to music that relies mainly on percussion instruments.

Back in Vienna, some fellow students and me decided to form a percussion group ourselves¹, playing music derived mainly from the *maracatu* groups and musicians we had seen, recorded, and interviewed in Recife. With instruments we had brought with us from the excursion, and the sustaining support from our Institute, our group was actively rehearsing and performing during two and a half years.²

The experiences with this group were important for the origin of this thesis in two ways: Firstly, writing the arrangements for our group, I was highly motivated to delve deeper into the music of the *maracatus-nação*, ultimately wakening my interest for the manifestation as a whole (not solely its music), and its history. Secondly, I started to think more and more about which things exactly made our group sound so different from the groups in Recife, even when playing ‘exactly the same’ patterns as they do. In

¹*Maracatu Novo Toque*, [[Maracatu Novo Toque, 2013](#)]

²Curiously and coincidentally, almost at the same time and without connection, another percussion group playing the music of *maracatu-nação*, *Maracatu Quebra Baque Austria*, see [[Maracatu Quebra Baque Austria, 2008](#)], started rehearsing in Vienna, rising the all-time count of Austrian percussion groups dedicated specifically to *maracatu*, to my knowledge, immediately from zero to two.

conjunction with an already existing interest in microrhythmic studies, and inspired by the relations of German percussionist and musicologist Christiane Gerischer, who accompanied us on the field trip to Recife and told me of fairly similar experiences with her own group, which led her to conducting her exemplary 2003 study *O suingue baiano. Mikrorhythmische Phänomene in baianischer Perkussion*³ [Gerischer, 2003], I decided that I wanted to conduct a microrhythmic analysis of *maracatu* recordings myself.

1.2 Hypothesis, Methods, Sources

Microrhythmics refers to the subtle timing nuances that standard Western musical notation is too imprecise to capture. In many musical *genres*, and definitely in ‘groove-oriented’ music, in other words, music which is typically danced to, placing notes ever so slightly earlier or later can make *all* the difference. I had learned this studying and teaching drum set and other percussion instruments. Describing and measuring such timing nuances, in the magnitude of milliseconds, cannot be done in a satisfactory way with plain ears; the requirement of technical aid might have contributed to the fact that, despite the crucial importance of microrhythmic phenomena for the ‘grooviness’ or ‘infectiousness’ of a piece of music, precise empiric research on them is a relatively recent discipline of musicology.

Regularities and Randomness

Trying to understand the microrhythmics of any music, I think a logical first step is to try to find regularities and recurring patterns. Subsequently, one can try to describe them and ultimately learn something meaningful about the music in question. I would argue that a characteristic of *any* accurate descriptive model of observations is that it achieves to capture a significant part of the observations in terms of regularities. Apparent randomness, on the other hand, tends to hint at that either the model does not describe the phenomenon’s essential features correctly, or that the features the model describes are not the phenomenon’s essential ones.

‘Groove-oriented’ music is often considered to have some metric level which is organized ‘quasi-isochronously’, usually the level of the *beats*. The musical events on this level constitute, according to this perspective, an equidistant ‘grid’, typically used as a basis for dance. There might be more than one such ‘quasi-isochronous’ level, e.g. in electronic dance music like

³Ger. “*O suingue baiano. Mikrorhythmische Phänomene in Bahian music*”

house or *techno*, often *all* the metric levels are organized equidistantly.⁴ But often, the lower metric level of the beat’s subdivisions is taken to be potentially non-isochronous, while showing timing patterns which recur from beat to beat. This is the prevailing conception regarding music like *jazz*, *samba*, or Malian *jembe* music, and the one I started out with, launching into my analyses of *maracatu* recordings.

Microrhythmics of *Maracatu*

The instrumental part of the music of *maracatu*, exclusively involving percussion, and highly ‘groove-oriented’, as I would suggest, is mostly organized in phrases that extend over four beats, with a quaternary subdivision of the beats. The only person who had, to my knowledge, previously studied the music of *maracatu-nação* microrhythmically, is French musicologist G erald Guillot. He analyzed three recording excerpts, a fairly short one in [Guillot, 2005, p. 9–15], published in revised electronic form as [Guillot, 2008], and two longer ones in [Guillot, 2011a, p. 177–179].⁵ The results of these brief analyses, alongside with remarks from Christiane Gerischer and my own listening impressions, conditioned the hypotheses concerning the music of *maracatu-nação* that I wanted to test.

The following are tendencies that both, Gerischer (for Bahian *samba*, see [Gerischer, 2003, p. 180], partly other forms of *samba* as well⁶) and Guillot (for *maracatu* recordings) have found to be general characteristics:

1. The metric level of beats is organized more or less ‘quasi-isochronously’.
2. The subdivisions show a timing pattern that recurs from beat to beat.
3. The first subdivision’s duration is close to $\sim 25\%$ of the beat duration.

⁴David Thallinger comes to this conclusion in his 2006 master’s thesis *„Hi-Hats m ussen flirren!“ Mikrorhythmische Phnomene in der Popularmusikgattung House* (Ger. “„Hi-Hats have to whirr!“ Microrhythmic phenomena in the popular music genre *house*”), see [Thallinger, 2006].

⁵I will report on his results and compare them to mine in Section 8.1.

⁶Concerning the subdivision durations, she reports:

The longest value can always be found on the pulse before the next beat. The placement and accentuation of this fourth pulse and its obvious extension constitute an important characteristic in all analyzed examples of Bahian samba. [Gerischer, 2006, p. 106] [And she further conjectures:] From my practical experience with samba rhythms in other parts of Brazil, I assume that this is a general characteristic of samba rhythms in Brazil. [Gerischer, 2006, p. 118, fn. 13]

4. The second subdivision is shorter.
5. The fourth is the longest one, close to $\sim 30\%$ of the beat duration.

However, it should turn out more difficult to make judgements on in how far these points accurately model the microrhythmic structure of the recordings I analyzed than I had prospected. The point of using statistic methods, as I did, is to be able to handle large amounts of data, and find regularities. But, as I will outline throughout the thesis, I think it is counter-productive to focus *too* strongly and exclusively on these regularities. This, I felt, was the case in a great part of the available microrhythmic literature. In my opinion, it is of great importance to also look at some concrete data, in order to be able to put conclusions drawn on a larger scale into perspective. Therefore, I will provide many examples, and an analysis of only one short recording excerpt in Chapter 6. This, as I hope, will demonstrate that all tendencies and the resulting average values I will be able to present, only to a certain extent describe the actual timing of the musical performances accurately.

Sources

Apart from the mentioned field trip to the Recife carnival of 2010, I conducted a more comprehensive field study during the carnival period of 2012, when I stayed in Recife from January until April. I talked to many *maracatuzeir@s* of different groups and some scholars working on *maracatu-nação*, made several formal interviews, and basically visited and recorded as many rehearsal and presentations of *maracatus-nação* as I could catch. I participated in the group *Leão da Campina*, with whom I rehearsed for several weeks and paraded during carnival as *caixeiro*⁷.

Apart from this, providing the second major group of sources for this thesis, I extensively researched the literature. I visited most major archives and libraries in Recife where material on *maracatu* can be found,⁸ exhaustively researched the Internet, and visited the Ethnological Museum in Berlin, Germany (Berliner Phonogramm-Archiv). All texts and recordings I found during this research informed and influenced this study to certain extents.

⁷Port. “*Caixa* player”

⁸Including the Fundação Joaquim Nabuco (FUNDAJ), the Fundação do Patrimônio Histórico e Artístico de Pernambuco (FUNDARPE), the Museu da Imagem e do Som de Pernambuco (MISPE), the Casa do Carnaval (Centro de Formação, Pesquisa e Memória Cultural), the Museu do Homem do Nordeste, the Biblioteca da Prefeitura do Recife, the Library of the Universidade Federal de Pernambuco (UFPE), and the Comissão Pernambucana de Folclore.

Methods

In the second part of the study, I selected some recordings that I found most suitable for the kind of analyses I had in mind, and used statistic methods to explore the microrhythmic timing structure of these recordings, trying to find regularities and possibly validating or falsifying the above mentioned hypotheses. A detailed account is given in Chapters 5 and 6.

1.3 Content and Structure

For better orientation, I shall briefly outline the content and structure of this text as well as of the Multimedia Content of the accompanying CD-ROM.

Part 1: *Maracatu-Nação*

As the non-lusophone material on *maracatu-nação* available is still relatively limited, and I conjectured that most readers of this text might not be familiar with *maracatu*, I felt it was necessary to give an overall introduction, which can be found in Part I. Readers already closely acquainted with *maracatu-nação* might want to skip this part; the microrhythmic analyses of Part III are largely comprehensible independently of it.

After giving a very brief overview of the history in Section 2.2, I focus on reviewing the non-lusophone literature, in the hope of opening up possibilities for future studies to interested people who not (yet) understand Portuguese. This, together with some remarks on the much more comprehensive Portuguese literature and the debates currently lead concerning various *maracatu* related contexts, is contained in Section 2.3.

In Chapter 3, I more specifically give an introduction to the *music* of *maracatu-nação*, explaining overall musical characteristics, frequently observed (macrorhythmic) patterns, partly the interaction between them, and playing techniques. Special focus is laid on the *caixa*, providing the necessary background for evaluating the significance of the microrhythmic analyses of Part III, and the degree to which they might or might not be representative of their native context.

Part 2: Rhythm Theory and Methods

Part II provides the theoretical and methodological framework for the subsequent analyses. If mainly interested in these analyses, it might as well be skipped and only consulted when the need arises.

I briefly comment on the terms *rhythm*, *meter* (Section 4.1), and *categorical perception* (Section 4.2), review the history microrhythmics as a musicological discipline (Section 4.3) and introduce necessary terminology and discuss various views, including my own one, on categorical perception and microrhythmic timing phenomena (Section 4.4). Some of the most important data to make judgements about the significance of the subsequent analyses possible at all, is collected in Section 4.5. There, I report on previously undertaken empiric works that provide estimates for the magnitude of the numbers we have to look at, when discussing which microrhythmic phenomena might or might not be perceptually relevant for humans.

In Chapter 5, I present the analytic methods that will be used in Part III, discussing them in the context of the previously derived theoretical setting. Error estimates, accounting on the precision of the methods, are given in Section 5.6.

Part 3: An Explorative Study: Microrhythmic Phenomena in *caixa* Recordings of *Maracatu-Nação*

In Part III, the empiric part of this thesis, I report on the microrhythmic analyses I conducted with the selected *caixa* recordings of *maracatu-nação*.

I start in Chapter 6 with taking an in-depth look at only one specific recording excerpt. The small amount of data involved will hopefully make it possible for the reader to more fully understand the relations between the tendencies and average values, presented as results of the analyses, and the actual performance data. In Section 6.1 I give a detailed account of the statistic calculations that are used throughout the entire analysis. This section is somewhat technical; most readers might want to first skip it, and only consult it later if needed. For most purposes, a look at Section 6.2 will suffice to facilitate the comprehension of the subsequent analyses. The analysis of the mentioned example recording is presented in Section 6.3 and summarized in Section 6.4.

Chapter 7 contains similar analyses, now taking all fourteen recording excerpts into account. After giving an overview of the used recordings, as well as their macrorhythmic structure, via transcriptions (Section 7.1), the metric levels of bars (Section 7.2), beats (Section 7.3), and Subdivisions (Section 7.4) are examined. The analyses are summarized in Section 7.5.

Finally, in Chapter 8, I compare the results with those of Gérard Guillot and give an outlook at topics that I could only briefly touch in this thesis, and which would maybe be worth future investigations. I conclude in Section 8.3 with some considerations on whether and in how far teaching and learning of microrhythmic timing phenomena are possible.

Multimedia Content

On the accompanying CD-ROM (hopefully still there, when you read this), I have included all material and data I felt to be necessary for checking back my microrhythmic analyses. This is, for each of fourteen recording excerpts I have examined, the following four files:

Content	File Name Extension
Audio recording excerpt ⁹	.wav
<i>Sonic Visualiser</i> session ¹⁰	.sv
Time codes of the note onsets ¹¹	.csv
Spreadsheet ¹²	.xlsx

The four files concerning a specific recording excerpt are contained in one folder. The file names are of the following format:

“Date (YYYY.MM.DD)” “Place” excerpt “number (1–8)” .“extension”

Copyright Notice

All video frames, screenshots from programs I used, files provided on the accompanying CD, in particular the original field recordings, and transcriptions are mine, unless noted otherwise.

1.4 Orthography, Type-Setting, Translations

Typeface

Emphasized by its typeface, that is in *italics* within roman type, *and in roman type if the surrounding text is set in italics*, are the following:

- titles of publications, articles, electronic files, and similar items
- untranslated non-English words, mainly from Brazilian Portuguese
- certain *termini technici*
- *emphasized* words

⁹digital audio WAV-format, with a bit depth of 24 bits and a sample rate of 48 kHz

¹⁰used for annotating the audio files with the note onsets

¹¹in plain-text format, as comma-separated values

¹²used for the statistic evaluation of the note onset data

Quotations

...are whether given as separate paragraphs with enlarged indents or enclosed in “double quotation marks”. Enclosed in [brackets] are my insertions into, or any other textual alterations by me, of original quotes, as well as references to the source. Quotations in other languages than English are given in original form in the text body and in translated form in footnotes, enclosed in double quotation marks. The same holds true for all untranslated words.

Set in ‘single quotation marks’ are (groups of) words in order to qualify their meaning, as well as quotations within double quotation marks.

Translations

In the translations, I tended to favor English words of the same root as the original, and, likewise, resembling phrase structures. More idiomatic choices would have been possible in some cases. If not indicated otherwise, all translations are mine.

Orthography

For untranslated words from Portuguese I used capitalization and plural according to Portuguese grammar rules.

For Portuguese terms referring to people and terminating in -a in the feminine form (e.g. *maracatuzeira*) and in -o in the masculine form (*maracatuzeiro*), I used the standard Portuguese plural endings -os for a group consisting only of male persons (*maracatuzeiros*), -as for a group consisting only of female persons (*maracatuzeiras*), and the non-standard Portuguese -@s for a group consisting of both female and male persons (*maracatuzeir@s*).

Transcriptions

The music of *maracatu-nação* is a tradition which is transmitted orally. Never have I seen, or heard of, anybody using musical notation in the context of *maracatu-nação*. The musical notation I provide in Section 3 and Part III are meant to be read in the light of the discussion of Section 4.4.2: These transcriptions are a very coarse and static approximation to a musical tradition to which dialogic processes, improvisational wealth, and variational richness are essential. These features cannot accurately be represented in standard Western musical notation. In fact, one of the main goals of this thesis, especially the analyses of Part III, is to lessen these very shortcomings to a certain extent.

Abbreviations

The following is a list of abbreviations used throughout the text. In addition to this list, an explanation is in some cases provided as a footnote at the first occurrence in the text.

bpm beats per minute	p. page
FFT Fast Fourier Transformation	par. paragraph
fn. footnote	PDs participatory discrepancies
Fr. French	Port. Portuguese
Ger. German	pp. pages
IOI(s) inter onset interval(s)	s second
Ital. Italian	Sp. Spanish
ms millisecond	Swe. Swedish

1.5 Acknowledgements

First of all, I would like to express my great gratitude to Regine Allgayer-Kaufmann. She has not only brought me in contact with microrhythmics, but also introduced me to *maracatu*, both of which have since played a decisive role for my work and life as a musicologist *and* musician. Moreover, she, and the Institute for Musicology at the University of Vienna, sustainedly supported our percussion group *Maracatu Novo Toque* in an extraordinary and invaluable manner.

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Pessoal do Leão da Campina! Muito obrigado para sua calorosa recepção na Nação. Eram momentos inesquecíveis com vocês—e espero que vai ter

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Part I

Maracatu-Nação

Chapter 2

Maracatu-Nação: Introduction

In Pernambuco and, to a certain extent, other Brazilian states, there is a vivid young scene of musicologists, cultural anthropologists and historians, producing a rapidly growing output of scientific works on—among others—gender-related topics, the social conditions, religion, and history of *maracatu-nação*. Being much further away from the sources and having a knowledge about *maracatu* which stems from a far more limited span of time and range of sources, I do not feel competent to ‘compete’ on these matters. I concord in this respect with Swedish musicologist Igmarr Bengtsson, who expresses similar feelings reflecting on the reasons why rhythm research—as opposed to Swedish historic musicology—has such a prominent position in Sweden [Bengtsson, 1975, p. 196]. He refrained from approaching other countries’ music history and hopes to produce internationally more relevant material by working on universal topics like rhythm theory. I likewise hope to contribute to *maracatu* research in a more meaningful way by choosing the systematic approach taken herein and focussing on a very specific rhythmic topic.

Nevertheless, in the upcoming sections I try to give a minimum of information facilitating the comprehension and significance of the remainder of this thesis, such that hopefully readers not yet familiar with *maracatu* do not necessarily have to consult other literature prior to the study of this text. Moreover, in Section 2.3.1, I will report on the sparsely available non-lusophone literature on *maracatu*, in the hope of providing easier access to a wider range of people. For a deeper understanding of *maracatu*-related discourses, however, some knowledge of Portuguese seems still indispensable.

2.1 Recife, Pernambuco and *Maracatu*

*Maracatu-nação*¹, or *maracatu de baque virado*², as it is frequently referred to synonymously is a cultural manifestation from the Northeast-Brazilian state of Pernambuco (PE). Including religion, social and political aspects, music, song, dance, costumes and more, it is a complex folkloric tradition with a centuries-long history. Traditionally, it is found more or less exclusively in the *Região Metropolitana do Recife*³, also called *Grande Recife*⁴, colloquially often simply referred to as *Recife*, which includes, among others, Recife (the capital of Pernambuco), and its neighboring cities Olinda, Igarassu and Jaboatão dos Guararapes.

Maracatu-Nação is commonly clearly differentiated by Brazilians, researchers, and the *maracatuzeir@s*⁵ themselves, from a few other folkloric manifestations also referred to as *maracatu*, like *maracatu de baque solto*⁶ in Pernambuco, *maracatu cearense*⁷ in Fortaleza⁸, or *maracatu estilizado* and *grupos de percussão* (calling themselves *maracatus*) in Recife and throughout the world.⁹

¹Port. “*maracatu* of the nations”

²Port. “*maracatu* of the turned-around beat”

³Port. “Recife Metropolitan Area”, the fifth-largest metropolitan area in Brazil.

⁴Port. “Greater Recife”

⁵A designation for the members of of a *maracatu* group.

⁶Port. “*maracatu* of the free beat”, or “*maracatu* without beat”; also called *maracatu rural* (“rural *maracatu*”; emphasizing the fact that this manifestation is more common in Pernambuco’s rural areas, this term was introduced by Katarina Real in [Real, 1990]—not without being criticized for it, see [Guerra-Peixe, 1980, p. 14]), and *maracatu-de-orquestra* or *-de-trombone* (“orchestral *maracatu*” resp. “*maracatu* of the trombone”; both terms stemming from the use of brass instruments in the groups’ *batuques* [Guerra-Peixe, 1980, p. 14]). Scientific works on *maracatu de baque solto* in languages other than Portuguese include [Pinto, 1996] and [Santos and Resende, 2009] in English, and [Weghuber, 2012] in German. In Portuguese language, the literature is somewhat richer, some examples illustrating the available diversity include [Guerra-Peixe, 1980, pp. 91–103], [Real, 1990, pp. 71–82] (containing an extensive English summary), [Chaves, 2008], and [Oliveira and Esteves, 2009].

⁷Port. “*maracatu* from Ceará”; the only scientific work on *maracatu cearense* I know of is the monographic master’s thesis *Vamos Maracatucá!!! Um estudo sobre os maracatus cearenses* (Port. “Let’s Maracatucá!!! [For a few remarks on the word “Maracatucá”, see [Guerra-Peixe, 1980, p. 28]] A study on the maracatus cearenses”) by Ana Cláudia Rodrigues da Silva, anthropologist from Fortaleza: [Silva, 2004].

⁸Capital of the Northeast-Brazilian state Ceará.

⁹*Maracatu estilizado* (Port. “Stylized *maracatu*”) is a designation for groups not seen as rooted in the ‘*maracatu* tradition’ but playing the same, or a similar, style of music. A main indicator for whether a group would be viewed as *estilizado* or not is its affiliation with religious practice. Generally, the history of *maracatu estilizado* goes back to the two groups *Cabralada* and *Nação Pernambuco*, the latter of which now is one of the most renown

2.2 *Maracatu-Nação*: A Historical Outline

The long and complex history of *maracatu-nação* is impossible to accordingly represent on a few pages. Also, there are some controversial points on which there is no consensus and which are difficult to expose in short. I will mainly repeat the most common views on *maracatu*'s history and try to point out a few processes that might need reconsideration in future studies.

2.2.1 1538–1888: Origin Myths and *Nações Africanas*

Since at least 1908, the year Pereira da Costa published his influential book *O Folk-Lore Pernambucano*¹⁰, the pre-history of the *maracatu-nação* is most commonly considered to start with “the colonial practices [...] called the *Rei de Angola* (King of Angola) and the *Rei de Congo* (King of Congo) [Crook, 2009, p. 92]”. In one of the most comprehensive and profound monographs on these practices, Marina de Mello e Souza sketches their historic outline as follows:

Presente em Portugal, na Espanha, na América espanhola, nas ilhas do Caribe e na América do Norte, foi na América portuguesa que a eleição de reis negros e sua comemoração festiva esteve mais difundida, existindo comprovadamente desde o início do século XVII, ganhando força no XVIII, mudando de feições no XIX e occurendo ainda hoje em várias localidades brasileiras.¹¹ [Souza, 2006b, p. 179]

In those rituals, queens and kings (of Angola, the Congo and other ‘nations’) were elected by the enslaved African population of Brazil that had been deported to colonial Brazil by the Portuguese from 1538 on [Silva, 1980, p. 3]. These royalties “served as intermediaries between the white masters and the enslaved and helped keep order as they presided over religious and secular activities of the black population [Crook, 2001, p. 234].” The celebrations for the coronations included music, song, dance, and costumes. Concerning the

groups in *maracatu* contexts in general. Related terms are *parafolclóricos* (Port. “para-folkloric groups”), *grupos de percussão* (Port. “percussion groups”), and *espectacularização* (Port. “spectacularization”). Various authors have worked on these issues, see, among others, [Guillen and Lima, 2006], [Souza, 2006a], [Lima, 2007a], [Esteves, 2008], [Lima, 2010].

¹⁰Port. “Pernambucan Folklore”

¹¹Port. “Present in Portugal, Spain, Hispanic America, the Caribbean Islands and in North America, it was in Portuguese America where the election of black kings and their commemoration festivities was most dispersed, proven to exist since the 17th century, gaining strength in the 18th century, changing character in the 19th century and occurring until today in various Brazilian localities.”

decline of them, renown Recife folklorist, historian, and journalist Leonardo Dantas Silva suggests that

[c]om a abolição da escravatura negra, em 1888,¹² e a proclamação da República, em 1889, a figura do Rei do Congo [...] perdeu a sua razão de ser. Os cortejos dos reis negros [...] vieram a se fazer presentes no carnaval do Recife. Em sua nova forma, o antigo cortejo do Rei do Congo veio ser chamado, pela imprensa de então, de *maracatu*,¹³ particularmente quando a notícia tinha conotação policial [...]¹⁴ [Silva, 2002, p. 51], also see [Metz, 2008, p. 67].

More contemporarily, some authors have started to question and critically rethink the views presented here, which have been repeated incessantly over the course of the 20th century. The unconditional attribution of the *maracatus-nação* of the present to the tradition of colonial coronation practices of black kings, and the over-focussing on this aspect, appears controversial to them. See, e.g. [Silva, 2004, pp. 30–54], [Couceiro, 2009], as well as the remarks made in Section 2.3.3.

2.2.2 1888–1988: *Maracatu*, Carnival, and Decay?

How many of these black royal courts remained there in the Recife area after the (official) abolition of slavery? The groups, now more and more frequently referred to as *maracatus*, needed a license, issued by the police, to be allowed to parade in the Recife carnival. We still have access to these licenses, since they were published in the newspapers. The currently maybe most productive author working on *maracatu*, Recife historian and *maracatuzeiro* Ivaldo Marciano de França Lima, *mestre* of *Maracatu-Nação Cambinda Estrela*, currently working at the Federal University of Bahia (UFBA), gives a listing of

¹²On May 13, 1888, Princesa Isabel signed the *Lei Áurea* (Port. “golden law”). This was the official abolition of slavery in Brazil.

¹³As is demonstrated in the 2001 master’s thesis *O Rosário dos Homens Pretos de Santo Antônio: Alianças e conflitos na história social do Recife, 1848–1872* (Port. “The Rosary of the Blacks of Santo Antônio: Alliances and conflicts in the social history of Recife, 1848–1872”) by Marcelo MacCord, the word *maracatu* was in use already before 1888. In it, he cites a source from the May 27, 1851 edition of the popular Recife newspaper *Diário de Pernambuco*. Taken from Ana Cláudia Rodrigues da Silva’s [Silva, 2004, p. 39].

¹⁴Port. “With the abolition of black slavery, in 1888, and the proclamation of the Republic, in 1889, the figure of the Congo King [...] lost its reason to exist. The courts of the black kings [...] came to make themselves present in the carnival of Recife. In its new form, the ancient court of the Congo King came to be called *maracatu* by the newspapers of the time, particularly if the content was related to the police [...].”

them for the period between 1886 and 1910. Between three and ten groups were granted such a license every year, allowing them to parade in carnival. Totally, Lima lists the name of 19 different groups for this time span [Lima, 2005, pp. 86–87].

Throughout the course of the 20th century, up to the 1990s, the relatively few folklorists who published works on *maracatu* invariably expressed their perception of the decline of *maracatu-nação*. A citation from Pereira da Costa from 1908 is found in a text by Leonardo Dantas Silva:

Pereira da Costa, in 1908, afirmava “. . . se o maracatu, portanto, já rareando, modestamente, época houve, e bem próxima ainda, em que se exibia em número avultado. . .”¹⁵ [Silva, 1975, p. 18]

Mentioning that his list could be incomplete, Guerra-Peixe reports six groups categorized as “Maracatus ‘antigos’¹⁶ [Guerra-Peixe, 1980, p. 22]” or as “Maracatu tradicional¹⁷ [Guerra-Peixe, 1980, p. 23]” that were active in carnival during the time of his field work, 1949–1952 [Guerra-Peixe, 1980, p. 11]. Two of them he considered extinguished in 1952.¹⁸

Katarina Real, from the time of her field work, 1961–1966, reports of five groups she rates as “maracatus-nações”, but

[d]esses cinco grupos, somente três eram legítimos descendentes das Nações africanas.¹⁹ [Real, 1990, p. 60]

Of the remaining three, by 1966 two had stopped their activities,²⁰ which leads her to the statement that

¹⁵Port. “Pereira da Costa, in 1908, confirmed ‘. . . even if *maracatu*, therefore, is slowly diminishing in numbers at the moment, there was a time, not long ago, when it expressed itself on a large scale. . .’ ”

¹⁶Port. “ ‘ancient’ Maracatus”

¹⁷Port. “traditional Maracatu”

¹⁸These two were *Estrela Brilhante* and *Cambinda Velha*. He was mistaken concerning the first, see the accounts below from Katarina Real. The four that, according to Guerra-Peixe, continued after 1952 were *Brilhante*, *Porto Rico*, *Coroado*, and *Elefante*. He reports seven more had been dissolved by the time of his research: *Oriente Pequeno*, *Oriente Grande*, *Sol Nascente*, *Lagartixa*, *Cambinda Nova*, *Diamante*, and *Dois de Ouro*, alongside with nine that he classifies as “Maracatu-de-orquestra”.

¹⁹Port. “[o]f these five groups, only three were legitimate descendants of the African Nations.”

²⁰She writes that *Estrela Brilhante* actually continued activities until 1964, but did not parade in 1965–1966. She confirms that *Cambinda Velha*, alongside *Porto Rico*, stopped parading at some stage between 1952–1961, and *Elefante* in 1962.

[...] *a única nação, ou maracatu-nação legítimo, de vida assegurada hoje em dia, é o Leão Coroado.*²¹ [Real, 1990, p. 61, emphasis by Real]

Leonardo Dantas Silva, in 1975, describes the situation similarly:

Hoje restam apenas duas Nações Africanas, quem vêm as ruas nos dias do carnaval, a do **Leão Coroado** (1863) e da **Estrela Brilhante**, que veio da Igarassu em 1910.²² [Silva, 1975, p. 18]²³

However, despite the view propagated by all these prominent actors in the discourse on heritage and identity of Pernambucan culture, the history of *maracatu-nação* might prove to be more complex and deserve careful resignification. The concepts of ‘authenticity’ and ‘tradition’, referred to by many authors, none of whom having been *maracatuzeir@s* themselves, seem to be based on a very static, non-processual image of history and popular culture. In particular the question what was regarded as *maracatu-nação* and what not, might have differed from the ideas of the *maracatuzeir@s* about this. Reviewing the authors quoted above, and some more of the same tradition of thought, Ana Cláudia Rodrigues da Silva accurately observed:

O que pode observar nesses trabalhos intelectuais é a falta da voz dos próprios sujeitos da manifestação.²⁴ [Silva, 2004, p. 45]

Given the fact that Brazil has one of the most unequal societies in the world, and that the struggle for social space, visibility, power, and economic

²¹Port. “[...] *the only legitimate nação, or maracatu-nação, of secured existence today, is Leão Coroado.*”

²²Port. “Today only two Nações Africanas are left which come to the streets in the days of the carnival, that of **Leão Coroado** (1863) and that of **Estrela Brilhante**, which came from Igarassu in 1910.”

²³Note that there were at least three active *maracatu* groups at that time. The third one might not have been rated as a *nação africana* by Silva. He himself, later in the same text, mentions that

[r]ecentemente o Recife ganhou mais um maracatu, de há muito desaparecido, que foi a Nação Porto Rico do Oriente [...] [Silva, 1975, p. 21]

(Port. “Recently, Recife won one more maracatu, which had been vanished for a very long time, that is the Nação Porto Rico do Oriente [...]”)

Porto Rico do Oriente was revived in 1967. The subsequent *Rei Eudes Chagas*, as well as composer João Santiago dos Reis and North American anthropologist Katarina Real all played crucial roles in this process, see [Real, 2001, in particular pp. 17–29], [Real, 1990, p. 181], or, in English language, [Santos and Resende, 2009, p. 45] and [Metz, 2008, p. 72].

²⁴Port. “What can be observed in these intellectual works is the lack of the voice of the subjects of the manifestation.”

resources of large parts of the Recife society has been lasting for centuries and in many aspects continues to date, it seems of great relevance and topicality to question where current views of legitimacy come from, whether they are justified, and in how far they are favorable for the actual carriers of popular culture.

The work of more recent authors puts new perspectives on hegemonic discourses. Among others, Isabel Cristina Martins Guillen, professor at the History Department of the Federal University of Pernambuco (UFPE), and the aforementioned *maracatuzeiro* and historian Ivaldo Marciano de França Lima offer most detailed and profound analyses of how the history of *maracatu-nação* was written so far and try to conceive new strategies of resignification. For a brief account of some of their work, see Section 2.3.3.

Ultimately, a better understanding of historical and cultural processes, in the context of Afro-Pernambucan culture and identity, might contribute to a more balanced distribution of power in Pernambucan society, opening up spaces of self representation for marginalized groups.

2.2.3 1989–2012: “Maracatu está na moda em Pernambuco”²⁵

According to Japanese scholar Yoshihiro Arai, who conducted field work during the Recife carnival of 1988, already eight *maracatu* groups were officially registered for the parades in that year [Arai, 1994, p. 117].²⁶ Three of them were founded, or reactivated, within the decade prior to this.

Katarina Real reports nine active ones in the carnival of 1989²⁷ and expresses, contrary to her views from 1967, great optimism concerning the present situation and future of *maracatu-nação* [Real, 1990, pp. 179–181].

Some 16 years later, in 2005, Climério de Oliveira Santos estimated that there were close to 65 *maracatu de baque virado* groups active in Pernambuco, 31 of which were registered in the Carnival Federation of Pernambuco [Santos and Resende, 2009, p. 29]. And in 2006, Isabel Guillen and Ivaldo

²⁵Port. “*Maracatu* is in fashion in Pernambuco”, headline from an article by Margarida Azevedo that appeared in the popular Recife newspaper *Jornal de Commercio*, 2007.01.28, cited in [Esteves, 2008, pp. 56, 113–114].

²⁶These were *Elefante*, *Porto Rico do Oriente* (according to the information given by Katarina Real in [Real, 1990, p. 179–182], the group of this name extinguished in 1979 after the death of Eudes Chagas; he must mistake it for *Porto Rico*), *Estrela Brilhante*, *Almirante do Forte*, *Indiano*, *Leão Coroado*, *Encanto do Pina*, and *Cambinda* (he must actually be referring to *Cambinda Estrela* here) [Arai, 1994, pp. 126–127].

²⁷The additional one being *Linda Flor*, founded according to the members, on September 15, 1984.

Lima confirmed likewise that “[o]s maracatus-nação fazem enorme sucesso no cenário cultural da cidade do Recife na atualidade [Guillen and Lima, 2006, p. 183].”²⁸

Maracatu is now generally regarded as one of the foremost carriers of Pernambucan identity and occupies some strategic spots in the carnival calendar and the cultural-political spheres of Recife. It has also quickly spread in- and outside Pernambuco. There are now dozens and dozens of percussion groups dedicated to the music of *maracatu*, not only in many other Brazilian states, but also in Japan, New York (U.S.A.), Toronto (Canada), many European countries²⁹, and possibly the rest of the world. Concerning the backgrounds of and discourses around these drastic developments, I will give a brief literature report in the following two Sections 2.3.1 and 2.3.3.

2.3 *Maracatu-Nação*: Literature

In order to understand the current discourses concerning issues like ‘tradition’ and ‘legitimacy’ of the *maracatus-nação*, as well as the prevailing views on their history, it is necessary to take the *literature* on *maracatu* into account, especially the one published up to the 1990s, which had a key role in the developments of all of these debates. Ernesto Ignacio de Carvalho refers to the renown and influential publications of Katarina Real from 1967 and Guerra-Peixe from 1955 as “sem dúvida os dois nomes mais utilizados para legitimar a ‘História Oficial’ [do maracatu.] [Carvalho, 2007, p. 14]”³⁰

Until the mid 1990s, the scientific literature on *maracatu-nação* was limited to the works of some interested intellectuals and folklorists, some of them I mentioned in Section 2.2. Regarding the developments since 1988, briefly touched upon in Section 2.2.3, it might in various regards seem appropriate to speak of a veritable ‘*maracatu* boom’, taking place both in- and outside the *Região Metropolitana do Recife* (including the world outside Brazil).³¹ This ‘boom’ extends to publications on *maracatu*, both scientific and non-scientific, and is reflected their rapidly growing number.

²⁸Port. “At the moment, the maracatu nations have enormous success in the cultural scene of the city of Recife.”

²⁹Examples include groups in London and Manchester (UK); Barcelona, Madrid (Spain); Paris and Nantes (France); Dublin (Ireland); 's-Hertogenbusch (Netherlands); Bruxelles (Belgium); Zurich (Switzerland); Hamburg, Berlin, Cologne, Augsburg and Mühldorf/Inn (Germany); and Vienna (Austria).

³⁰Port. “without doubt the two names used most widely for legitimizing the ‘Official History’ [of maracatu.]”

³¹See for example [Guillen and Lima, 2006], [Carvalho, 2007, pp. 39, 51, 58], [Thalwitzer, 2010, p. 6–9], [Tsezanas, 2010, p. 86], and [Oliveira, 2011, p. 7].

2.3.1 Non-Lusophone Literature on *Maracatu*

Prior to the mid 1980s, it seems unlikely to me that any substantial works on *maracatu* in any language other than Portuguese were published. Although still being limited, some non-lusophone literature on *maracatu* has been made available over the past two decades. In order to delve into the topic more seriously, and to develop a more profound understanding of this complex cultural manifestation, it is still indispensable to have a working knowledge of Portuguese.

To facilitate the possibility to at least start on the subject even without understanding Portuguese, I hoped it would be useful to gather the available sources together in one place. It certainly cannot be hoped to achieve completeness in such a task. But due to the extensive literature research I conducted in Vienna, Recife, Berlin, and the Internet, I do think that I might have covered a fair amount of existing non-lusophone publications, at least of those written in English, German, or any Romance language.

Dictionaries

In his 2001 lexicon article *Brazil*, of the honorable English music dictionary *New Grove*, Gerard Béhague dedicates about one paragraph to *maracatu* [Béhague, 2001, p. 289]. An overall idea of this folkloric tradition is given, but due to the shortness necessarily somewhat superficially. Several questionable propositions are put forward, such as that “the festivities for the coronation of black kings [were] first mentioned in 1711” (without naming any sources)³²; that the “religious function [of *maracatu*] seems to have been lost”³³; that the *dama-do-paço*, carrying the “*calunga* on which

³²Guerra-Peixe mentions the date 1711, possibly Béhague took that date from him. However, Guerra-Peixe also cites earlier sources [Guerra-Peixe, 1980, p. 16]. The most likely date for the earliest account of coronation festivities in Pernambuco, repeated by various authors, is September 10, 1666, see for example [Metz, 2008, p. 67] or [Crook, 2001, p. 234]. This is based on a testimony by Urbain Souchou de Rennfort, who visited Recife from July 6–November 2, 1666 [Silva, 2000, p. 311, fn. 10], named *Memoires pour servir a L’Histoire des Indes Orientales* (Fr. “Memorials to serve the History of the East Indians”) and published 1688 in Paris. Renown Pernambucan folklorist Pereira da Costa published a Portuguese transcription in a publication named *Anais Pernambucanos*, see [Silva, 2000, p. 51] and [Silva, 2002, p. 43]. He also reports another coronation from before 1711, of a *rei Congo*, in Igarapé, Pernambuco, in 1706. See [Silva, 1975, pp. 19–20] and [Souza, 2006b, p. 205]. In Recife, according to Leonardo Dantas Silva, coronations of Angola kings and queens are documented since 1674 [Silva, 2002, p. 44]. Also see [Silva, 1980, pp. 3–4] and [Guerra-Peixe, 1980, p. 16] on this topic.

³³See Section 2.3.4. Béhague would be most harshly criticized by many *maracatuzeir@s* for this statement.

the attention of all participants is focussed” was “the central figure of the parade”³⁴; and that *afoxé* from Bahia “retains more clearly African elements [than *maracatu*], such as singing in Yoruba language (Nagô), and typically Afro-Brazilian ritual practices in the preparation of the dance-parade”³⁵. In addition, a musical transcription from Guerra-Peixe’s seminal monograph is reproduced [Guerra-Peixe, 1980, p. 76].

In the German equivalent Dictionary, *Musik in Geschichte und Gegenwart*, a German translation by Eike Wernhard, omitting the musical transcription, can be found: [Béhague, 1995, columns 117–118].

Daniel J. Crowley

Daniel J. Crowley only briefly mentions *maracatu* in two articles. In his English *The Sacred and The Profane in African and African-Derived Carnivals*, he comments on the “dead-serious [Crowley, 1999, p. 226]” *mara-*

³⁴Although the *dama-do-paço* and the *calungas* (of which there might be more than one) are indeed highly important figures in the *maracatu cortejos* (Port. “courts”), judging from my experience most *maracatuzeir@s* would first name the *rainha* (Port. “queen”). I hence find Jerry D. Metz’ point of view much more plausible, who writes that

[t]he focal point of each procession is its “king” and “queen,” a man and a woman—usually the spiritual leaders and directors of the group [...]
[Metz, 2008, p. 64].

Roberto Benjamin, generally regarded as one of the main authorities on Pernambucan folklore, also wrote, some twenty years earlier, that the *rainha* “é a principal personagem [Benjamin, 1989, p. 81]” (Port. “is the principal character”). Another case in point is the huge importance and influence of the *rainha* Dona Santa (see my remarks in Section 2.3.3). Moreover, other parts of the parade, like the *porta-estandarte* (Port. “Carrier of the Standard”) or the *batuque*, in particular the *mestre* or *mestra do batuque*, might be rated as equally important.

³⁵Although Portuguese is by far the more common language in *maracatu toadas*, there are some groups partly also singing in African languages. Examples include *Maracatu Nação Cambinda Estrela* and *Maracatu Nação Raízes de Pai Adão*, see [Maracatu Nação Cambinda Estrela, 2003], [Maracatu Nação Raízes de Pai Adão, 2011], and [Various Artists, 2011]. Also, the typically Afro-Brazilian ritual practices in the preparation of carnival parades of the *maracatu* groups can be fairly extensive and lengthy, requiring for instance, at a few very specific occasions, not leaving the house for several weeks, fasting, or shaving off one’s hair. Further, a linkage to ‘African’ heritage is regarded as being of central importance in the constitution of *maracatu*’s identity by many *maracatuzeir@s*, and constantly emphasized by both official institutions and the *maracatu-nação* themselves. For more grounded views than the one presented here, consult, to name but a few works reflecting on this aspect, which is indeed one of the main focusses of current *maracatu* debates, [Metz, 2008], [Galinsky, 2002], or [Crook, 2001, pp. 237–240] in English, as well as [Lima, 2009], [Lima and Guillen, 2007], [Lima, 2006], [Guillen, 2011], or [Carvalho, 2007] in Portuguese.

catu courts that stand in striking contrast to the “most Profane of festivals [Crowley, 1999, p. 223]”, a seeming contradiction explored more in-depth by Ivaldo Marciano de França Lima (in Portuguese language), for example in *Maracatus-Nação e Religiões Afro-Descendentes: Uma Relação muito além do carnaval*³⁶, [Lima, 2006].

In the second one, published in Italian (translation from English by Paolo Ghidoli), he reflects on participation in carnival in various Brazilian cities, among others the Recife/Olinda area [Crowley, 1982, p. 85].

Tiago de Oliveira Pinto

There are a few non-lusophone publications by Tiago de Oliveira Pinto, renown Brazilian Ethnomusicologist now living and working in Germany, who is the author of some of the most important works on Afro-Brazilian music and paid, among others, also some attention to *maracatu*. These could possibly be the earliest non-lusophone publications containing substantial information on *maracatu*; but clearly, living in Vienna I have much better access to German publications than to those in any other language.

In field work conducted in Brazil 1984, he spent some of the time in the Recife area, where he had a chance to audio record an entire performance of the *maracatu* group *Leão Coroado* in Jaboatão dos Guararapes on October 27, 1984. Moreover, he recorded an extensive interview, also containing sung demonstrations of *maracatu toadas*, on November 3, 1984 with one of the most famous and influential *maracatuzeir@s* of all of *maracatu*'s history, Luíz de França de Souza (1901–1997³⁷), who was then leading the group. The recordings are available through the Ethnomusicology section of the Ethnological Museum in Berlin, Germany (Berliner Phonogramm-Archiv). A brief account of them, in German, is given in [Pinto, 1984]. However, almost no information is provided on the content.³⁸

Subsequent to this field trip, in 1986, Pinto released the German book *Brasilien. Einführung in die Musiktraditionen Brasiliens*³⁹. It contains a chapter called *Musik der Xangô-Kulte von Recife*⁴⁰, which seems very likely

³⁶Port. “Maracatus and Afro-Descendent Religions: A Relationship beyond The Frontiers of Carnival” (English title by Lima)

³⁷Dates taken from [Lima, 2007b, pp. 246, 231]

³⁸Concerning the exact dates of the recorded events, [Pinto, 1984] contains information contradictory to the documentation catalogue for the single recordings. The other dates reported would be October 28, 1984 for the performance and October 29, 1984 for the interview.

³⁹Ger. “Brazil. Introduction to the music traditions of Brazil”; Mainz, Germany: Schott, from the series *Welt-Musik*, 227 pages, illustrated, German.

⁴⁰Ger. “Music of the Xangô-Cults of Recife”

to contain an account of *maracatu*, but I have not yet had direct access to the book.

In 1992, the International Institute for Traditional Music and the Hamburgisches Museum für Völkerkunde⁴¹ published the CD “Carnival in Pernambuco/Brasil”, [Various Artists, 1992b], which contains two short recordings, made by Max Peter Baumann, from a carnival parade by *Maracatu Nação Porto Rico*, that took place on December 2, 1991. In the liner notes [Pinto, 1992], in German and English, Pinto in utmost shortness summarizes what is heard on the recordings as well as the history of *maracatu*.⁴²

Finally, his 1994 article *The Pernambuco Carnival and its Formal Organizations: Music as Expression of Hierarchies and Power in Brazil*, [Pinto, 1994], in English language, gives a detailed account of the formal conditions imposed on the carnival in the Recife area by official institutions and other formal organizations and in which ways those conditions and organizations have influence on the cultural actors of Pernambucan folklore.⁴³ From my own field work in 2010 and 2012, I can say that most of the formal conditions he reports as well as the interpretations he offers, seem still accurate today. He also gives brief accounts on the origins, the *batuque*, and ‘African aspects’ of *maracatu*.

Andreas Richter

The most detailed account of *maracatu* in German, in fact, as far as I know, alongside the *Batuque Book* project (see the paragraph below) probably the most comprehensive non-lusophone work on *maracatu* to date, is the 2001 master’s thesis *Der Maracatu in Pernambuco/Brasilien. Vielfalt in der Einheit am Beispiel dreier Maracatus*⁴⁴, [Richter, 2001], by German ethnomusicologist Andreas Richter. Based mainly on observations made and material recorded during a three-month field stay in Recife/Olinda, complemented by literature research, the thesis starts with a thorough discussion of the concepts *folgado*⁴⁵ and *folklore*, as well as *maracatu*, *nação*, and related and particularizing terms. Following this, Richter gives detailed descriptions of

⁴¹Ger. “Hamburg Museum for Ethnology”

⁴²According to [Pinto, 1994, p. 29], Pinto in 1991 also made video recordings of the group *Porto Rico*.

⁴³This is an approach which he pursues in even more detail for the specific case of *maracatu rural* in [Pinto, 1996].

⁴⁴Ger. “*Maracatu* in Pernambuco/Brazil. Diversity in unity at the example of three *maracatus*”

⁴⁵This Portuguese term designates in Brazilian folklore context, roughly speaking, popular manifestations involving dramatic elements, dramatic plays. *Maracatu-nação* is generally regarded as a *folgado*.

the *batuques* of the three *maracatu* groups that were the main focus of his field work: *Maracatu Nação Elefante*, *Maracatu Nação Porto Rico*, and *Maracatu Nação Pernambuco*. The approach resembles the one taken half a century earlier by César Guerra-Peixe in [Guerra-Peixe, 1980], who similarly gave an in-depth description of one specific group (again *Maracatu Nação Elefante*), only that Richter additionally tries to point out similarities and important differences between the groups, both of which contribute in certain ways to the groups' respective identities.

Apart from explaining look, construction, and playing techniques of the various instruments in each group, many transcriptions of music and lyrics are provided. The recordings used for the analyses are accessible through the Ethnomusicology section of the Ethnological Museum in Berlin, Germany (Berliner Phonogramm-Archiv).

Larry Crook

Larry Crook, North-American music historian and ethnomusicologist, now working at the University of Florida, has reported on *maracatu* on two occasions, both in English. The article *Turned-Around Beat. Maracatu de Baque Virado and Chico Science*, [Crook, 2001], from 2001, already mentioned several times, summarizes the history of *maracatu de baque virado* and focusses on the relation to the *mangue*⁴⁶ movement of the 1990s.

In his book *Focus: Music of Northeastern Brazil*, [Crook, 2009], first released in 2005, he also dedicates a well-conceived section to *maracatu*, partly containing information similar to his article, see [Crook, 2009, p. 90–105].

Philip Galinsky

The English PhD thesis *Maracatu Atômico. Tradition, Modernity, and Post-modernity in the Mangue Movement of Recife, Brazil* of North American scholar Philip Galinsky, published in 2002 as [Galinsky, 2002], puts the *mangue* movement of the 1990s into focus. In an in-depth discussion, he explores the discourses of 'local' and 'global', as well as 'modernity' and 'post-modernity', and relates them to *maracatu* and *pop* music, and analyses how these contexts crucially informed the coming about of *mangue* and the development of *maracatu* in the 1990s, culturally and politically, but also musically. Along

⁴⁶*Mangue* is or was part of the *nova cena musical*, the new musical scene, of Recife. Dating from the 1990s, the most renowned group of the movement was the formative *Chico Science and Naço Zumbi*, a pop/rock band which prominently featured *alfaias* in their stage performances and on their record.

the way, he provides some musical transcriptions and offers interesting insights on the group *Estrela Brilhante (do Recife)* and the developments and striking transformation of its *batuque* during the 1990s.

Gérald Guillot

French musicologist Gérald Guillot is author of the only two works including microrhythmic analyses of *maracatu-nação* recordings that I know of (both in French): in [Guillot, 2005], republished in electronic form as [Guillot, 2008], a *maracatu toada* called *Toque O Gonguê* by the *maracatu-nação Estrela Brilhante (do Recife)* is thoroughly analyzed on several levels and from various perspectives.

His doctoral thesis [Guillot, 2011a] is an extensive study on the impact of transcultural didactic processes on sub-syntactic timing in the context of French percussion groups playing Afro-Brazilian music. It also contains a microrhythmic analysis of two *maracatu* recordings. I will compare his results with mine in Section 8.1.

He further mentioned to me that he is currently working on a paper called *Uma perspectiva musicológica analítica a serviço de uma compreensão aprofundada do maracatu de baque virado*⁴⁷, which will be published in a “Coletânea de maracatu”⁴⁸ (working title) in March or April 2013, and focusses on musical aspects of *maracatu de baque virado*.

The *Batuque Book* Project

This project, planned since 2001 and launched in 2003, realized by ethnomusicologist and musician Climério de Oliveira Santo and professional percussionist Tarcísio Soares Resende [Santos, 2004, p. 92], has produced three releases, so far. In 2005, the *Batuque Book* was published. It contains overall introductions to both *maracatu de baque virado* and *maracatu de baque solto*, as well as to the three *maracatus Leão Coroado, Porto Rico, and Encanto da Alegria*, as well as to three further *maracatus de baque solto*. All the texts are presented simultaneously in Portuguese and in an English translation by Peter Malcolm Keays. The main part offers transcriptions, in score form, including percussion, of three *toadas*, of each group. Recordings are included on an accompanying CD. The transcriptions are not mainly of analytical and descriptive nature, but rather focus on patterned repetitions. As such, they lend themselves excellently to be used as instructional material. Combined

⁴⁷Port. “A music analytic perspective serving a profound comprehension of *maracatu de baque virado*”

⁴⁸Port. “*Maracatu* collection”

with the scarcity of non-lusophone literature on *maracatu* in general, which probably became more and more sensible during the rapidly growing popularity of *maracatu* outside Brazil in the 1990s and 2000s, this has led to great popularity of the release. In 2007, Ernesto Ignacio de Carvalho remarked that

[o] *Maracatu Batuque Book* foi recentemente comprado em grandes quantidades na Inglaterra, onde um grupo de percussionistas pretende adotá-lo como método de ensino de percussão em escola.⁴⁹
[Carvalho, 2007, p. 131, fn. 103]

He also criticizes the didactic approach for being static and not process-oriented, and hence missing the dialogic essence of the music of *maracatu*. On the other hand, the book can hardly be criticized for representing an unjustified and purely external view, as it was conceived and developed in close collaboration with the represented groups [Santos, 2004], [Sandroni, 2009, p. 15]. Also, Resende himself strongly emphasizes the dialogic aspect of playing *maracatu* [Santos and Resende, 2009, pp. 33–34]. As the first edition of the book sold out, it was republished as [Santos and Resende, 2009].

In [Santos, 2004], Climério Santos gives informative insights on the backgrounds, the preparatory field work, and some of the complications he and Tarcísio Resende saw themselves confronted with during the process leading to the publication.

Lastly, in 2010, a DVD was released: *Maracatu-Nação. Brazil's Heartbeat*, [Santos and Resende, 2010]. It contains a documentary on *maracatu*, transcriptions; a section in which Alfonso Aguiar of *Leão Coroado*, Jailson Shacon Viana of *Maracatu Porto Rico* and Seu Toinho of *Maracatu Encanto de Alegria*, all *mestres do batuque* of their respective groups, talk about and demonstrate the respective rhythms; a section on the construction of *alfaias*; as well as a feature on percussion groups dedicated to *maracatu* in- and outside Brazil.

Jerry D. Metz

The compelling and aforementioned English article [Metz, 2008] by Jerry D. Metz, from 2008, after briefly reviewing *maracatu*'s history, offers an excellent discussion of the concepts *gonguê* and *calunga*, both central to the discourse on *maracatu* identity. He subsequently puts this in a wider Afro-Brazilian

⁴⁹Port. “[r]ecently, the *Batuque Book* was purchased in great quantities in England, where a group of percussionists intends to employ it as an instructional method for teaching percussion in school.”

context, focussing on the Brazilian, in particular Bahian, black empowerment movements of the 1970s and 1980s.

Instructional Literature

In an English paper from 2010, [Thalwitzer, 2010], I reviewed available *instructional material* related to *maracatu*. This included mainly arrangements for percussion instruments *not* directly linked to the *maracatu* tradition, like *drum set* or *pandeiro*. Due to the still limited amount of non-lusophone resources on *maracatu*, I conjectured that this material, alongside *maracatu* workshops held in Europe, influences the reception of *maracatu* by interested musicians and percussion groups outside Brazil. Although not of scientific nature, I still included some of this instructional material in the bibliographic listings of the Appendix, see Section 9.1.

One of the few examples also including a few overall introductory remarks on history, significance, the *cortejos*, and the *batuques* of *maracatu*, is [Assis, 2002, pp. 95–96], in German language.

Miscellaneous

Published in 1990, the second edition of the aforementioned publication *O folclore no carnaval do Recife* (1967) by Katarina Real, discussed in Section 2.3.2, includes an extensive English summary of the book [Real, 1990, 209–265].

Apart from that, there are some contributions of maybe more peripheral interest which I want to mention for the sake of greater completeness.

Gerhard Béhague published an English book review on *Folclore Nacional* by Alceu Maynard Araújo (1964), in which he also briefly summarizes the *maracatu* section of that book, [Béhague, 1966, pp. 100–101]. Gertrude P. Kurath wrote an English review of the first, 1967, edition of [Real, 1990] and another book by Katarina Real, *Arte Popular do Nordeste*⁵⁰ from 1966, see [Kurath, 1970]. A second English review of Real’s 1967 book stems from Seth Leacock, both are included in [Real, 1990, pp. 149–153].

Japanese scholar Yohihiro Arai visited the Recife carnival of 1988 subsequently and published a well-conceived article in Japanese language in 1992 on it, in which he focusses on *maracatu de baque virado*. It was later republished in the Portuguese translation [Arai, 1994].

In 1992, the French CD [Various Artists, 1992a] was released, which was in some respects conceived similarly to, and incidentally published the very same year as, the already mentioned [Various Artists, 1992b], to which Tiago

⁵⁰Port. “Popular Art of the Northeast”, English title by Kurath

de Oliveira Pinto wrote the liner notes. A recording of “Marakatu” is included but it is unfortunately not specified which group is heard or when the recording was made. In the short liner notes, offered in French and in an English translation, Jean-Pierre Tzaud tells us about

[...] the “Maracatus”, who, carrying on the tradition of the ambassadors from the kingdoms of Africa, come down from the suburbs with their cardboard animals (the elephant and the lion), their Kings and Queens, their Ladies playing with banners or carrying the mascot doll. [Tzaud, 1992, pp. 8–9] ⁵¹

Finally, Tristan Jehan developed a computer model for automatized down-beat prediction. The model was tested, among others, on some *maracatu* recordings⁵², chosen for the strongly syncopated and contra-metric patterns accented on the *alfaia*, which also tend to make it difficult for unacquainted human listeners to find the *down-*, or, in fact, any *beat*.⁵³ An English account of the project is given in [Jehan, 2005].

2.3.2 Literature up to the 1990s

The earliest sources on *maracatu* frequently cited by authors that take historical aspects into account, are articles published in the newspapers of Recife. This is exemplified by many of the writings of Leonardo Dantas Silva and Ivaldo Marciano Lima.

As far as secondary sources are concerned, the body of scientific publications on *maracatu-nação* is already fairly comprehensive today.⁵⁴ However,

⁵¹Funnily, the track list in the booklet interchanges the “Marakatu” and the “Ecole de Samba” recordings as compared to the actual order on the CD, which in conjunction with the missing information of the coming about of the recordings and the highly superficial texts in the booklet, leaves one wondering whether the producers of the release could actually tell one from the other. This quote is the only passage from the booklet mentioning *maracatu*. If it should happen to have anything to do with the recording on the CD, which appears neither especially probable nor improbable, then due to the mentioned allegorical animals, the elephant and the lion, it could be conjectured that the recorded group is *Maracatu Elefante*, but due to the overall impression of the source, this must remain highly uncertain.

⁵²They were by the group *maracatu-nação Estrela Brilhante (do Recife)*. Although not mentioned explicitly, from some remarks in the article it can be concluded that they must have been taken from [Maracatu Nação Estrela Brilhante do Recife, 2001].

⁵³Guerra-Peixe specifically dedicated an essay to the interesting perceptual effects of the highly syncopated accents in the bass range, which are something rather peculiar in most Western classical and pop music traditions, see [Guerra-Peixe, 1950]. His views largely are congruent with my own experiences in this regard.

⁵⁴One of the most productive and renowned authors currently working on *maracatu*, Isabel

this is a rather recent phenomenon. Carlos Sandroni, professor for ethnomusicology at the Music Department of the Federal University of Pernambuco (UFPE), remarked in 2005 on “Pernambuco’s *maracatus*” (English translation by Peter Malcolm Keays):

Until very recently, however, the only work which had attempted to understand the musical proceedings was the famous book by Guerra-Peixe, *Maracatu do Recife*, which dates from the 1950s. [Sandroni, 2009, p. 15]

A similar view is shared by historian Isabel Guillen, who in 2007 wrote the following:

A obra de Guerra Peixe, *Maracatus do Recife*, publicada em 1955, pode ainda hoje ser considerada como o estudo mais completo sobre os maracatus [...].⁵⁵ [Guillen, 2007b, p. 236]

That article, as well as [Guillen, 2004], both specifically dedicated to this topic, discuss the significance of Guerra-Peixe’s work as well as the contexts in which it should be considered.IVALDO Lima similarly offers many detailed and thoughtful considerations on this in several of his publications, as for example in [Lima, 2005] and [Lima, 2010].

Guerra-Peixe carefully reviews the literature available up to that point, considers various theories about the history of the *maracatus* as well as several terms that are important in that context, describes in great detail his observations concerning *Maracatu Elefante* and to a certain extent other groups, and included musical transcriptions for all of the instruments used in *Elefante*. As far as the instrumental part of the music of *maracatu* is concerned, to my knowledge, and apart from the minor exceptions mentioned below, these transcriptions might be the only ones that are preserved from the period prior to the 1990s.⁵⁶

I would now like to take a quick look at the literature up to the 1990s that I consider most relevant concerning the musical aspects of *maracatu*. I would say that by far the greater part of the available literature on *maracatu* focusses on other issues than its music.

Cristina Martins Guillen, is coordinator of a research-project on the history of *maracatu-nação*. On the homepage of the project, there is an extensive though uncommented listing of (predominantly lusophone) *maracatu*-literature [Guillen, 2013].

⁵⁵Port. “The work of Guerra Peixe, *Maracatus do Recife*, published in 1995, can up to this date be considered as the most complete study on the maracatus [...].”

⁵⁶In fact, the earliest transcriptions of *maracatu* percussion that I know of, published after Guerra-Peixe, are published as recently as 2001 and are found in [Richter, 2001] and [Crook, 2001, p. 238].

Pereira da Costa: 1908

The earliest scholarly publication regularly referred to since then by most authors working on *maracatu*, and which seems to have influenced decisively and in various aspects the views and thoughts on *maracatu-nação*, its history and its characteristics, represented in the greatest part of scientific publications up to the 1990s and certainly at least partly beyond that,⁵⁷ is Francisco Augusto Pereira da Costa's *Folk-lore pernambucano. Subsídios para a história da poesia popular em Pernambuco*, first published in 1908. Unfortunately, I so far had no direct access to this book.

Mário de Andrade: 1930s

Most influential were also the ideas and works of poet, writer, musicologist and historian Mário de Andrade [Benjamin, 1985, pp. 10–11], [Guillen, 2007b, pp. 239–240]. In the carnival period 1928–1929, he conducted a field research in Recife where he transcribed several melodies of the *maracatu Sol Nascente*, which were sung for him by the “[r]eis e dono do maracatu da Nação do Sol Nascente”⁵⁸ [Andrade, 1982, pp. 133–134]. To my knowledge, these might be the earliest documented transcriptions of the music of a *maracatu*. They were published in 1934–1935, together with an article in which he describes his observations [Andrade, 1982, pp. 137–176].⁵⁹

A little later, in 1938, Mário de Andrade was involved in the “Missão de Pesquisas Folclóricas”, which conducted field research and audio recordings in Pernambuco and Paraíba [Guillen, 2007b, p. 239]. The research team also recorded “alguns poucos segundos do maracatu-nação Leão Coroado.”⁶⁰ [Guillen, 2007b, p. 239] According to Ivaldo Lima, the quality is almost

⁵⁷See, for example, [Lima, 2005, pp. 56–72] or [Silva, 2004, pp. 31–43]. Virtually *all* authors I have read so far who have published on *maracatu* prior to the 1990s make reference to Pereira da Costa, in the majority of the cases illuminatingly already on the very first pages of their works, when discussing the origins of *maracatu* and the sources they use. Examples include Mário de Andrade in 1934 [Andrade, 1982, p. 139]; Guerra-Peixe in 1955 [Guerra-Peixe, 1980, p. 15]; Theo Brandão in 1961–1962 [Brandão, 1976, p. 3]; [Ferreira, 1951, p. 24], Katarina Real in 1967 [Real, 1990, p. 59]; Leonardo Silva in 1975 [Silva, 1975, p. 18].

⁵⁸Port. “king and lord of the maracatu of the Nação of the Sol Nascente”

⁵⁹Some very brief transcriptions of instrumental parts, in score form are also included. Unfortunately, no additional description is offered. Given the fact that these transcriptions appear slightly peculiar when compared with the ones offered by Guerra-Peixe, seemingly carried out with great care, or even the music the *maracatus-nação* are playing today, and in the light of the remarks that Guerra-Peixe makes on the observations of Andrade as far as the *batuque* is concerned [Guerra-Peixe, 1980, pp. 83–84], it seems not entirely clear how Andrade's transcriptions are to be interpreted and how accurate they are.

⁶⁰Port. “a few seconds of maracatu-nação Leão Coroado”

inaudible and the recordings are currently being archived in digital form.⁶¹ To my knowledge, this is most probable the oldest preserved audio recording of a *maracatu-nação*.

Ascenço Ferreira: 1942

Originally published in 1942, there exists a ‘folkloric lecture’ by Ascenço Ferreira, called *O Maracatu*, in which he reflects on the origins of *maracatu*, reports some of his own observations, and provides some transcriptions of the words and melodies of *maracatu toadas*.⁶²

Katarina Real: 1967

In her relatively brief account of “As Nações Africanas”⁶³ which is found in her influential book on the various carnival traditions of Recife [Real, 1990, pp. 55–69], already mentioned a few times, Katarina Real mainly reports her observations from the period of her field work in Recife, 1961–1966. In the second edition, published 1990, a chapter is added containing some of the observations she made when visiting the Recife carnival again in 1989.

Although little information is given which would directly concern the music, it offers at least remarks on the groups that existed during the respective observation periods, and the instrumentation of their *batuques*. Moreover, it seems to be more or less the only major work containing any information on the music of *maracatu* published between Guerra-Peixe’s *Maracatus do Recife*, from 1955, and the 1990s.

2.3.3 Current *maracatu* Discourses

As mentioned before, the scientific accounts and reflections on *maracatu* have greatly increased in number and, in my opinion, to a great part in quality, in a development that began partly during the 1990s, but is mainly fully fledged since the beginnings of the 2000s and has lasted since then. I dare say that during the past decade more significant and valuable works on *maracatu* were published than in the century before. Views until recently undisputed, which seem questionable from today’s perspective, have been rethought, opening possibilities for a deeper comprehension of all aspects of *maracatu-nação*.

⁶¹Personal communication, February 23, 2012.

⁶²He gives a single example of an instrumental pattern, designated as “baque virado”, although without specifying on which instrument it is meant to be played [Ferreira, 1951, p. 27].

⁶³Port. “The African Nations”

Besides this resignification of the history of *maracatu*, a few of the many discourses around *maracatu*, that are currently debated in the scientific literature are centered around the following issues:

Black and Afro-Brazilian identity and culture; the participation of the middle-class in *maracatus-nação*, and, in relation, the borders of identity between percussion groups respectively *maracatus estilizados* and *maracatus*, as well as the spectacularization of popular culture and the homogenization of *maracatu*; female *batuqueir@s*, partly in connection with the concept of ‘tradition’;⁶⁴ the relation of religion and *maracatu*; *maracatu*, and Pernambuco popular culture in general, in the context of globalization; and the social components of *maracatu*.

Furthermore, several works have been dedicated to specific *maracatus-nação* or certain *maracatuzeir@s* of great visibility, first and foremost Dona Santa⁶⁵, who is with little doubt the most widely renown and influential *maracatuzeir@* in the history of *maracatu*.

⁶⁴To illustrate this, I want to repeat a citation from Seu Toinho, former *mestre* of *Encanto da Alegria*, reported through Jerry Metz:

There are obviously differing perceptions among Recife leaders about the meanings and boundaries of *maracatu*, and the groups monitor each other: Seu Toinho, director of Maracatu Encanto da Alegria, states flatly that “I’ll die first, but I won’t allow the *abê* in, nor will I let women play in this *maracatu*” (“Maracatu Nação Encanto da Alegria” liner notes). [Metz, 2008, p. 86]

Mestre Gilmar Santana of *Estrela Brilhante de Igarassu* likewise remarked to me that, for ‘traditional reasons’, he would not let neither women nor ‘gays’ play in his *maracatu*. According to the ‘tradition’, he argued, only men play and only women dance (informal conversation on February 2, 2012, after an *ensãio* of the group, in front of Gilmar’s house in Igarassu, Pernambuco).

In *Porto Rico*, woman may play all instruments except *atabaque*, which is for ‘religious reasons’, and which is treated the same way in *candomblé* context, as *mestre* Shacon Viana explained to me. Furthermore, *only* women are playing *abê*, for ‘aesthetic reasons’ (informal conversation on February 4, 2012, after an *ensãio* of *Encanto do Pina* and *Baque Mulher* in the Pina neighborhood of Recife).

It seems worth noting that by now, *Encanto da Alegria*, under the direction of new *rainha*, *rei*, and *mestre*, have incorporated an *abê* section consisting entirely of *batuqueiras*.

⁶⁵Maria Júlia do Nascimento, born on March 25, 1887, passed on October 5, 1962 [Silva, 2002, p. 54], better known as “Dona Santa”, was *rainha* of *Leão Coroado* in the early 20th century. At least from the late 1930s onwards [Guillen, 2006, p. 36] and until her death, she was *rainha* of *Maracatu Elefante*, which she is most widely known for. This hence included the period during which Guerra-Peixe conducted his field study on *Elefante*, the observations from which constitute the basis of the descriptions he reports in his 1955 book *Maracatus do Recife* [Guerra-Peixe, 1980]. Some of the articles and (parts of) other publications focussing specifically on Dona Santa are [Batista e Silva, 78], [Brito, 2003], [Guillen, 2006], [Guillen, 2007a], [Lima, 2010, pp. 105–110].

In this place, I cannot give an overview on this relatively dense and highly interesting body of work, published during the past ten years. However, all the literature known to me that has specific relevancy for the music of *maracatu*, and hence for the analyses I will conduct in Part III, is mentioned throughout Chapter 3.

2.3.4 A Remark on Religion

Maracatu-nação is a rather complex folkloric phenomenon of substantial social, religious, cultural, and economic relevance in great parts of the society in the Recife/Olinda area. Its current manifestation results from an intricate and century-long history during which it has incorporated elements of many religious and musical traditions and has been influenced and shaped by (to name but a few aspects) changing political and social backgrounds, influential individuals and groups, competition and rivalry between them, scientific debates, the media, and public reception.

Talking to various *maracatuzeir@s* and folklorists in Recife, I met some who were worried about the fact that outside of what is often regarded as the ‘traditional’ *maracatus-nação* in Recife and Olinda, in particular in percussion groups within and outside Brazil, *maracatu* is often perceived solely or mainly as a musical genre—like e.g. *samba*, *forró*, or pop music—and not as a cultural manifestation in which music plays only some specific role, in fact a maybe even rather subordinated one.

For example, Shacon Viana, *mestre* of *Porto Rico*, remarked to me that if *candomblé* is taken away from *maracatu*, nothing remains.⁶⁶ According to him, *capoeira* today is in a state of utmost popularity throughout the world, but hardly anybody seems to know about the meanings, religious backgrounds and history of it. He sees *maracatu* at the moment in a place similar to where *capoeira* was twenty years ago, with rapidly growing popularity of *maracatu* within and outside Pernambuco. He thinks that in this growth lies the danger of *maracatu* becoming renown on the one hand (which he would think of as a very positive thing), but somehow shallow or meaningless on the other hand. He consequently expressed some skepticism towards publications that over-focus on the music of *maracatu*.

The *batuque* usually constitutes only a relatively small part of the *maracatu* groups, as far as numbers are concerned (see p. 45 in Section 3.1). That the music, the *batuque*, is likewise by no means usually perceived as the central or most important aspect of the *maracatus-nação*, becomes apparent

⁶⁶Informal conversation on February 4, 2012, after an *ensãio* of *Encanto do Pina* and *Baque Mulher* in the Pina neighborhood of Recife.

in the descriptions of the *maracatu* groups by folklorists and by the aspects they are placing their focus on. For example, Leonardo Dantas Silva in 2002 described the parade of a *maracatu-nação* as follows:

[A]s seculares nações [...] seguem pelas ruas afora com o estandarte no ar, umbela girando, rei e rainha com porte de realeza, damas-do-paço mostrando as calungas, damas-de-frente portando buquês de flores, lanceiros abrindo espaço na multidão, meninos carregando lampiões ou puxando a carroça com o animal símbolo da nação, baianas com um ginga própria dos terreiros de xangô e um jogo de braços característicos da dança molenga, caboclos de pena fazendo complicados passos, como servissem de guia ao préstito, e no final uma orquestra de percussionistas com o seu baque virado.⁶⁷ [Silva, 2002, p. 64]

A similar relation stems from Francisco Augusto Pereira de Costa from his *Folk-Lore Pernambuco* (1908):

Rompe o préstito um estandarte ladeado por arqueiros, seguindo-se em alas dois cordões de mulheres lindamente ataviadas, com os seus turbantes ornados de fitas de cores variegadas, espelinhos e outros enfeites, figurando no meio desses cordões vários personagens, entre os quais os que conduzem os fetiches religiosos,—galo de madeira, um jacaré empalhado e uma boneca de vestes brancas com manto azul—; e logo após, formados em linha, figuram os dignitários da corte, fechando o préstito o rei e a rainha.

Estes dois personagens, ostentando as insígnias da realeza, como coroas, cetros e compridos mantos sustidos por caudatários, marcham sob uma grande umbela e guardados por arqueiros.

No coice vêm os instrumentos: tambores, buzinas e outros de feição africana, que acompanham os cantos de marcha e danças diversas com um estrépito horrível.⁶⁸ (cited in [Silva, 2002, p. 52–53].)

⁶⁷Port. “[T]he centuries old nações [...] are processing through the streets with the standard in the air, the umbrella turning, king and queen of royal comportment, *damas-do-paço* showing the *calungas*, *damas-de-frente* carrying bouquets of flowers, *lanceiros* opening up corridors through the crowd, children carrying lamps or pulling the carts with the symbolic animals of the nação, *baianas* with a *ginga* of a *xangô terreiro* and an arm movement characteristic to a *molenga* dance, *caboclos de pena* performing complicated steps, as if serving as a guide for the procession, and at the end a percussion orchestra with its *baque virado*.”

⁶⁸Port. “At the front of the procession is a standard, flanked by archers, following in the wings are two lines of women beautifully dressed, with their turbans adorned with

Similarly, in a leaflet from the 2012 carnival, called *Cartilha do carnaval*, issued by the Recife city government as an overall introduction to the various carnival manifestations, written for visitors of the carnival, out of three pages in which the *maracatus-nação* are described, one paragraph is dedicated to the music [Nascimento and Ribeiro, 2010, p. 35-37].

I think the respective space which is dedicated to the various components of the *maracatus-nação*, gives hints at what the authors of these three examples might think of more or less centrally to *maracatu*.

As another observation in support of this point could be rated that in the *critérios de julgamento* of the *concurso carnavalesco*⁶⁹, only a very small part of the maximum score is granted according to the jury's assessment of the music and the *batuque* of the *maracatus-nação*, the by far greater part is granted according to the assessment of other components, like costumes and accessories, choreography, posture, and overall impression.⁷⁰

In this work, nevertheless, I discuss virtually *exclusively* musical matters. This is mainly due to the limited scope of this diploma thesis and the fact that my main competence as well as interest—being a percussionist and musicologist—lie in this area. In no way it should be inferred from the topic chosen for this thesis that the music is a more (or less) 'important' aspect of *maracatu* than e.g. its religious practices. I can only hope to contribute not too much to the great selectivity of the *maracatu* reception in substantial parts of the general public, which sometimes tend to focus on the music.

variegated ribbons, tiny mirrors and other effects, between these two lines are positioned various figures, between which those who carry the religious fetishes,—a wooden rooster, a stuffed alligator and a doll dressed in white garments and a blue cloak—; and following behind, formed in a line, the dignities of the court, closing the procession are king and queen.

These two characters, marked by the signs of royalty, with crowns, scepters and long robes carried by the train-bearers, are marching under the big umbrella and guarded by archers.

At the rear come the instruments: drums, horns and others of African make, which accompany the marching songs and diverse dances in a horrible uproar.”

⁶⁹The *concurso carnavalesco* is a competition, organized in various *grupos* (groups) or *categorias* (categories), in which the parading groups are judged by a jury and in which the winners are donated an amount of money from the city government. The *critérios de julgamento* is a catalogue of criteria according to which the judgements of the jury shall be made. It can be obtained from the *Casa do Carnaval* in Recife, where the *critérios* since the 2002 carnival are archived. (According to the president of the Recife *escola de samba Banhistas do Pina*, such a criteria catalogue exists since 1990, which he remembers exactly due to a certain event; informal conversation on March 9, 2012, in the *Casa do Carnaval*.)

⁷⁰In 2004 and since 2008, a *nação* can achieve 10 out of 80 points for its music and *batuque*. In 2002, it was 10 out of 140 points; 2003: 10 out of 60 points; and 2005: 10 out of 90 points.

Chapter 3

Maracatu-Nação: Batuque and Macrorhythms

In a public presentation of a *maracatu-nação* group, typically a great multitude of components take part, including the following: a *porta estandarte*¹; *rainha* and *rei*², behind which an *escravo*³ is carrying the *pálio*⁴; various other components of the *corte* or *cortejo*⁵; the *dama do paço*⁶ who is carrying a *calunga*⁷; *baianas*⁸; further figures and dancers; *diretores*⁹ who are not wearing costumes and solely fulfill important organizational tasks; and, usually last, the *batuque*, the percussion ensemble of a *maracatu-nação*, on which I will henceforth focus exclusively.

3.1 The *Batuque*

What I present in here is only intended to give a very rough overall idea of the *maracatu batuques*. Due to capacity constraints, I will not be able to portray in due manner the great manifoldness of Recife's *maracatu* groups and the central points that are constituting their respective identities and

¹Port. “carrier of the standard”

²Port. “queen” and “king”

³Port. “slave”

⁴A large protecting umbrella; for some considerations on its history, see [Silva, 2002, pp. 49–51].

⁵Port. “court”

⁶Concerning orthography and meaning, see [Guerra-Peixe, 1980, 40–45].

⁷A certain doll of central religious significance. For detailed discussions, see [Metz, 2008, pp. 71–74], [Andrade, 1982, 140–149], or [Silva, 2002, pp. 57–62].

⁸Port. “Bahians” (female form)

⁹Port. “directors”

individualities.¹⁰

Concerning the microrhythmic analyses of Part III, I conjecture that differences in the composition of the *batuques* might have important effects on the microrhythmic timing. Besides the question which instruments are used, I think this is particularly the case regarding the *size* and *formation* of the groups, where substantial disparities can be observed.

The information I give on positioning of the instruments, playing style and related topics arise mainly from my own observations, firstly during the carnival periods of 2010 and 2012, and secondly from field- and other recordings of *maracatus-nação*. Very little detailed descriptions of playing techniques can be found in the literature.

Instrumentation

The *batuque* of *maracatu-nação* consists of a relatively definite range of instruments. Instruments currently used in virtually all *maracatus-nação* are *alfaia*, *caixa*, *gonguê* (or possibly another bell), and some type of shaker. However, the instrumentation is, like all human things, subject to developments. For example, over the last two decades, two ‘new’ instruments, *abê* and *timbal*, were introduced and quickly spread around the Recife *maracatu* scene.¹¹ They can now be regarded as more or less fixed parts of the ensemble. At least two other ones, *ganbê* and *patagone*, have been added in two different, very popular *maracatus-nação*,¹² during the past few years and have since been used in their public presentations. In the ‘modern’ *maracatus estilizados* of Olinda, *caixas* are now often seen mounted on stands and used alongside various bells and cymbals in a drum-kit-like setup.¹³ Such developments are not new: Guerra-Peixe reports from his field research on *maracatu*, conducted between 1949 and 1952 [Guerra-Peixe, 1980, p. 11], that

¹⁰For some remarks on the different playing traditions in the *maracatus-nação* of Recife, see [Lima, 2004].

¹¹The question whether an instrument is to be regarded as ‘traditional’ or as an innovation in *maracatu* context, is of great importance to some *maracatuzeir@s*. Whether these two instruments are ‘new’ to the *maracatus-nação*, is disputed. See, for example, [Santos and Resende, 2009, p. 46, fn. 1].

¹²These are *Porto Rico*, respectively *Estrela Brilhante*. Both are regarded as particularly ‘traditional’ and still are regularly introducing elements into *maracatu-nação*, musical and else, which might appear as innovative, which seems to not stand in contradiction.

¹³These are observations from my own field work. A mounted *caixa*, positioned next to a *crash cymbal* on a stand, is also already documented in a recording of an *ensãio* of *Nação Pernambuco*, filmed in 2000 in the *sede* of the group in Olinda, by Andreas Richter. The recording, *Bras 00/V11 VU 2*, is available through the Ethnomusicology section of the Ethnological Museum in Berlin, Germany (Berliner Phonogramm-Archiv), see [Richter, 2001, p. 113].

back then, the *ganzá* was very little used among the *maracatus* of Recife.¹⁴ Today, the instrument is regarded as a part of the ‘tradition’, and most groups either use it or used it until replacing it with the *abê*.

The *mestra/mestre*

Besides the *batuqueir@s*, playing the various instruments, the *batuque* also comprises its *mestra* or *mestre*¹⁵. She or he is, during a performance, responsible for the organization and formation, decides the overall order of *toadas* and arrangements played. Moreover, using the *apito*, a whistle, the only instrument played by the *mestre* or *mestra* during a performance, cues are given, sometimes to start a new piece, and usually to end it. The solo voice in the *toadas* is nowadays most often sung by the *mestre* or *mestra*.

Group Size

The number of each of the instruments actually played at a certain occasion may vary greatly, depending on the overall setting of the event, the size of the *maracatu* group, and on the number of *batuqueir@s* available at that moment. Generally, the size of the *batuques* has strongly tended to increase over the course of the past two decades. In 1950, César Guerra-Peixe reported the *batuque* of *Maracatu Elefante* as consisting of 15 instruments:

No Maracatu Elefante o conjunto instrumental compõe-se, atualmente, de gongué, taró, três caixas-de-guerra e dez zabumbas—um “marcante”, um “meião” e oito “repiques”.¹⁶
[Guerra-Peixe, 1950, p. 158]

From a public presentation of *Maracatu Indiano* in 1963, Katarina Real reports 22 instruments. From the 1989 carnival, she relates the following:

¹⁴Although he speaks of *Maracatu Brilhante* as being the *only* group to use one [Guerra-Peixe, 1980, p. 26], he later in the same text mentions that *Maracatu Estrela Brilhante* also uses them [Guerra-Peixe, 1980, p. 64]. (These are two different groups, as can be inferred from his listings [Guerra-Peixe, 1980, p. 22].) Again, he emphasizes that this is rather an exception, even one of several “deformações” (Port. “deformations”), which he believes to observe in the music of *maracatu* groups of that time.

However, some earlier sources also report the use of *ganzás* in *maracatu* groups [Andrade, 1982, p. 152], [Ferreira, 1951, p. 14], [Guerra-Peixe, 1980, p. 83]. On the question when and how the *ganzá* might have been introduced to *maracatu*, see [Oliveira, 2006, p. 120–121].

¹⁵Port. “Master”, feminine and masculine form.

¹⁶Port. “In the Maracatu Elefante, the musical conjunct is composed, at the moment, of gongué, taró, three caixas-de-guerra and ten zabumbas—a ‘marcante’, a ‘meião’ and eight ‘repiques’.”

A nova Nação PORTO RICO [...] deixou o público, já bastante animado, espantadíssimo com o trovoadas do seu impecável “baque virado” de 22 bombos e três taróis—o maior jamais visto num desfile do carnaval!¹⁷ [Real, 1990, p. 183]

Assuming that *Porto Rico* had in addition at least a *gonguê*, this makes 26 instruments. In 1992 and likewise in 1994, Tiago de Oliveira Pinto speaks of around thirty percussionists in a *maracatu* group, which he portrays as being rather the rule than the exception [Pinto, 1992, p. 16], [Pinto, 1994, pp. 24, 29].

Today, from my own field work, I can say that groups with *only* thirty *batuqueir@s* are already almost an exception; although the group sizes vary vastly, among the greatest *maracatus-nação*, *batuques* of sixty or even a hundred components can frequently be observed. For example, as Oswaldo Pereira and Tarcísio Resende inform us in 2005 (translation by Peter Malcolm Keys), in *Porto Rico*, “nearly 110 *batuqueiros* make the earth move with *baque* waves. [Santos and Resende, 2009, p. 46]” In the *critérios de julgamento* of the *concurso carnavalesco*, in 2002, a minimum of 13 *batuqueir@s* and an overall minimum of 80 (second) resp. 100 (first group) participants of the *nação* was required for the *passarela*¹⁸. In 2012, 16 *batuqueir@s* and overall minima of 60/90/130/160 (access, second, first, and special group) were required.

Judging from my own experiences as a percussionist, it appears close to impossible that playing in a group of twenty or of a hundred percussionists does not affect the microtiming, but it would be highly speculative to conjecture any specific numerical ranges for such possible phenomena.

Formation

In the *Nação do Maracatu Leão da Campina*, the group I participated in during the Recife carnivals of 2010 and 2012, the *alfaias* are forming the rear part of the *batuque*, with a line of *caixas* before them.¹⁹ Positioned at the very front are the *abês*, facing *mestre* Hugo Leonardo. The *gonguês* are also usually found towards the front; however, they are often free to move

¹⁷Port. “The new Nação PORTO RICO [...] left the audience, already quite lively, most astonished by the thunder of its impeccable ‘baque virado’ of 22 bombos and three taróis—the greatest I have ever seen in a carnival parade!”

¹⁸In the *concurso carnavalesco*, the *passarela* is the official carnival parade which is judged by the jury.

¹⁹Variations are also found in the formation *within* the *alfaias*. In *Leão da Campina*, for example, the first row of usually consisted of *alfaias* playing *viradas*. In other groups, these *alfaias* might be positioned differently.

around the *batuque* during performance. Occasionally some of the *caixas* are positioned strategically between the *alfaia* lines. This formation, in its basics, applies to many other groups as well, although frequently with modifications.

In *Estrela Brilhante*, for example, basically the same positioning is used, but *mestre* Walter Ferreira de França does not stand in front of the *batuque*, but usually *in between* the line of *abês* and the line of *caixas*, separating the *abês* from the remaining *batuque* and standing with his back towards the *abê* players. This, as I was told by Nathalia Paixão, one of the *batuqueir@s* from the recordings I analyzed, former *mestra dos abês* in *Estrela Brilhante*, but now playing *caixa*, imposes sometimes significant difficulties on the *batuqueir@s* playing *abê*. I never observed *caixas* being placed among the *alfaias* in the *batuque* of *Estrela Brilhante*, as is the case in *Leão da Campina*.

Concerning *Porto Rico*, Oswaldo Pereira and Tarcísio Resende notify us in 2005 (translation by Peter Malcolm Keays), that

[*Mestre Jailson*] Shacon [*Viana*] organizes the group in a special way, spreading the *abês* and *caixas* amongst other *batuqueiros*, which provides for a simpler pulsation and a more cohesive beat. [[Santos and Resende, 2009](#), p. 46]

One could possibly relate speaking of “a simpler pulsation” and “a more cohesive beat” to microtiming phenomena. Again, from my experience as a musician, I can verify that standing close to or far from another musician, as well as having eye contact or none, can somehow effect the interplay, possibly including microrhythmic timing.

The Music

The music played includes sung pieces, called *toadas* or *loas*, and instrumental ones. If there is singing, it often stops at some stage within the piece, leaving the percussion continuing alone. In many cases, but not always, the singing is organized in a *call-and-response* manner, most typically, the *calls* are performed by a solo singer while the *responses* are performed by various members of the *nação*, including the playing *batuqueir@s*.

Both, *toadas* and instrumentals, almost always contain some sort of introduction. This can, among other, involve unaccompanied singing; one or more instruments playing alone or entering in various stages (most frequently, it is the *alfaias* which enter last, possibly simultaneously with other instruments); specific introductory phrases performed by one instrument, all instruments of a type (usually the *caixas*), or various instruments; or combinations of these possibilities.²⁰

²⁰For more information on introductory phrases, consult [[Oliveira, 2006](#), pp. 28–33].

The instrumental part of the music is based on interwoven and repeated rhythmic patterns of the various groups of instruments. All instruments of a kind might or might not have the same pattern, although divisions into more than two ‘sections’ are, to my knowledge, only found in the *alfaias*. The various instruments are free to play variations, or to phrase rather freely in an improvisational manner, to different degrees. Greatest liberty is usually found in the *alfaias* playing *viradas*²¹, the *gonguê(s)*, and possibly the hand drums. Also, different parts of the arrangements might allow for various degrees of freedom in the playing. In the *alfaias*, invariably at least some of them repeat basic patterns, whereas some are free, throughout the whole performance of certain parts of a performance, to play *viradas*.

The form most often presented as being typical for a *maracatu toada* is the following: After the vocal part, consisting of phrases sung by the *mestre* or *mestra* and answered by the *batuque*, has been repeated several times, the *caixas* enter. During the short introductory phrases, existing in many variations, the singing continues, and soon the other instruments join in. Various repetitions later, the singing stops and a part of the *alfaia* section is now free to improvise, until the *mestra* or *mestre* gives a signal shortly after which the piece is concluded by some variant of a generic ending phrase.

In 2005, master percussionist Tarcísio Resende stated the following:

Maracatu is a conversation, each *baque* being a different dialogue between groups of drums, and consequently, each *nação* presents itself as a different conversation. [Santos and Resende, 2009, p. 33, English translation by Peter Keays]

It is true that the music of *maracatu* involves patterns that are repeated. But the essential point might be that the repetitions are subject to variations. The conversational aspect of *maracatu*, which is the main proposition that Ernesto Ignacio de Carvalho makes in [Carvalho, 2007], is most apparent in the playing of the *alfaias*, when phrased freely.

Provenance of the instruments

Reportedly, the *maracatus-nação* at some stage used to manufacture all the instruments themselves, and paint them in the colors identifying their group. Today, this is (still) true to a certain degree. The *alfaia* is the instrument most likely to be manufactured by the *nações* themselves, whereas for example the *caixas*, made of hard-to-work metal, are more often bought.

²¹Port. An approximate English translation would be “turned-around beats”. *Viradas* designate the sometimes fairly complex and improvised playing found in the *alfaias*.



Figure 3.1: A *batouqueiro* of the group *Gato Preto* playing *gonguê*. Recorded at a public *ensãio* on February 10, 2012, recorded in the Rua da Moeda, Recife Antigo.



Figure 3.2: Two of the most prominent *gonguê* patterns. In the right one, two different playing areas are used in order to achieve different pitches. The left one exists in several variants, in which different pitches are applied to the notes.

3.2 Bells (*Gonguê, Agogô*)

The *gonguê* is a large single bell made of metal. It is held in one hand. It can be heavy—sometimes an extension rod that the player can put on his hip or thigh facilitates the support of the instrument. It is played with a thick wooden stick, held in the other hand. Most groups do not manufacture them on their own, but buy them, which could be a consequence of the fact that metal is more difficult to work with than, say, the wood needed for the *alfaias*.²² Sometimes the *gonguês* are painted in the color of the group.

A *gonguêzeiro* of the group *Gato Preto* is shown in Figure 3.1. Another

²²Guerra-Peixe made similar remarks regarding the *caixa*, also made of metal, see Section 3.6.1.

example of a *gonguê* can be seen in Figure 7.2 on p. 163, at the side of Hugo Leonardo, in the lower right corner.

Sound

While sometimes only one specific playing area is chosen, usually two different ones are used, in order to achieve a higher and a lower pitched sound. The first one is located more to the edge, the second one more to the middle of the instrument. Comparing different instruments, the sound range is huge, ranging from rather dull and deep sounding instruments to penetrating high-pitched sounds. Likewise, the look and construction may differ substantially.

Number of *Gonguês* in a *Batuque*

Various sources report that only ever one *gonguê* is and has been used in a *maracatu batuque*. However, two can now be observed on a regular basis. (Speculating, this could possibly be attributed to the tendency towards larger *batuques*.) In the 2012 *passarela*, and a few other presentations of the 2012 carnival, *Leão da Campina* paraded with as many as six *gonguês*, which appeared to be highly exceptional.²³

Macrorhythmic

Two patterns can be identified in the playing of the *gonguê* that are played most often in the various *batuques*. These are displayed in Figure 3.1. However, the *gonguê* is in many *batuques*, besides certain parts of the *alfaia* section, the instrument which is freest to improvisational variations.²⁴ Also, despite the limited duration of my field stay, I have already observed dozens of variants to be used as a basic pattern.

Terminology

Climério Santos informs us, that “[s]ome *batuqueiros* employ the word ‘*agogô*’ for this instrument. *Gonguê* is a word of bantu origin; *agogô* is of *nagô* origin. [Santos and Resende, 2009, p. 30, fn. 5]” Notably, Afonso Aguiar, current *mestre* of the highly estimated group *Leão Coroado* utilizes the word *agogô* [Oliveira, 2006, p. 19, fn. 27]. A comprehensive discussion of the origin of

²³Mário de Andrade in 1934–1935 reported to have seen as many as nine *gonguês* in a rehearsal or presentation of *Leão Coroado* [Andrade, 1982, p. 152]. For a discussion of this somewhat surprising observation, see [Guerra-Peixe, 1980, pp. 83–84].

²⁴For a detailed transcription of the *gonguê* phrases played over the course of an entire *toada* of *Estrela Brilhante (do Recife)*, see [Guillot, 2005, pp. 17–18].

the instrument and its names is found in Jerry Metz’ article [Metz, 2008, p. 68–71]. With regards to the symbolic significance of the *gonguê*, he speaks of it, alongside the *calungas*, as “arguably the most traditional objects in *maracatu* (along with the *alfaia* bass drums) [Metz, 2008, p. 89].”

The smaller double bell *agogô* is now also used by some groups. Metz in 2008 reported the groups *Nação Gueto*, *Daruê Malungo* [Metz, 2008, p. 85], and *Nação Erê* [Metz, 2008, p. 86–87] to have used the *agogô* instead of the *gonguê*. Likewise, *Nação Pernabuco* and other groups of similar contexts have incorporated the *agogô* into their instrumentation. However, to put this into perspective, many of Recife’s *maracatuzeir@s* would argue that neither of these groups can be regarded as *maracatu-nação*, but rather as *maracatu estilizado* or *grupo percussivo*.

3.3 Shakers (*Ganzá, Abê, Ganbê, Patagone*)

Various *chocalhos*²⁵ are used in *maracatu*. Most *batuques* comprise either a section of *ganzás*, or of *abês*, or both. Their main (though not exclusive) rhythmic function is to provide a continuous carpet of subdivisions/sixteenth notes, playing either all or most of them. In this respect, their patterns stand in close relation to the *caixa*.

3.3.1 *Ganzá*

The *ganzá*, in *maracatu* context more often called *mineiro* or *mineirinho*,²⁶ is a filled cylindrical metal tube. Holding it in front of the body, it is played in a more or less horizontal motion. Two *batuqueir@s* of the group *Estrela Brilhante de Igarassu* playing *ganzá* are depicted in Figure 3.3. Two of the *ganzá* patterns that are most often played are shown in Figure 3.4. As the subtleties of *ganzá* playing are especially difficult to capture in standard Western musical notation, these transcription should be regarded as only very coarse approximations.

Frequently, only one or a few of these instruments are used in a *batuque*. Many groups currently do not or rarely use them. In some cases, it is only used for the *passarela*. Hugo Leonardo in 2010 told us that *Leão da Campina* uses it there, because it “vale um ponto. [Leonardo, 2010]”²⁷ Groups

²⁵Port. “Shakers”

²⁶Antônio Pereira de Souza, better known as Seu Toinho, former *mestre* of *Maracatu-Nação Encanto da Alegria*, refers to it as *maraca* [Oliveira, 2006, p. 23].

²⁷Port. “is worth a point.” The *mineiro* is listed explicitly in the *critérios de julgamento* of 2002–2012 as a required instrument.



Figure 3.3: Two *batuqueiros* of the group *Estrela Brilhante de Igarassu* playing *ganzá*. Recorded at an *ensãio* on February 3, 2012, at the *sede* of *Estrela Brilhante* in Igarassu.



Figure 3.4: Two frequently observed *ganzá* patterns. The different pitches are meant to indicate a movement away from the body (lower notes) or towards the body (higher notes). Many subtle variations of these patterns exist. Note that firstly, the indicated accents only very approximately describe the actual sound level, and secondly, the sixteenth notes are often played in a highly un-isochronous manner.

that used it in the 2012 carnival included *Cambinda Estrela*, *Estrela Brilhante de Igarassu*, *Leão Coroado*, *Axé da Lua*, *Encanto da Alegria*, *Cambinda Africana*, *Gato Preto*, *Linda Flor*, *Tupinambá*, *Encanto do Pina*, and *Baque Mulher*.

3.3.2 *Abê*

The *abê*, the large gourd rattle, also known as *agbê*, or, in other contexts, *xequerê*, is made of a *cabaça* (gourd) around which a net of cord and *miçangas* (plastic beads) is attached. In practically all of the groups, the *batuqueir@s* manufacture the *abês* themselves. The *miçangas* are typically chosen according to the colors that identify the respective group. The number of *abês* in a *batuque* varies greatly, according to the *batuque*'s size. In the large groups, ten or more are not exceptional.

It is held with both hands in front of the body and played in horizontal or slightly diagonal motion, shaking it back and forth. The sound used in *maracatu* is only the high one produced by the *miçangas* colliding with the *cabaça*. The deeper sound, as produced by hand to *cabaça* contact and commonly used in other music traditions, is not usually used.

Estrela Brilhante (do Recife) introduced the *abês* around 2000. Reportedly, they were the first ones to use them at that time.²⁸ The first public performances in which *Porto Rico* used them also date back to 2000.²⁹ The *critérios de julgamento* explicitly make reference to them since 2005, leaving the opportunity to use them or not: “sendo livre a presença do Agbê e

²⁸Cal do Rap, musician and long-term *batuque* of *Estrela Brilhante*, said that he was among the first group of percussionists within *Estrela Brilhante* and hence any *maracatu* who played these new shakers (Interview, conducted on February 5, 2010, in Recife's Alto José do Pina neighborhood, close to *Estrela Brilhante*'s *sede*). *Abês* are documented on *Estrela Brilhante*'s CD [*Maracatu Nação Estrela Brilhante do Recife*, 2001], released in 2001. Also see [Oliveira, 2006, p. 23–24].

²⁹*Porto Rico*'s *mestre* Shacon told me in an informal conversation on February 4, 2012, taking place in Pina, Recife, after an *ensãio* of the groups *Encanto do Pina* and *Baque Mulher*, that the first use in a public presentation was during the *noite dos tambores silenciosos* (Port. “Night of the silent drums”, an event taking place in Recife's Pátio do Terço, in the São José neighborhood) on March 6, 2000. In [Santos and Resende, 2009, p. 46], also the date 2000 is reported. Incidentally, one of the recordings by Andreas Richer, *Bras 00/V05 > VU 1*, documents the mentioned performance, accessible via the Ethnomusicology section of the Ethnological Museum in Berlin, Germany (Berliner Phonogramm-Archiv) [Richter, 2001, p. 112]. However, only the use of an *atabaque* is captured, whereas the only shaker used is a *ganzá*. It seems likely, consequently, that the first use of an *abê* was during another performance of that year, or maybe during the *noite dos tambores silenciosos* of the 2000/2001 carnival period.



Figure 3.5: Some of *Leão da Campina*'s *batuqueiras* playing *abê*. Observe the horizontal sideways motion, slightly diagonal, in which they move the instruments: In the first video frame, the *batuqueira* on the left-hand-side of the picture holds the *abê* in an upper left position, seen from her perspective. She then moves it to her right while lowering it a bit. Finally, she moves the instrument back to her left side, while lowering it even more. Recorded at the *passarela* of the 2012 carnival, Avenida Nossa Senhora do Carmo, Santo Antônio, Recife, February 19.



Figure 3.6: The most commonly used *abê* pattern. It is performed via a motion that is directed either horizontally sideways or, combined with a slight upwards/downwards motion, diagonally, see Figure 3.5. The notated two different pitches are meant to indicate the two different end points of the motion. Different *batuqueir@s* start the pattern in different positions, both possibilities to start can be observed in different *nações*.

Atabaques”³⁰. Jerry Metz in 2008 reported the following on the introduction of the *abê*:

Another musical symbol of African cultural heritage has been absorbed, not only by newer groups, but by the venerable *Nação Estrela Brilhante* (founded in 1910): the *abê*, or large gourd rattle. Traditional *maracatu* groups have tended for years to use *ganzá*, a metal tube shaker common to *samba* as well as regional styles, but Mestre Walter of *Estrela Brilhante* decided that the *abê* was more traditional than the *ganzá*—because older *maracatus* had probably used this African instrument instead of the industrially manufactured Brazilian *samba* shaker. In the opinion of Pernambucan percussionist Eder “O” Rocha, a member of the band Mestre Ambrósio and a fixture in Recife’s music scene, “The *abê* was introduced into *Estrela Brilhante* through the direct influence of *candomblé-de-rua* [*afoxé*].” He notes that groups deriving from the “*cultos de candomblé de Recife*” use a trio of differently sized gourds—large, medium, and small—to play syncopated patterns, and that this practice also appears in *Estrela Brilhante* (Rocha 2001). [Metz, 2008, p. 85–86]

In the 2010 *carnaval*, within the *maracatus-nação* these instruments were already far more common than the *mineiro*. Groups that used them in 2012 include *Leão da Campina*, *Estrela Brilhante (do Recife)*, *Porto Rico*, *Encanto do Pina*, *Encanto da Alegria*, *Aurora Africana*, *Gato Preto*, *Linda Flor*, *Raízes de Pai Adão*, *Estrela Dalva* and *Baque Mulher*, *Encanto do Dendê*, *Rosa Vermelha*, *Tupinambá*, and *Gato Preto*.



Figure 3.7: A *batuqueiro* of *Porto Rico* playing *Ganbê* during a public presentation of the group. Recorded in San Antônio, Recife, February 25, 2012.

3.3.3 *Ganbê*

The name *ganbê* was introduced in order to indicate that this instrument is a hybrid between the *ganzá* and the *abê*. It consists of the cylindrical metal tube of a *ganzá*, to the outside of which a net of *miçangas* is attached, similar to the *abê*. It is played like a *ganzá*; the pattern I observed resembled the first from Figure 3.4.

Porto Rico paraded with the instrument in the 2012 carnival. A *batuqueiro* of the group, the only one who played a *ganbê*, depicted in Figure 3.7, told me that 2011/2012 was the first carnival season in which the instrument was used.³¹ The sound of the instrument, however, is much more quiet than *ganzás* or *abês*. To me, it was in fact completely inaudible in all of *Porto Rico*'s presentations and *ensaios* that I saw.

Instrument maker Abílio Sobral told me that *Porto Rico*'s instrument was built by him, and that he further had been producing these instruments for twenty years, although first using a PVC tube, and only switching to

³⁰Port. "being optional the presence of Agbê and Atabaques"

³¹Informal conversation on February 25, 2012, on the Avenida Nossa Senhora do Carmo, Santo Antônio, Recife, after a public presentation of *Porto Rico*.



Figure 3.8: Two *batuqueir@s* of *Estrela Brilhante (do Recife)* playing *patagone*. The one on the right is Cal do Rap. Recorded during a public presentation of the group in the Avenida Nossa Senhora do Carmo, Santo Antônio, Recife, February 25, 2012.

ganzá tubes later.³²

3.3.4 *Patagone*

The *patagone* is a flat, hollow instrument made of metal, which has a filling similar to *ganzás*. In the presentations and *ensaios* of *Estrela Brilhante* I saw in 2012, they usually used one or two, on occasions up to three *patagones*. They are held in front of the body with two hands and shaken horizontally in a sideways motion. The pattern played was the same as for the *abês* (see Figure 3.6). Cal do Rap, one of the *batuqueir@s* that played this instrument, told me that it had been used three years in *Estrela Brilhante*.³³ He, together with another *batuqueira* of *Estrela Brilhante*, are depicted playing *patagone* in Figure 3.8

According to Abílio Sobral, the instrument came to Recife via *tambor de minas*, a cultural manifestation found in the South-Eastern Brazilian state

³²Conversation on March 23, 2012, in Abílio's oficina and shop, Avenida Norte 5600, Casa Amarela, Recife.

³³Informal conversation on February 25, 2012, on the Avenida Dantas Barreto, Santo Antônio, Recife, before a public presentation of *Estrela Brilhante*.



Figure 3.9: Two *batuceiros* of *Porto Rico* playing *atabaque* (the instrument that can be seen is in other *maracatus-nação* and contexts other than *maracatu* often called *timbal*). Recorded at an *ensãio* of the group, in front of *Porto Ricos sede* in the Pina neighborhood in Recife, February 11, 2012.

of Minas Gerais.³⁴

3.4 Hand Drums (*Atabaque, Timbal*)

Atabaques (hand drums) are now also utilized in many *maracatus-nação*. The most prominent one seems to be the *timbal*, in *maracatu* context also referred to as *atabaque*, which has popularly been used since the 1990s by Bahian *axé* group *Timbalada*. Due to its lightness, it is well suited for parading through the streets, which is not unrestrictedly true for other forms of *atabaques* possibly regarded as more ‘traditional’, as for example used in *candomblé* context. The first *maracatu-nação* to use hand drums was *Porto Rico*. Two *batuceiros* of the group playing them can be seen in Figure 3.9. Subsequently, the instrument spread quickly among Recife’s *maracatus*:

In 2000, under the direction of master Shacon Viana, the *Maracatu Porto Rico* reintroduced *atabaque* drums into *batuque* rhythms and were subsequently criticized by some groups and

³⁴Conversation on March 23, 2012, in Abílio’s oficina and shop, Avenida Norte 5600, Casa Amarela, Recife. Abílio also builds and sells *patagones*. The ones from *Estrela Brilhante*, however, are not from him.

folk experts. Shacon affirms that the use of *atabaques* is a historical resuscitation of black traditions. Research by the Maracatu Nation [i.e., Porto Rico, or Shacon himself] finds that these instruments were in fact present in the “Kings of the Congo” processions, a long-standing tradition, from which maracatu is derived. [Santos and Resende, 2009, p. 46]

In 2004 and 2005, the young *maracatu* groups Nação Gueto and Daruê Malungo were both led by musicians who, walking on stilts, played musical signals and fiery solos on the *timbau*. [Metz, 2008, p. 85]

In the 2012 carnival, I observed several groups that had *atabaques*, including *Porto Rico*, *Encanto do Pina*, *Baque Mulher*, *Estrela Dalva*, and *Encanto da Alegria*. Due to the great variety and complexity of the patterns played and the relatively high degree of improvisational freedom, I refrain from presenting formulaic exemplary patterns. I feel they would possibly be misleading rather than illuminating.

3.5 Bass Drum (*Alfaia*)

Invariably, the *alfaias* outnumber the other instruments by far. It is safe to consider them as the instruments perceived as most characteristic for *maracatu-nação* by the public. For example, *alfaias* were the instruments that most strongly contributed to the intimate linkage to *maracatu* that was prevailingly attributed to *Chico Science & Nação Zumbi*, a pop band of the 1990s’ *mangue* movement, in the public reception of the band [Galinsky, 2002]. Pointing this out, Larry Crook is led to even applying the designation of “*maracatu* drum” to the *alfaia* [Crook, 2001, pp. 240–241].

Terminology

There are various terms applied to the typical *maracatu* bass drum. The most common ones are *alfaia*, *bombo*, and *zabumba*.

Of these, *alfaia*³⁵, possibly of Arab origin,³⁶ seems to refer *only* to bass drums as used in *maracatu-nação*. It is also the term that I heard most often in Recife.

³⁵Variations include *afalhas* [Guerra-Peixe, 1980, p. 60], *afaias* [Lima, 2005, p. 57], [Guillen and Lima, 2006, p. 183], and *afayas* [Guillen and Lima, 2006, p. 187], [Lima, 2008].

³⁶See [Lima, 2005, pp. 57–58], [Crook, 2001, p. 244, fn. 11].

The term *bombo* is frequent as well. It is a more generic term for large and deep-sounding drums in Brazil.³⁷ In *Encanto da Alegria*, one of the terms more specifically differentiating between *alfaias* of different sizes and musical functions, is *alfaia bombo mestre* [Santos and Resende, 2009, p. 83].

Although I have not personally heard anyone in Recife calling the *maracatu* bass drums *zabumbas*, this is yet another term used in a significant part of the literature on *maracatu*.³⁸

Construction

Despite the multitude of terms, there seems to be no doubt about what the proper bass drums in the *maracatu-nação* actually *is*: A cylindrical wooden drum with a natural skin on each side (usually goat's skin) and rope-tension. The rope might be from natural or synthetic material. The diameter ranges most typically between 16 and 24 inches. Still smaller ones are made for children, larger ones are occasionally found in some *nações*. The height of the drum can be smaller, larger, or about equal to its diameter, although large drums tend to have a height markedly smaller than its diameter.

Alfaias are constructed from either *macabía* wood³⁹, or *compensado*⁴⁰, with the use of the latter resulting in much lighter drums. In the 2012 carnival, exclusively *alfaias* from *macaíba* wood were used by *Estrela Brilhante (do Recife)*, *Estrela Brilhante de Igarassu*, and *Aurora Africana*. Some groups, like *Leão da Campina*, have both types of *alfaias* in their *batuques*. From my observations, I would say that by far most groups utilize more or less exclusively *alfaias* of *compensado* wood. A few examples include *Porto Rico*, *Encanto do Pina*, and *Leão Coroado*.

Most *nações* paint the *alfaias* in the colors which identify their group.⁴¹

³⁷For example, Philip Galinsky, who in 1998 conducted field work in Recife, reports that “[a]lfaia [is a] local synonym for the *bombo* drum used in the *maracatu-nação* of Recife [Galinsky, 2002, p. 199].” *Bombo* also designates the type of bass drums used in *jazz* and *pop* drum kits.

³⁸See, for example, [Assis, 2002, p. 95], [Guerra-Peixe, 1950], or [Guerra-Peixe, 1980]. *Zabumba* may also designate a fairly specific type of cylindrical drum, typical for musical genres like *baião*, *farró*, *xote*, or *carvalo marinho*, which are regional folkloric traditions and musical *genres* from Northeast-Brazil: It is shallow, has a large diameter, two drum heads (most often plastic nowadays), is made of metal or wood, and is played usually with a thin stick in the left hand (for a right-handed person) on the bottom head and a thicker stick in the right hand on the top head.

³⁹According to Andreas Richter, the scientific name of this palm tree is “*Acrocomia aculeata* (Lood. Ex Mart.)” [Richter, 2001, p. 59].

⁴⁰Port. “plywood”

⁴¹In the case of *alfaias* made from *macaíba* wood, usually only the hoops, and sometimes the skins, are painted. Not in the *maracatu-nação* but in the marketplace, made by

Positioning

For a right-handed-person, the drum is carried to the left. The heads are not parallel to the ground: The front (playing) head is tilted a little towards the walking direction. Either a padded strap or remaining rope from the tensioning system is used to carry the drum on one shoulder, either the one next to the drum, or the one further away.

Baquetas

The drum is played holding one *baqueta* (stick) in each hand. I could observe a rather great variety of stick combinations. The variety was especially great for the sticks played with the left hand. In general, the right stick (for a right-handed person) is thicker and heavier than the left one,⁴² which is a characteristic feature of *maracatu alfaia* playing and reflected in the greatly differing usage of the left and right hand. *How great* the difference of the two sticks is, may vary greatly.

In *Estrela Brilhante de Igarassu*, long, thin, and flexible sticks are used in the left hand, which are called *bacalhau*⁴³ and are made from the branches of the *goiaba*⁴⁴ tree. They produce a sound vastly different from the more compact, shorter, and heavier sticks utilized for the right hand. All *batuqueir@s* in *Estrela Brilhante de Igarassu* use this type of sticks. As I was told several times, and in concordance with my own observation, it is the only group to use this kind of sticks.

In *Porto Rico*, and partly in the closely related groups *Encanto do Pina* and *Baque Mulher*, also long and thin sticks from *goiaba* are used, but they are not quite as long, thin, and flexible as the ones from *Estrela Brilhante de Igarassu*. They are called *agdavi*.

In all other groups, the left stick tended to be thicker than in these two examples. In a few cases, the left stick was of the type that is also used for *caixa* playing and for *jazz/pop* drum kits.

In some *nações*, all *batuqueir@s* were using resembling sticks, whereas in others, different *batuqueir@s* were playing with different stick combinations. Apart from the mentioned examples of sticks from *goiaba* wood, the sticks are mostly bought and of industrialized make.

different instrument makers, I also saw *alfaia* decorated with fabrics and other materials.

⁴²In a few exceptional cases they were of identical dimensions.

⁴³Port. “dried cod”

⁴⁴Port. “Guava”

Grip

The two sticks are held in different ways. This corresponds to the way the drums are carried—on one side of the body, not directly in front of it. From my point of view as a percussionist, with the drum in this position, it would be very uncomfortable to play it while holding both sticks in the same manner.

The stick in the right hand is held the same way a hammer would be hold: The hand forms a fist around the butt end of the stick.

For the left-hand grip, I saw a few different variants. One looks the same as the right-hand grip, only with the stick pointing to the different direction: If the left fist holding the stick around its butt end points upwards with the thump, the stick points downwards. Other variants were similar, only that the stick rested not as firmly in the whole hand, but was held a little looser by the tips of the extended fingers. In that playing style, I observed both the little finger on the same side of the stick as the other fingers, or on the same side as the thump, which enhanced stability and control.

Playing Techniques

The energetic movements of a master *alfaia* player can look fairly spectacular. Several authors report that the designation *maracatu de baque virado* as a synonym for *maracatu-nação* stems from the playing style of the *alfaias*: whereas the right hand is moved in a relatively straight up and down motion, the left arm performs a more complicated turning movement to play the drum. The left elbow is raised, sometimes up to the height of the head, with the forearm pointing downwards or diagonally towards the body. To perform a stroke, the elbow is lowered quickly and the forearm is ‘thrown’ into the direction of the drum.⁴⁵ Several *batuqueiras* of *Encanto do Pina*, playing in this fashion, are depicted in Figure 3.10. Two stages of the described motion can be seen in the pictures: In the upper video frame, the *batuqueira* in the foreground lifts her left arm up, in preparation of the stroke; in the lower one, the stick has reached the drum head.

The mentioned theory concerning the meaning and origin of the term *maracatu de baque virado* is, for example, found in Oliveira Pinto’s 1994 article:

⁴⁵There are huge differences in the playing motions of different *batuqueir@s*. Also, the motions’ size vary greatly, according to the arrangement and other factors. Quite frequently, the left hand is, in contrast to the description above, played extremely softly, using very small motions of exclusively the hand, or even just the fingers. The left hand might sometimes be used to hold and support the drum, in which case the left hand strokes are left out. This is especially frequent if the drum is very big, or when walking during the performance, such that additional support is needed.



Figure 3.10: Several *batujeiras* of *Encanto do Pina* playing *alfaia*. Recorded at the *noite dos tambores silenciosos*, February 20, 2012. Two stages of the arm movements can be observed in the two pictures.

Baque virado literally means “spun beat” and refers to the technique in which the two playing sticks are rapidly spun before striking the huge *bombos*. [Pinto, 1994, p. 29]

Andreas Richter reports similar information [Richter, 2001, p. 80]. According to another theory, however, the word *virar* is an adaption of *dobrar*⁴⁶. Guerra-Peixe in 1955 speculated that this expressed the fact, that in *maracatus-nação* there invariably used to be more than just one *alfaia*, such that the beat is ‘doubled’. He contrasted this with *maracatu de baque solto*, in which there was usually just one *zabumba* [Guerra-Peixe, 1980, p. 65] (also see [Santos and Resende, 2009, p. 29] on this). Yet another explanation I was given, is that that *virar* indeed comes from *dobrar*, but to ‘double’ or *virar* the beat is meant in the sense of playing double-time off-beats, which is a common feature of the *virada* playing of the *alfaias* (as is the turning motion described above). Christiane Gerischer reports the usage of *virar* in another context:

In [...] a samba de caboclo performance, [...] the solo drummer on the *rum* consciously articulates accents with the purpose of “turning” (*virar*) the energies of initiates into *Orixás* (Afro-Brazilian gods) by inducing spirit possession. The Brazilian expression for improvising on the solo drum is *quebrar*—to break—suggesting departure from the regular rhythm. [Gerischer, 2006, pp. 111—112]

Alfaia ‘sections’

In all *maracatus-nação*, the *alfaias* are subdivided into various ‘groups’ or ‘sections’. To these, usually names are assigned.

The *alfaias* of one section, most often called *maracação* or *marcante*⁴⁷, play certain patterns more or less throughout a *toada* or an instrumental piece. Their patterns are also called *maracação*. For some very common *baques*⁴⁸, transcriptions of the respective *maracação* patterns are depicted in Figure 3.11.

Another part of the *alfaias*, throughout an entire piece or only parts of it, plays *viradas*, improvisational phrases of which countless variants exist.

⁴⁶Port. “double”

⁴⁷Port. “marking”

⁴⁸Port. “beat”. Corresponding to the remarks Rainer Polak makes in [Polak, 2010, par. 39] on the terminology concerning Malian *jembe* music, a more suitable translation in this context might be “piece”. A certain *baque* consists not only of an *alfaia* pattern; for example, specific introductory phrases and suiting patterns on the *caixa* and possibly other instruments are also part of a given *baque* and vary from *baque* to *baque*.

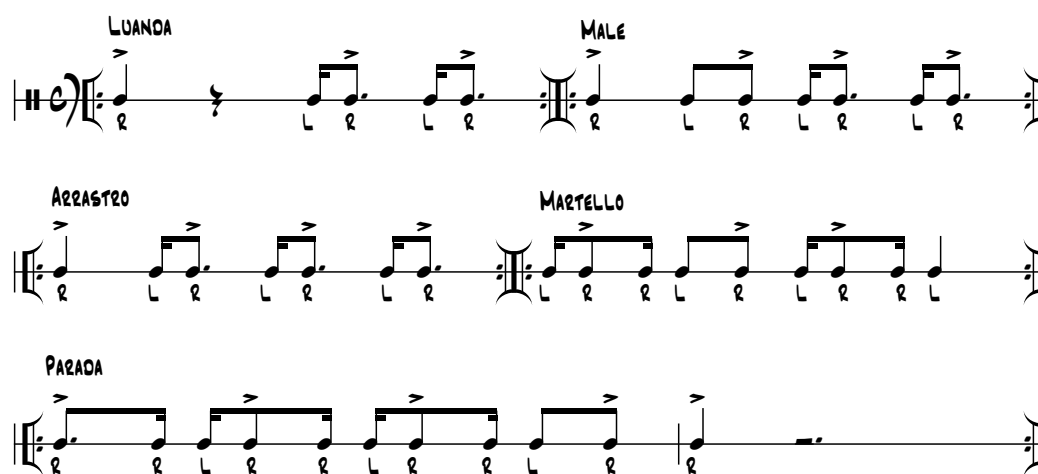


Figure 3.11: Five *alfaia marcação* patterns, which currently can be observed frequently among the *maracatus-nação* of Recife, including names used by some *nações*. The exact accentuation patterns may differ from *nação* to *nação* (in some cases, even all right hand notes are accented), as do the—usually huge— volume differences between the unaccented notes of the left hand and the accented notes in the right hand. The unaccented notes of the right hand are usually played louder than the notes of the left hand. Variations are also found in the syntax of the unaccented notes; some notes transcribed above might be left out, while others might be added. Likewise, many variants exist concerning the stickings and the names of the patterns.

These *alfaias* are often called *repiques*, and normally only more experienced *batuqueir@s* occupy the position of a *repiqueir@*.

Most *maracatus-nação*, though not all, use a third section, called *meião*⁴⁹, that is often regarded to musically stand ‘in between’ *marcação* and *repiques*. Typically, their patterns are a little more dense than the *marcação*, but the playing is not as varied as in the *repiques* and not of improvisational nature.

To my knowledge, *Porto Rico* currently is the only *maracatu* that subdivides the *alfaias* into four different groups.

Syncopated Accents

The heavily accented notes played on the *alfaias* with the right hand on the second sixteenth note of the beat make up one of the most prominent features of the music of *maracatu*. These accents characterize all of the *marcação* patterns depicted in Figure 3.11, the *virada* playing, and is in many cases also featured in the playing of the *caixas* and the *gonguê*.

This is one of the musical characteristics that differentiates *maracatu* most strongly from other styles, like *samba*, in which the deepest sounding drums more regularly accent the beats and other, higher pitched, instruments are predominantly used for playing the more syncopated patterns. Guerra-Peixe dedicated an article specifically to reflect on the fact that this differentiates *maracatu* from probably *most* musical traditions worldwide [Guerra-Peixe, 1950].

Baques

The utilized *baques* are one of the musical features according to which a certain *maracatu-nação* group is identified most easily. Although the *marcação* patterns displayed in Figure 3.11 constitute something like a common repertoire shared to some extent by most *maracatus-nação*, different groups perform the rhythms in different variations, play only some of those rhythms and use other ones as well. I doubt that there are two *maracatus-nação* that share an identical repertoire of *baques*.

Before I first came to Recife, I saw a video on YouTube.com in which Eder “O” Rocha, a professional percussionist who used to play with *Estrela Brilhante (do Recife)*, demonstrates the five rhythms from Figure 3.11 [Rocher, 2008]. When asked to explain the various existing rhythms of *maracatu-nação*, Hugo Leonardo also performed and named these five rhythms, including *arrastro*, although that rhythm is not used in his group *Leão da Campina*. Philip Galinsky cites the five rhythms as musical examples from

⁴⁹Port. “middle”

maracatu in [Galinsky, 2002, 131-133] (with reference to *mestre* Walter of *Estrela Brilhante*). In June 2010, Tarcísio Resende held a *maracatu* workshop in Vienna, Austria, which I attended. In the workshop, mainly these five rhythms were used. As they currently also form the greatest part of the rhythms heard from the *maracatus-nação* in Recife, I came to assume that they form sort of a ‘traditional’ repertoire of *maracatu-nação*. For someone not very familiar with *maracatu*, it seems likely that such an impression is given by the information on *maracatu* available, mainly in the form of instructional material, online, or through *maracatu* workshops held by Brazilian percussionists throughout the world.

That this, however, might be a relatively recent phenomenon, is exemplified by the fact that the only one of these five rhythms reported by Guerra-Peixe for *Elefante* of the period 1949–1952, is the one found as *arrastro* in Figure 3.10 [Guerra-Peixe, 1980, pp. 74–78]. A comparison of the recordings and transcriptions of the groups *Elefante* and *Porto Rico* from Andreas Richter, made in 2000, with the five rhythms in question further supports this thesis [Richter, 2001, p. 82–83].

Ernesto Ignacio de Carvalho offers an explanation for the great visibility and popularity of specifically these five rhythms, including the names that I suggested in Figure 3.10: In the mid 1990s, parallel to the *mangue* movement, more and more “brancos de classe média”⁵⁰ [Carvalho, 2007, p. 115]” became interested in *maracatu* and joined them as *batuqueir@s*, including popular musicians of the *mangue* scene.⁵¹ *Estrela Brilhante* was arguably the group most frequently joined by people who had not grown up in proximity to *maracatu* context (see [Galinsky, 2002]). Also, in *Estrela Brilhante* these developments were strategically embraced and utilized, ultimately leading to the still enduring visibility and popularity of the group. Another important factor in this context are *maracatu* workshops, which have become increasingly popular in- and outside Recife since the end 1990s.⁵² According to Carvalho, the mentioned five rhythms came together as a pedagogical concept, mainly conceived by *mestre* Walter of *Estrela Brilhante*, in order to accommodate the new situation of ‘outsiders’ taking part in the *batuque* and

⁵⁰Port. “white middle-class people”

⁵¹Several authors have worked on this topic. For a comprehensive discussion, see [Esteves, 2008].

⁵²Besides Cristina and Virginia Barbosa, both ethnomusicologists, Lima cites the participation of Eder Rocher and Jorge Martins, both renown musicians and educators, in *Estrela Brilhante* as crucial for the proximity of *Estrela Brilhante* to middle-class *batuqueir@s*. Both of them later held *maracatu* workshops, and played or led percussion groups dedicated to the music of *maracatu*. It seems probable that the playing style of *Estrela Brilhante* was and is reflected in their teaching.

to meet the needs of participants of *maracatu* workshops:

A cartilha “Estrela Brilhante” de baque virado [by which he refers to the five rhythms of Figure 3.10] é mais ou menos a base do que foi ensinado por várias cidades do Brasil e do mundo desde o movimento das “oficinas de maracatu”, a partir do final da década de 90 [Carvalho, 2007, p. 118].⁵³

Carvalho also suggests, citing Eder Rocher, that various of the mentioned names for *baques* stem from Walter [Carvalho, 2007, p. 116]. He also provides some further considerations on each of the five rhythms [Carvalho, 2007, pp. 118–123].

3.6 Small Drums (*Caixa*, *Taról*)

The *caixa*⁵⁴ is the instrument of our main interest, as (almost) all the recordings analyzed in Part III are recordings of *caixa* playing. All the video frames and transcriptions serving as examples for this section are found there.

3.6.1 Construction

Caixas are small double-headed drums made of metal or wood, with snares applied to the bottom (unplayed) side. They closely resemble to what is known in *orchestral*, *marching band*, *jazz*, *pop* and other contexts as *snare* or *side drums*.

The diameter found most frequently was 14 inches, but I also sometimes saw smaller ones, down to 12 inches. The drum heads were in all cases I observed made from industrialized synthetic material and in most cases had smooth white heads⁵⁵. They were tuned either similar to *alfaias*, using a rope tensioning system, or via tuning rods. Metal drums usually had a rod tensioning system, while most wooden *caixas* I saw used a rope tuning system. Examples for wooden drums using rope tension are depicted in Figures 7.2 on p. 163 and 7.15 on p. 171, metal ones with a rod tensioning system are shown in Figure 7.10 on p. 168.

⁵³Port. “The primer ‘Estrela Brilhante’ of the baque virado is more or less the basis for what has been taught in various cities in Brazil and the world since the movement of the ‘maracatu workshops’ has taken place, starting at the end of the 90s.”

⁵⁴Related terms are discussed in Section 3.6.2 below.

⁵⁵So-called *coated* heads, with a raw surface, as for example preferred in *jazz* when playing with *brushes*, are fairly rare but also in use.

Provenance of the Instruments

By far the greatest part of the instruments I observed was of industrialized make and bought by the groups, with possibly decorative painting⁵⁶ in the groups' colors on the shell or heads of the drum. I have never seen a metal drum manufactured by one of the groups, but wooden ones are occasionally made by them. For example, Hugo Leonardo told me that in *Leão da Campina* the metal *caixas* are bought, whereas the wooden ones are made by the members of the group themselves [Leonardo, 2010].

The observation that *caixas* are mainly of industrialized make is, among others, also reported by Andreas Richter [Richter, 2001, p. 58], Marco Oliveira [Oliveira, 2006, p. 21], Julia Pittier Tsezanas [Tsezanas, 2010, p. 106], and even already Guerra-Peixe, concerning the group *Elefante* around the period 1949–1952, as can be inferred from the following citation:

No Maracatu Elefante ambos os instrumentos [*tarol* and *caixa-de-guerra*] são industrializados, preferência devida a duas razões: uma, de ordem financeira—maior durabilidade do material; outra, de ordem técnica—possibilidade de produzir, para essa orquestra, intensidade mais satisfatória, que nesses mesmos instrumentos de fabricação popular.⁵⁷ [Guerra-Peixe, 1980, p. 59]

Baquetas

In *maracatu*, the *caixa* is played with two wooden sticks, usually identical, holding one in each hand. Only one *batuqueiro* told me that used sticks he had made himself. Most often, I observed the type of industrialized sticks that is also common for drum kit playing in *jazz* and *pop*. Again, the industrialized make of the sticks is something that Guerra-Peixe observed already around 1950:

As baquetas do tarol e das caixas-de-guerra são geralmente adquiridas nas lojas que vendem os instrumentos industrializadas.⁵⁸ [Guerra-Peixe, 1980, p. 63]

⁵⁶Porto Rico in 2012 used some *caixas* nicely decorated by printed fabric material that was wrapped around the drum's shell.

⁵⁷Port. “In the *Maracatu Elefante*, both instruments [*tarol* and *caixa-de-guerra*] are of industrialized make, a preference due to two reasons: firstly, financial considerations—greater durability of the material; secondly, technical considerations—possibility to produce, for this ensemble, a more satisfying intensity than the same instruments of popular make.”

⁵⁸Port. “The sticks for *taról* and *caixas-de-guerra* are generally bought in the shops that sell industrialized musical instruments.”

3.6.2 *Taról(-de-Guerra)* and *Caixa(-de-Guerra)*

Various terms are reported for the drums described above in *maracatu* context. The most frequent terms are *taról*, *caixa*, *taról-de-guerra*, and *caixa-de-guerra*.

Caixa-de-guerra and *Taról-de-guerra* I heard hardly ever from a *maracatuzeir@*; for instance once when I asked Hugo Leonardo specifically about the difference between *caixa* and *taról* [Leonardo, 2012]. I also very rarely heard the term *taról*. Marco Oliveira, from the observations of his field work, likewise confirms that he never heard *caixa-de-guerra* and only very rarely *taról* [Oliveira, 2006, p. 22].

Constructional Distinction

The various terms seem to be used with slightly varying meanings by different *maracatuzeir@s* and authors. Basically, I had the impression that currently to many *maracatuzeir@s* the distinction between *caixa* and *taról* is not of great importance. What I was coherently told several times, and what is confirmed by many authors, is that the main difference is the depth of the drum: A *taról* is shallower. Not as clear seems to be if there are different musical functions for the two instruments. Concerning the construction of the two, Guerra-Peixe gives the following information:

O menor tambor do Maracatu é o “tarol” (**taró**). Nos diferentes folguedos nordestinos há quem oponha distinção entre “caixa” e “tarol”, ao verificar as procedências do mesmo instrumento. “Caixa” seria o tambor industrializado, com aro de metal e tarachas para distender as membranas; “tarol” aquele cujos couros são apertados a corda, com aro de metal ou não. Apesar dessa distinção, ambos são geralmente tratados de um e de outro modo, predominando vantajosamente o segundo, ou seja, tarol (**taró**, como dizem).

Outro instrumento do mesmo gênero é a “caixa-de-guerra”, de altura um pouco superior á do tarol e usado em número que varia de dois a cinco. A sua origem, popular ou industrializada, não confere a ele outro designativo.⁵⁹ [Guerra-Peixe, 1980, p. 59]

⁵⁹Port. “The smallest drum of Maracatu is the ‘tarol’ (**taró**). In the various folkloric plays of the Northeast, there are people that argue against the distinction between ‘caixa’ and ‘tarol’, affirming the provenance from the same instrument. According to them, ‘caixa’ would just refer to the industrialized drum, with metal hoops and tensioning systems; ‘tarol’ to the one whose skins are tensioned with rope, with hoops of metal or other material. Contrary to this view, actually both instruments are manufactured either way,

Andreas Richter reports the following information concerning the construction of the drums:

Die brasilianische *Caixa* und der *Taról* (auch *Caixa-de-Taról*) ähneln sehr der im Schlagzeug-Set verwendeten *Snare-Drum*. Sie werden wie diese industriell hergestellt. [...] Der entscheidende Unterschied zwischen der *Caixa* und dem *Taról* besteht in der Zargenhöhe. Sie beträgt bei dem *Taról* nur 4–6 cm und bei der *Caixa* 10–15 cm. [...] Im *Batuque* von Maracatu Nação Elefante wurden bis zu drei *Taróis* und bis zu vier *Caixas* eingesetzt, im Maracatu Nação Porto Rico jeweils höchstens zwei. Im *Bloco carnavalesco* von Maracatu Nação Pernambuco verzichtete man auf den *Taról* und benutzte drei als *Caixas* bezeichnete *Snare-Drums*. Die von mir erbrachte Unterscheidung zwischen *Caixa* und *Snare-Drum* hinsichtlich der baukundlichen Merkmale war für die Gruppen in der Sprachregelung bedeutungslos.⁶⁰ [Richter, 2001, p. 58.]

Musical Distinction

Not only concerning the construction, but also musically, Guerra-Peixe differentiated very clearly between *taról* and *caixa*, as much as between any other two instruments of the *batuque*, which is contrasting my own observations, in which I could not discern a different use of the two instruments. In all of Guerra-Peixe's scores, different parts for *taról* and *caixa* were transcribed [Guerra-Peixe, 1980, p. 74–78]. He also gave different transcriptions for the variations that each one of these instruments typically plays [Guerra-Peixe, 1980, p. 72].

O primeiro tambor—o tarol—deve em média levar seis “bordões”—cordas de violão, **lá, ré e sol**, duplicadamente—para favorecer

with predominance of the second method, or, tarol (**taró**, as they say).

Another instrument of the same family is the ‘caixa-de-guerra’, of a slightly greater depth than the tarol and used in a quantity that varies from two to five. Its provenance, popular or industrialized, does not give it another designation.”

⁶⁰Ger. “The Brazilian *caixa* and the *taról* (also called *caixa-de-taról*) are much resembling the *snare drum* used in the drum kit. They are produced industrialized, like the *snare drum*. [...] The crucial difference between the *caixa* and the *taról* is the depth of the shell. It is only 4–6 cm for the *taról* and 10–15 cm for the *caixa*. [...] In the *batuque* of Maracatu Nação Elefante up to three *taróis* and up to four *caixas* were used, in the Maracatu Porto Rico at most two of either one. In the *bloco carnavalesco* of the Maracatu Nação Pernambuco, there was no *taról* and up to three *snare drums* that were referred to as *caixas*. The distinction I made between *caixa* and *snare drums* with regards to constructional aspects was of no significance to the groups.”

uma execução bastante rufada e característica. As caixas-de-guerra não devem conter além de quatro “bordões”, a fim de que a sua sonoridade não se confunda com a do tarol.⁶¹ [Guerra-Peixe, 1980, p. 59]

This last sentence already indicates that the distinction between *caixa* and *taról* seems to be of significance to Guerra-Peixe. He further gives insight in what might be the main musical distinction:

Se bem que o primeiro instrumento a marcar a sua entrada seja indiferentemente o gongué ou o tarol, a este cabe anunciar o andamento a ser observado. Vejamos como ocorre comumente a música de percussão: o tarol anuncia levemente um esquema rítmico bem simples, rufado e intercalado de pausas; quase no mesmo instante, o gongué assinala a sua rítmica característica; a seguir, dão entrada as caixas-de-guerra. Por essa altura, o tarol já passou do esquema inicial às variações.⁶² [Guerra-Peixe, 1980, p. 66–67]

Julgamos desnecessário abordar os efeitos particulares do tarol e das caixas-de-guerra, tambores suficientemente conhecidos. Lembraremos apenas que a música do primeiro soa **agudo** em comparação com a das outras caixas. Tarol e caixas-de-guerra executam ritmos diversos, embora alguns fragmentos sejam relativamente semelhantes.⁶³ [Guerra-Peixe, 1980, p. 68]

In his instructional book on Brazilian percussion, Gilson de Assis gives two different patterns for the *caixa* and the *taról*. In his “*maracatu*” score the *taról* plays the *entrada* alone, while the *caixas-de-guerra* enter later, together

⁶¹Port. “The first drum—the tarol—needs on average to have six ‘bordões’—guitar strings, **A, D, and G**, twice—in order to achieve the characteristic sound, which is fairly rolling/rattling. The caixas-de-guerra must not have more than four ‘bordões’, so that their sound does not fuse with the sound of the tarol.”

⁶²Port. “Invariably the first instrument to enter would be the gongué or the tarol, but it is the latter which announces the tempo that is to be followed. Let us take a look at the common succession of the percussion part [of *maracatu*]: The tarol announces lightly a rhythmic scheme quite simple, with *press strokes* and interrupted by rests; almost immediately, the gongué states its characteristic rhythm; following, the caixas-de-guerra enter. At this stage, the tarol has already gone from the initial rhythmic scheme to variations.”

⁶³Port. “We consider it unnecessary to address the particularities of the tarol and the caixas-de-guerra, drums sufficiently familiar. We only remind that the sound of the first is **high** in comparison with the other caixas. Tarol e caixas-de-guerra play different rhythms, apart from some relatively similar fragments.”

with the *alfaias* [Assis, 2002, pp. 98, 101]. This corresponds to what Andreas Richter was told by his informants in 2000:

Wie mir von den Gewährsleuten aus allen drei Gruppen [*Nação do Maracatu Porto Rico*, *Nação do Maracatu Elefante* and *Nação Pernambuco*] mitgeteilt wurde, ist es nach den traditionellen Normen der Aufführungspraxis die Aufgabe eines *Taról*-Spielers, das Signal für den Einsatz des *Batuque* zu geben. Diese Norm wurde in der Praxis jedoch nur im Maracatu *Nação Porto Rico* umgesetzt, in den beiden anderen Gruppen übernahm jeweils ein *Caixa*-Spieler die leitende Funktion.⁶⁴ [Richter, 2001, p. 59]

When Hugo Leonardo described the *taról* to me, apart from explaining that it is shallower, he said that it “tem um baque mais agudo”⁶⁵ and “vibra mais”⁶⁶ [Leonardo, 2012]. However, the distinction does not seem to be of great importance in *Leão da Campina*, the term *taról* is not usually used, and there are no separate patterns for *taróis*.

In the descriptions of Santos and Resende’s *Batuque Book*, *taról* and *caixa* are also clearly treated as different instruments.⁶⁷ When looking through the provided scores, however, the differences seem relatively small. For *Leão Coroadado*, the authors list them as separate instruments, but in the scores they always give the exact same patterns [Santos and Resende, 2009, p. 36–44]; in the interview on the accompanying DVD, Afonso Aguiar, *mestre* of this group, does likewise not specifically make a distinction between *caixa* and *taról* [Santos and Resende, 2010]. In two of the three scores for *Encanto da Alegria*, the only differences are subtle nuances in the introductory phrases,⁶⁸ which are played by both instruments; in the third score the respective parts are identical [Santos and Resende, 2009, pp. 83–103]. Only for *Porto Rico*, the parts in the score are markedly different [Santos and Resende, 2009,

⁶⁴Ger. “As I was told by the informants of all three groups [*Nação do Maracatu Porto Rico*, *Nação do Maracatu Elefante* and *Nação Pernambuco*; remark], by the traditional norms of performing practice it is the duty of a *taról*-player to give the signal for the entrance of the *batuque*. However, this norm was in practice implemented only in the *maracatu-nação Porto Rico*, in the two other groups *caixa*-players assumed the leading function.”

⁶⁵Port. “has a higher pitched sound”

⁶⁶Port. “vibrates/rattles more”

⁶⁷For example, they are both listed as an instrument used in *maracatu de baque virado* [Santos and Resende, 2009, p. 30], whereas for *maracatu de baque solto* only the *taról* is listed [Santos and Resende, 2009, p. 31].

⁶⁸Some notes are played as *flams* in the *caixas* but not in the *taróis*. The authors report the same distinction for *Porto Rico*’s introductory phrases, which are furthermore documented on the accompanying DVD [Santos and Resende, 2010].

pp. 44–82], and likewise *mestre* Shacon Viana lays great emphasis on the distinction in the accompanying DVD [Santos and Resende, 2010].

Summary

Contrary to the physical differences between *taról* and *caixa*, the musical distinction is seemingly not in all *maracatus-nação* as clear. Although some groups use the two in different ways, for others the distinction seems to have no importance. One of the things reported most often was that the *taról*, and not the *caixa*, was responsible for playing the introductory phrases.

Comparing my own observations to the ones reported by Guerra-Peixe in 1955 and Andreas Richter in 2001, and to the scores provided in Santos’ and Resende’s *Batuque Book*, I conjecture that the distinction at some stage might have had greater importance and that currently in some of the *maracatus-nação* these two instruments are converging.

3.6.3 Sonic Aspects

In different *maracatus-nação*, there were sometimes huge differences in how the *caixas* of the different *batuques* sounded. Some of the aspects that I think of as relevant in this regard are described in this section.

Number of *Caixas* in a *Batuque*

In all *batuques*, there were much fewer *caixas* than *alfaias*. From her observations, Julia Pittier Tsezanas in 2010 gave the following estimate:

O naipe das caixas pode ser mais reduzido, arriscaria dizer uma proporção de uma caixa para cada cinco alfaias, só para ilustrar, mas isso depende de como cada mestre organiza o seu baque e da disponibilidade de músicos para isso.⁶⁹ [Tsezanas, 2010, p. 106]

This number corresponds approximately to my own observations. Curiously, Hugo Leonardo named the exact same numbers during an interview in 2012:

Existe um regra dos caixas: [...] Para cada caixa se toca cinco alfaias.⁷⁰ [Leonardo, 2012]

⁶⁹Port. “The *caixa* section can be smaller, I would risk to state a proportion of one *caixa* for every five *alfaias*, only for illustration, but this depends on how each *mestre* organizes their *baque* and on the availability of musicians.”

⁷⁰Port. “There exists a rule concerning the *caixas*: [...] For every *caixa*, five *alfaias* are to be used.”

Tuning

From my observations in 2012, I would say that most *caixeir@s* preferred moderately high tunings. My own *caixa*, that I used in *Leão da Campina* in 2012, and which was, according to my personal preference, coming from a *jazz* background, tuned fairly high, was higher pitched than most other *caixas*, in *Leão da Campina* as well as in other *maracatus*. Several people I met liked the sound of the drum but specifically noticed the high tuning. Concerning the tuning, Hugo Leonardo stated the following:

A afinação do caixa para o *maracatu* não é a mesma afinação de caixa para banda. [...] Tem que ser um pouco mais grave.⁷¹
[Leonardo, 2012]

A possibly related statement he made, was that “o baque do maracatu de caixa, ele é mais pesado”⁷², and added furthermore that the sound “fica seca”⁷³, if the tuning is too high. I think this could be related to the fact that the notes tend to become shorter when the tuning is raised. The notes of lower tuned *caixas* have a slower, more gradual decay. Consequently, successive notes tend to ‘overlap’ more.

Sound

The sound of a *caixa*, in particular the length of the decay, depends greatly on the drum heads, the tuning of the drum, the kind of *snare*s that are used, how tight they are attached to the bottom drum head, and where the drum is struck. Most *batuqueir@s* played predominantly in the central area of the drum head. When I once during an *ensãio* played my *caixa* relatively close to the edge, a *batuqueiro* of *Leão da Campina* remarked to me that the resulting sound would be a “som do frevo”⁷⁴, implying that this was not suitable for the sound of *maracatu*.

3.6.4 Playing Techniques

In this section, I will try to describe what I observed in the *maracatus-nação* concerning the techniques employed to play the *caixa*.

⁷¹Port. “The tuning of the *caixa* for *maracatu* is not the same tuning as for *caixas* in bands. [...] It needs to be a little lower.”

⁷²Port. “the *baque* of the *maracatu caixa* is heavier.”

⁷³Port. “results dry”

⁷⁴Port. “sound of frevo”. *Frevo* is another musical tradition which is commonly regarded to be very ‘typical’ for Recife. It has musical characteristics hugely differing from *maracatu*, due to the predominant use of large wind instrument ensembles resembling rather *jazz big bands* or *marching bands*.

Placement of Instrument

In all cases I observed, the *caixa* was carried via a strap that was attached to both the body and the instrument, such that both arms were free for playing. The instrument was in many cases positioned centrally in front of the body, with the heads approximately parallel to the ground, and the strap fastened around the hip or waist. Examples are depicted in Figure 7.10 on p. 168.

As frequently, however, the instrument was positioned to one side of the body (mainly to the left for *batuqueir@s* playing *right-hand lead*, see the remarks below) and the strap put around one of the shoulders, usually the one next to the instrument. In this case, it was tilted towards the walking direction (similar to the placement of *alfaias*), in some cases even with the drum heads completely vertically. Examples of this position, with the drum at two different angles, are found in Figures 7.2 on p. 163 and 7.15 p. 171. Note that the *batuqueir@s* in these examples do not use straps as they are sitting, which is highly uncommon in public presentations of a group. The position of the drum in both examples nevertheless is relatively similar to how they positioned it standing.

Whereas a placement centrally in front of the body results in equal motional freedom for both hand, and, in the case of a *matched* grip (see Section 3.6.4 below), similar movements of the two hands and arms, the second possibility results in unequal conditions for the two hands and arms. In particular, due to the physical movements necessary to perform the strokes, it is easier to play very loud accents with the hand that is further apart from the drum. This is a statement that I think is easily verified and becomes evident instantly when observing the way in which *alfaias* or *caixas* in such a position are played.

Moreover, sometimes I observed that *caixeir@s* left the hand which was next to the instrument in continuous contact with it, providing additional stability to the instrument, or maybe just comfortably resting their hand there. If playing in this manner, the motional possibilities of that hand are further diminished (which is by no means to be necessarily regarded as a disadvantage).

Grip

For describing the many variants of holding the sticks that I observed, I suggest a classification into four basic categories. The names of the first two come from Western orchestral and drum kit pedagogics. For the other two categories, playing styles previously unknown to me, I invented names.

1. *matched grip*
2. *traditional grip*
3. *‘inverse traditional’ grip*
4. *‘double traditional’ grip*

The idea behind this categorization is the following: Basically, a *caixa* stick can either be hold like a hammer, which is also how the right *alfaia* stick is hold, or, it can be hold in a manner similar to how the left *alfaia* stick is hold (both for right-handed players). Combing these two possibilities for both hands, the four categories above result.

Matched grip refers to holding *both* sticks in a ‘hammer’ style. The two *caixeiros* at the left of Figure 7.10 on p. 168 are playing with *matched grip*. ‘*Double traditional’ grip* means holding *both* sticks like the left *alfaia* stick.

The remaining two grip categories from the list above combine the two possibilities: According to this categorization, standard *alfaia* playing would for example classify as using a *traditional grip*, with the *leading* hand (see Section 3.6.5) holding the stick with a ‘hammer’ style grip. Hugo Leonardo, depicted in Figure 7.2 on p. 163, and Nathalia Paixão of *Estrela Brilhante*, depicted in Figure 7.15 on p. 171, both played with a *traditional grip*. ‘*Inverse traditional’ grip* would be the opposite, where the *leading* hand holds the stick like a left-hand *alfaia* stick. An example is depicted in Figure 7.10 on p. 168, where Andresa Bento, the *batuqueira* on the right-hand side uses this grip in the lower of the two pictures.

There are countless variants of all these possibilities. Differences I observed included: The angle between the stick and the arm; how close to the end or to the center the stick is held; how many fingers have contact with the stick; and which fingers are touching the stick from which side.

I regularly observed that *caixeir@s* switched between different ways of holding the sticks. Besides switching between various of the four possibilities listed above, this also included variations within the *traditional grip* family, i.e. which fingers exactly are in contact with the stick and whether they are positioned above or underneath it. For example, Andresa Bento, the aforementioned *caixeira* of *Leão da Campina*, switched frequently between all four, *matched*, *traditional*, *inverse traditional*, and ‘*double traditional’ grip*. In the two video frames in Figure 7.10 on p. 168, recorded within several minutes, she switched between *matched* and ‘*inversed traditional’ grip* (she played right-hand lead).

The *traditional grip* family is with few exceptions the one I observed in those cases where the drum was positioned besides the body. This and the ‘*inverse traditional’ grip* family are, from my point of view as a percussionist, the only comfortable and practicable choice when the drum is in that position. If the drum is positioned centrally in front of the body, all four possibilities

seem workable.

Strokes

The most widespread technique of playing the *caixa* that I observed were strokes in which the stick is in relative short contact with the drum head and produces a clearly defined short attack, followed by a moderately longer decay. This basic stroke is also the one predominantly used in Western drum kit playing or orchestral percussion.

Another technique often employed were *press strokes*, where for one stroke, played via one movement of the hand or arm, the stick rests on the drum head a longer time, respectively bounces off it and again into it in very fast succession several times. The result is a very short *drum roll*, in Portuguese *rufo*. The quality and length of the resulting sound depend largely on the pressure that the player applies to the stick.

For playing longer *press* or *closed rolls* in orchestral drumming, several such *press strokes* are played in succession, overlapping each other and hence resulting in one long sound, in which—ideally—the single strokes are not audible anymore. In *maracatu*, however, this technique is not common. Rather, the various strokes are audible to a certain degree most of the time. Long successions of *press strokes* are not common. They seem to be mostly used as embellishments, a continuous spectrum of possibilities between *pressed* and ‘*unpressed*’ strokes exists.

How often, when, and how *press strokes* are applied, and to what extent they are *pressed* or ‘*unpressed*’, seems to vary not only between different *maracatus*, but also from *caixeir@s* to *caixeir@s*. Concerning “rufado” playing (*press strokes*), Hugo Leonardo said to me that “[o] uso depende das pessoas”⁷⁵, but, in reference to *Leão da Campina*, “se usa pouco.”⁷⁶ He also gave an explanation for this and said that *press strokes* were not used so much since “tem que ouvir a divisão.”⁷⁷ [Leonardo, 2012]

However, as I constantly observed strokes *pressed* to various degrees in almost all *nações*, to a certain extent also in the playing of *caixeir@s* of *Leão da Campina*, I conclude that this technique *is* in fact essential to *maracatu caixa* technique, but that it might be of crucial importance when and how it is applied.

Finally, a playing technique that I observed a lot in several groups, mostly from Olinda, which are by many considered as *grupos percussivos* or *maracatus estilizados*, like, to name but a few, *Nação Pernambuco*, *Nação Camaleão*,

⁷⁵Port. “The usage depends on the person”

⁷⁶Port. “it is little used.”

⁷⁷Port. “one needs to hear the subdivisions.”

Badia, or *Maracambuco*, were *rim shots*. This technique consists of hitting the drum head and the drum's rim simultaneously with the stick. The loudest and most penetrating sounds possible on the *caixa* are produced in this way. Andreas Richter observed this technique for the *caixa* playing in *Nação Pernambuco* already in 2000 [Richter, 2001, p. 79]. However, it is a technique I very rarely observed in the *batuque* of a *maracatu-nação*.

3.6.5 Macrorhythmics of the *caixa*

Several *caixa* transcriptions (those of the recordings I will analyze in Part III) are provided in Chapter 7. Some of them I will discuss in this section.

Basic Features

One of the most salient feature of *caixa* playing in *maracatu* is that usually all, or almost all, subdivisions are played. Some of them are accented, such that various patterns result without interrupting the continuous flow of sixteenth notes. The volume differences between notes with and without accents can be big, but the dynamic levels of the note form a continuum with all sorts of subtle nuances. Likewise, notes embellished by *press strokes* are found in all sorts of variations.

Patterns

In a first approach, I would suggest two main categories to very coarsely describe the patterns that according to my observations form the basis for the *caixa* playing of the *maracatu-nação*. I will also introduce a third family of patterns in order to account for several patterns described by various authors, which I, however, never observed during my field work.

Clearly, not all of the *caixa* patterns show all of the characteristics of one of the families I will describe below. Furthermore, I want to emphasize again that the *caixa* playing displays a great variational wealth that is impossible to accurately account for in a few sentences or transcriptions.

Patterns in Proximity to *Alfaia* Patterns

The first group consists of patterns that resemble the *alfaia* patterns they accompany, and hence possibly change from *baque* to *baque*. The accent pattern follows that of the *alfaia*. Typically some accents are added: Most often these can be observed on the four beats, and/or the sixteenth notes preceding them. As such, these patterns in some sense combine characteristics of the

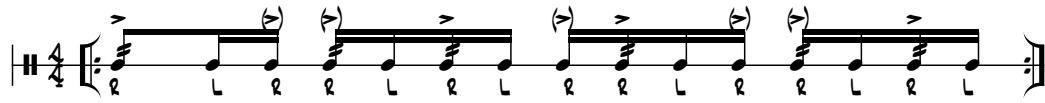


Figure 3.12: The basic *caixa* pattern that Nathalia Paixão, of *Estrela Brilhante (do Recife)*, played in the recordings *2012.03.24 Jacqueira excerpt 1–2*.

first *ganzá* pattern notated in Figure 3.4 on p. 52 and the *alfaia* pattern of the *baque* in question.

Take a look at my transcription from the first recording I will analyze microrhythmically in Part III, *2012.03.29 Ibura excerpt 3*: It is given in Figure 6.2 on p. 141. In this recording, Hugo Leonardo plays the basic *caixa* pattern used in *Leão da Campina* to accompany the *alfaia* rhythm that is called *malê* in that group. A transcription of this *alfaia* pattern is given in Figure 3.11 on p. 65. In Hugo’s playing, exactly those notes tended to be accented that are also accented in either the *alfaia* pattern, the mentioned *ganzá* pattern, or both. In *Leão da Campina*, only this type of *caixa* patterns is used. This can be verified for the case of my transcriptions of the recordings of *caixa* playing by members of this group that I analyzed: *2012.02.16 Ibura excerpt 1–4* and *2012.03.29 Ibura excerpt 2–8*, for which the transcriptions are found in Figures 7.4–7.14 on p. 164–170.

Further examples include the transcriptions of *caixa* patterns of *Leão Coroado* reported by Santos and Resende [Santos and Resende, 2009, p. 44] as well as Oliveira [Oliveira, 2006, p. 31]; the patterns reported by the latter for *Estrela Brilhante de Igarassu* and *Cambinda Estrela* [Oliveira, 2006, pp. 30, 33]; some of the *caixa* and *taról* patterns reported for *Porto Rico* by Richter, observed in 2000 [Richter, 2001, p. 78]; the *caixa* pattern (but not the *taról* pattern) reported for *Porto Rico* by Oliveira in 2006 [Oliveira, 2006, p. 30]; the *taról* pattern (but not the *caixa* pattern) reported for *Porto Rico* by Santos and Resende in 2005 [Santos and Resende, 2009, p. 82]⁷⁸.

Patterns in Proximity to *Gonguê* Patterns

The second group consists of patterns that are less strongly resembling any *alfaia* pattern and are correspondingly used for various *baques* with no or only minor modifications. Whereas patterns from the first family are four beats long, like the *alfaia* patterns given in Figure 3.11 on p. 65, the patterns of this family tend to repeat, entirely or almost, literally already after two

⁷⁸For the one scores, [Santos and Resende, 2009, pp. 73–81], both, the *taról* and *caixa* patterns, would fall into this pattern family.

beats. Possibly some minor variations *do* differentiate the two halves of a bar, but to a lesser extent than it is the case for the first pattern family. These patterns share some characteristics with the first *gonguê* pattern notated in Figure 3.2 on p. 49, or variants of it.

For example, the basic pattern that Nathalia Paixão of *Estrela Brilhante (do Recife)*, played in some of the recordings I made, 2012.03.24 *Jacqueira excerpt 1–2*, is depicted in Figure 3.12. All the notes, with the exception of the first, of the mentioned *gonguê* pattern are accented, with additional accents on the last sixteenth notes of beats 1 and 3. I also observed other *caixeir@s* of *Estrela Brilhante*, as well as *mestre* Walter, playing this pattern or variants of it.⁷⁹ Guillot reports a similar *caixa* pattern for a recording of *Estrela Brilhante* in [Guillot, 2005, pp. 32–35].

Further examples reported by other authors that would fall into this pattern family are: Most of the ones reported for *Maracatu Elefante* by Richter [Richter, 2001, p. 78]; the ones reported for *Encanto da Alegria* by Santos and Resende [Santos and Resende, 2009, pp. 85–103] as well as Oliveira [Oliveira, 2006, p. 32]; and the *taról* pattern reported for *Porto Rico* by Oliveira [Oliveira, 2006, p. 30].

Patterns in Proximity to *Ganzá* Patterns

In some of the literature, I found transcriptions of *caixa* variations that more strongly resemble the first *ganzá* pattern notated in Figure 3.4 on p. 52 than the patterns mentioned so far. The feature of these patterns that I would suggest to put into focus, is the accentuation of either beats 1 and 3 or all four beats, together with a ‘lack’ of syncopation, or off-beat accents.

Of this kind are the *caixa* patterns, and some of the *taról* patterns reported for *Elefante* by Guerra-Peixe in 1955 [Guerra-Peixe, 1980, p. 72]; and some reported for *Elefante* and *Porto Rico* by Richter in 2001 [Richter, 2001, p. 78]. However, I have never observed these kind of patterns during my field work in Recife.

Viração de caixas

The discussion above about *patterns* should not mislead to the conception that there is no improvisational freedom found in *maracatu caixa* playing. I had the impression that more or less *all caixeir@s* play variations up to

⁷⁹In most cases I observed, instead of the eighth note at the beginning of the pattern, continuous sixteenth notes were played, resulting in even greater resemblance of the two halves of the pattern. In fact, very often only the second half of the pattern depicted in Figure 3.12 was played repeatedly, i.e. twice in each bar.

varying degrees. Hugo Leonardo further told me that there is *viração* playing in the *caixas*, just as in the case of *alfaias*, which is also applied in the same parts of a performance as in the *alfaias* and performed by some specifically designated players [Leonardo, 2012].

He played a brief example to me, *2012.03.29 Ibura excerpt 6*, which I used for the analyses of Part III. A transcription is found in Figure 7.7 on p. 166. Another example is found in the recording *2012.02.16 Ibura excerpt 1*, played by *Leão da Campina caixeira* Andresa Bento, of which the transcription is depicted in Figure 7.11 on p. 169: The eighth note variations she plays on the first beats of bars 2 and 3 and throughout bar 4, with a strong accent played on the off-beat, embellished by a *flam*, would classify as *viração*. Accented eighth note off-beats are one of the features found frequently in *caixa viração*.

However, due to the variational richness and complexity of *viração* playing in the *caixas*, an extensive discussion would be needed to appropriately represent these phenomena.

Introductory Phrases

As mentioned, often the *taról* and/or the *caixa* are the instruments that start a *baque* with playing certain introductory phrases. These are sometimes called *chamada* and involve a family of certain ternary phrased patterns⁸⁰. As these show macrorhythmic structures that are very different from all the other patterns I described above, and it therefore seems difficult to compare the microrhythmic timing of the two directly, I omit a description of them.

Besides a few notations provided by Richter [Richter, 2001] and Santos and Resende [Santos and Resende, 2009], a more comprehensive discussion of introductory sequences is led by Oliveira [Oliveira, 2006, 28–33]: There, examples transcribed from the groups *Estrela Brilhante (do Recife)*, *Estrela Brilhante de Igarassu*, *Porto Rico*, *Leão Coroado*, *Encanto da Alegria*, and *Cambinda Estrela* are included, such that similarities and differences can well be analyzed.

⁸⁰I found it always peculiar that a ternary subdivision is in the music of *maracatu*, with few exceptions, *only* used during the introduction, whereas all other rhythmic patterns only involve quaternary subdivisions. (Exceptions to this are occasionally found in the playing of the hand drums and some *caixa* variations.) Interestingly, Gérald Guillot suggests to see the ternary four note phrases played several times during the *chamada* (an eighth note triplet, followed by two sixteenth note triplets and another eighth note triplet) as an extreme case of the, non-isochronous, quaternary sixteenth notes played in the main parts of the pieces [Guillot, 2005, p. 15]. In this view, one of the main features of the microrhythmic timing of the recordings analyzed in Part III would appear in overemphasized form in the introductory phrases of the *caixa*: the length of the fourth sixteenth note.

Stickings

Concerning the *sticking*, the succession in which the two different hands are used to play the notes, I observed two main variants. Again, the names I give here partly stem from concepts of Western percussion pedagogics. Nevertheless, I felt they are suitable for describing my observations fairly accurately.

1. *hand-to-hand* sticking
2. *predominant* use of one hand

Hand-to-hand means a sticking where, in the case in which all subdivisions are played, the two hands are used in strict succession. In other words, one hand plays the first and third sixteenth note of each beat, the other hand plays the other notes, which are the double-time off-beats. This kind of sticking can start with either hand. The starting hand is sometimes also referred to as the *leading* hand, and most often the right hand (for a right-handed person) is chosen as the *leading* hand. Examples for this sticking are found in the transcriptions I provided for the recordings *2012.02.16 Ibura excerpt 1–4* and *2012.03.29 Ibura excerpt 2–8*, depicted in Figures 7.11–7.14 on p. 169–170 and 7.4–7.9 on p. 164–167.

The other kind of sticking I observed was characterized by the *predominant* use of one of the hands. This included, firstly, starting the pattern with that hand, secondly, playing systematically more notes with it, and thirdly, playing most accents with it.

Examples for this kind of sticking are found in the transcriptions I provided for the recordings *2012.03.24 Jacqueira excerpt 1–2*, depicted in Figure 7.16 on p. 172. Observe that all of the three characteristics I named above can be verified for those particular transcriptions.

A mixed form of the two stickings is found in the transcription of the recording *2012.03.29 Ibura excerpt 3*, shown in Figure 6.2 on p. 141: There, Hugo Leonardo clearly uses *hand-to-hand* sticking for the second half of the pattern (beats 3 and 4), whereas in the first half of the pattern he uses the same sticking that is found in the second half of the examples just mentioned, which I suggest to classify as a *predominant* use of, in this case, the right hand.

I noticed a slight tendency towards using *hand-to-hand* sticking when positioning the instrument centrally in front of the body, and rather using one hand *predominantly* when positioning the instrument besides the body. This should not be regarded as a strict rule, as I saw many exceptions to this.

In the overwhelming majority of the cases I observed in which the *caix-eir@s* that had positioned their instrument besides the body and played with

a *hand-to-hand* sticking, they chose the stick they held in a ‘hammer’ style as their *leading* hand (see Section 3.6.4 for a description of the various grips). In a few cases, however, the other hand was chosen, resulting in greater motional freedom of the arm to perform strongly accented off-beats, which, as described above, is a common feature of many common *caixa* patterns.

In opposition to ideas as expressed by Olava Alén, who related the microtiming of Cuban *tumba francesa* to the distribution of the strokes on the drum head and the resulting body movements of the drummer [Alén, 1995, pp. 69–70], I conjecture that the sticking does not have noteworthy relevancy for sub-syntactic timing. (I will make some further remarks on this topic in Section 4.5.1.)

I rather think that most *caixeir@s* are well able to achieve the microtiming they desire independently of the utilized sticking. One observation that supports this conjecture is the fact that Hugo Leonardo’s *caixa* playing showed no systematic timing differences in patterns resembling each other on a syntactic level very strongly, but for which he used different stickings: The only recording where he did not use *hand-to-hand* sticking was 2012.03.29 *Ibura excerpt 3*, see the transcription in Figure 6.2 on p. 141. However, the microtiming did not differ significantly from the recordings 2012.03.29 *Ibura excerpt 2*, 4–8, for which transcriptions are provided in Figures 7.4–7.9 on p. 164–167.

Part II

Theory and Methods

Chapter 4

Rhythm Theory and Definitions

4.1 Rhythm and Meter

In the early 1960s, Ingmar Bengtsson remarked: “Bezüglich der Begriffe Rhythmus, Takt und Metrik herrscht immer noch große Verwirrung innerhalb der Musikwissenschaft [Bengtsson, 1963, p. 276].”¹ Paul Friaese starts his classic 1982 article *Rhythm and Tempo* with the following sentences:

The task of those who study rhythm is a difficult one, because a precise, generally accepted definition of rhythm does not exist. [...] It is necessary to emphasize that the problem has been complicated by music theorists who have often chosen, due to their personal aesthetic preferences, to recognize only one of the several aspects of rhythm. [Friaese, 1982, p. 149]

In this respect, not too much has changed ever since. In the introductory statements to his 2001 lexicographic entry “Rhythm” of the *New Grove Dictionary*, Justin London still can only cite Margot E. Fassler (1987) and Curt Sachs (1953):

Fassler remarks: ‘There is no accurate simple definition of the term “rhythm” (or “rhythmics”) and no consistent historical tradition to explain its significance’ [...] Sachs is even more pessimistic: ‘What is rhythm? The answer is, I am afraid, so far, just—a word: a word without generally accepted meaning. Everybody believes himself entitled to usurp it for an arbitrary definition of his own. the confusion is terrifying indeed’ [...] [London, 2001, p. 277]

¹Ger. “Regarding the terms rhythm, measure and meter there is still much confusion within musicology.”

As Sachs mentions, there have been various attempts to define the terms *rhythm* precisely, and the same applies to *meter*. What is clear, is, that both have to do with the temporal structure and/or processes of music. The basic and probably most broadly accepted overall ideas are the following.

Heuristic Working Definitions

Meter concerns recurring structures and the listeners' expectations of when the upcoming musical events will take place. There is not necessarily a direct or easy correlation between the meter of a piece of music and actually sounding events. The meter is usually thought of as a more or less fixed underlying grid for the sounding musical events. This does not mean that the meter can never change within a piece of music, but when it changes too often (e.g. in every bar), a distinction between *meter* and *rhythm* becomes problematic, especially since a certain amount of time is needed until a listener can build up temporal expectations.

Rhythm applies more to the actual sounding events of a piece of music. It might potentially change constantly but it can also consist of constantly repeated patterns. Rhythm and meter are not independent from each other: the meter of a piece of music is commonly viewed as being inferred from the sounding rhythms, whereas the same sounding rhythm is held to be potentially different within different metric framework.²

As exact definitions do not seem imperative for this thesis, I will not delve further into the topic and focus on the terms that are more crucial for the analyses I want to conduct. Apart from the aforementioned lexicon article [London, 2001], I want to refer the interested reader to a well-conceived summary on this topic by Martin Pfeiderer, found in [Pfeiderer, 2006, Chapter 4], and an interesting rather brief reflection by Ingmar Bengtsson in [Bengtsson, 1975, Section II].

4.2 Categorical Perception

The concept of *categorical perception* means that if humans perceive any stimuli, they tend to structure them into *discrete categories*. For example, a color could be classified as *yellow*, *green* or *blue*. Those categories are distinct from each other and usually each color is expected to fall into exactly one of them. All colors in the same category are taken to be somehow similar. They can be thought of as forming an equivalence class.

²The latter is strongly supported by listening experiments, as for example by Dirk-Jan Povel and Peter Essens (1985), reported in [Hähnel, 2008, p. 28].

The categories are not necessarily universal: Whereas standard Welsh does not distinguish between ‘blue’ and ‘green’, and likewise Japanese has words for ‘blue’ and ‘yellow’ but (except for an English loan word) not for the intermediary ‘green’, a designer’s professional language might involve a dozen words to describe different shades of green.³

Categorical Rhythm Perception

Applied to the context of musical rhythm, theorists take the categories to be note durations and metric positions as found in musical notations. For example, a note is heard as an eighth note or as a sixteenth note, and might be heard as played on the third beat of the bar or the successive offbeat, but is unlikely to be heard as “in between” those categories.

One of the pioneers in this field is English musicologist Eric F. Clarke. In 1987, he published an experimental study, offering empirical evidence for categorization in the perception of musical rhythm [Clarke, 1987]. Some 13 years later, in abandoning the idea “that some perceptual domains [...] demonstrate categorical perception, while others [...] demonstrate continuous perception [Clarke, 2000, Section 1]”, he suggests “that categorical perception is nothing special at all, and is the inevitable consequence of the sensitivity to events that characterizes an ecological understanding of perception. [Clarke, 2000, Section 1]” He further comes to the conclusion: “In short, categorial perception as a concept seems to offer little in the way of explanatory value. [Clarke, 2000, Section 6]”

I do think, however, that categorical perception is a useful model, which helps to understand how musical notation works. My understanding of the terms *syntactic* and *sub-syntactic* respectively *macro-* and *microrhythmic* as introduced in Section 4.4.2, is based on it. I believe that some problems with the concept of categorical rhythm perception stem from the fact that in, among others, the writings of Clarke, the process of categorization is confused with the preference for specific representatives of the categorical equivalence classes, which is discussed in Section 4.4.1.

³It is a different question in how far the existence of termini corresponds to human perception; there are empiric studies indicating that human color perception *is* more universal than the variety of words for specific colors in different languages might suggest. My main point, however, is that I am convinced that certain categorizations are *learnable*, which I will discuss in Section 4.5.1.

4.3 Microrhythmics: A Historical Outline

Microrhythmics is the field within rhythm theory which is concerned with very short durations and the exact timing of musical phrasing. The time spans involved are typically in the range of milliseconds. Its empirical branch is a rather young discipline, which certainly has to do with the fact that technical aid is needed for the quantitative description of such small durations.

4.3.1 Engendered Feeling and Participatory Discrepancies

In 1966, Charles Keil published the article *Motion and Feeling through Music* [Keil, 1966] as a response to Leonard B. Meyer’s book *Emotion and Meaning in Music* from 1956. In it, he introduces the terms “engendered feeling” as an antagonizing concept to Meyer’s “embodied meaning”, which focusses on the syntactic concepts of music. In contrast to that, the concept of Keil is process-oriented and meant to subsume “aspects of the on-going musical progress [Keil, 1966, p. 338]”. It intends, as Matthew Butterfield put it,

[...] to highlight a level of musical expression inadequately explored in Western music theory. [...] Keil sought to capture with the term a crucial aspect of jazz performance practice, that certain something beyond notation that performers add to music to make it swing. [...] Engendered feeling, perhaps best summarized as groove, subsumes the sense of rhythmic propulsion that Andre Hodeir once referred to as vital drive, the impulse that makes music come alive and induces listeners to movement, to a feelingful, corporeal participation in the ebb and flow of a given performance. [...] Western music theory, Keil rightly concluded, had no adequate language or conceptual framework through which to deal with this expressive domain.

[Butterfield, 2006, par. 1]

Keil’s main point was, that “engendered feeling” is created not on a syntactic but on a sub-syntactic level, like the microtiming of musical events as opposed to their metric position within the bar. To capture sub-syntactic processes in music, he later, in 1987, coined the term “participatory discrepancies”, which he thinks of as being

[...] basically of two kinds: processual and textural. Music, to be personally involving and socially valuable, must be “out of time” and “out of tune.” [Keil, 1987, p. 275]

He further explains what he means by this phrase and conjectures:

It is the little discrepancies within a jazz drummer's beat, between bass and drums, between rhythm section and soloists, that create "swing" and invite us to participate. [Keil, 1987, p. 277]

4.3.2 Quantitative Methods

In the same 1987 article still, Keil continues:

Confident that these participatory mysteries will never be more fully resolved than the mysteries of small particle physics or the furthest reaches of the universe, I'm ready to call in the engineers and start exploring. [Keil, 1987, p. 279]

The empiric work conducted since then leaves me optimistic that maybe indeed soon musicologists will understand sub-syntactic musical timing processes as well as quantum physicists understand subatomic particles.

In 1995, a special issue of the journal *Ethnomusicology* (no. 39) was dedicated to participatory discrepancies, containing a lively debate between researchers on the topic and pioneering empirical studies by Olavo Alén [Alén, 1995]⁴ and J. A. Prögler [Prögler, 1995] in which timing phenomena were measured more precisely than it had probably been achieved previously. In his essay [Keil, 1995] in the same publication, Keil gives an overview of developments in the theory of microtiming and sees in the two mentioned studies a definitive "proof [...] that PDs⁵ exist [Keil, 1995, p. 2]" and as "the bare beginnings of a scientific answer to [Keil, 1995, p. 3]" the question "Where does the groove come from? [Keil, 1995, p. 2]" Although I agree with one thing Leonard Meyer responds to this, who, in his own words, has an "intellectual-idiological position" which stands in "patent disparity" to that of Keil [Cowdery et al., 1995, p. 85], namely his question "[w]hoever doubted that [PDs exist]? [Cowdery et al., 1995, p. 86]", I *do* think that the quantitative description of microtiming phenomena is capable of opening up new ways towards a deeper and more satisfying understanding of musical rhythm and the elusive quality known as *groove*.

⁴Actually Alén's study was originally published in Spanish already nine years earlier, as part of the author's book *La Música de las Sociedades de Tumba Francesa en Cuba* (1986), but received a much more widespread reception through the republishing in the popular English language journal.

⁵abbrev. "Participatory Discrepancies"

Keil’s theoretic writings and the pioneering empiric works by the authors mentioned above, have contributed in a crucial way to establishing a scientific discourse on a topic hugely neglected before.⁶

4.3.3 Creating *Groove*: Syntax Vs. Sub-Syntax

American musician and musicologist Matthew W. Butterfield, in turn, thinks

[...] that the consequences of such participatory discrepancies have probably been overstated. Their effects are actually quite subtle and considerably less consequential than events that transpire in the syntactical domain. [Butterfield, 2010b, fn. 3]

In his opinion, some theorists influenced by Keil’s school of thought laid too much an emphasis on the sub-syntactic level, neglecting and/or denying the relevance of the syntactic level in creating *groove* or “engendered feeling” [Butterfield, 2006, par. 4].⁷ Whether this is true or not, in my opinion, a certain over-emphasis on the sub-syntactic level might have actually had some historical legitimacy and resulted in a productive and still growing discussion that had not been led before.

Yet I absolutely agree with Butterfield in that I think both, the syntactic and sub-syntactic level, as well as the interplay between them, contribute decisively to the way musical timing and rhythm is perceived and need to be taken into account when an accurate and comprehensive model for rhythmic phenomena shall be derived. Works that successfully attempted this,

⁶The most important exception to this are, to my knowledge, the empirical performance and mirrorhythmic studies conducted at the University in Uppsala, Sweden, since already the beginnings of the 1960s by a group of researchers around Ingmar Bengtsson. See his report [Bengtsson, 1975] on this.

Surely technological progress since the 1980s has also enormously prompted exact empiric work of musical performance. In fact, this very study would probably not have been possible to carry out without the development of small and high-quality recording equipment, rapid and inexpensive home computers and powerful free software programs for sound editing and annotating, all of which are now readily available to an average student of musicology in Central Europe. This is a far cry from the previous situation in Uppsala, where the musicologists interested in sub-syntactic research built a few specifically designed apparatuses for this in collaboration with physicists from the same university [Bengtsson, 1975]. Also compare this to Olavo Alén’s description of the technical implementation of their study (conducted somewhere between 1976, where the underlying recordings were made, and 1986, where the results were first published) using an “adapted Winckel model repeater” for determination of the note-onsets, and hand-written calculation charts [Alén, 1995, pp. 57–60, fn. 9].

⁷For a clarification of the terms *syntactic* and *sub-syntactic*, see Section 4.4.2 below.

and in particular demonstrate ways of how to account for the interplay between the syntactic and sub-syntactic level, include J. A. Prögler’s article on *swing* in Jazz [Prögler, 1995, e.g. pp. 39–40], Christiane Gerischer’s study on Bahian *samba* [Gerischer, 2003, chapters 4–6] and Matthew Butterfield’s own discussion of the *backbeat* in groove-based music [Butterfield, 2006].

4.4 Terminology

In this section, I would like to discuss the central terms that constitute the theoretical framework for the analyses of Part III.

4.4.1 Categorical Perception Vs. ‘Perfect Categorical Fit’ and ‘Remainder’

In one of the first empirical works on categorical perception of musical rhythm, Eric F. Clarke concludes:

After the temporal information for rhythm has been perceptually categorised, any “remainder” (i.e. any deviations from a perfect categorial fit) is considered to be expressive information, or perhaps accidental inaccuracy. [Clarke, 1987, p. 30]

In another text, from 1999, he speaks of an “appropriate categorial target value” of the note durations (cited in [Butterfield, 2006, fn. 16]). Similarly, Bruno Repp speaks of a “target IOI⁸” (cited in [Butterfield, 2006, par. 31]). Butterfield himself uses terms like “idealized instant to the beat anticipated [Butterfield, 2006, par. 24]” or “idealized location [Butterfield, 2006, par. 45]” of notes. Yet more terms describing the same idea are “theoretical duration”, “deviate”, “variate”, or “temporal warping”, all found in the microrhythmic literature.⁹

Is there a ‘Norm’?

I find all of these notions highly problematic if used without care. They imply the existence of a specific ‘norm’ to which the listener compares the real musical events (like for example an isochronous timing grid) and lie a certain focus on this norm. Sometimes, even worse, without stating explicitly what this ‘norm’ would be. Although having something quite different in mind,

⁸inter onset interval

⁹The last one I encountered in [Clynes, 1987]; all the other ones are in rather widespread use.

namely demonstrating the existence of such ‘norms’, Leonard Meyer rightly pointed out this (often implicit) implication: “[D]eviations are intelligible and effective *only in terms of norms*—and this is true for participatory discrepancies as well. Such norms arise out of the intimate interaction of nature and nurture (cited in [Cowdery et al., 1995, p. 86]).”

I think the mentioned terms should only be used if the implication of a certain norm is intended, and in any case it should be pointed out which the conjectured norm is, and possibly be discussed why *this* particular norm is used as a reference. Already in 1987, Ingmar Bengtsson advised that “we should avoid calling [slightly differing durational values] ‘deviations’ . . . without stating clearly that we just mean deviations *from a mechanical norm* that we use as a sort of temporal ruler (cited in [Polak, 2010, par. 17]).” I am, however, not convinced that such norms, be they ‘mechanical’ ones, as Bengtsson calls them, or of any other kind, necessarily exist in the perception of musical rhythm. I think there is a danger of confusing things that are not comparable. Let us, for clarification, look at examples from other fields than music.

Example 1. Justin London in [London, 2010] used the analogy of colors to illustrate categories: What would be an ‘idealized orange’, an ‘appropriate target tone’ for orange, ‘accidental inaccuracy’ of a certain tone of orange or a ‘theoretical’ orange tone? And what exactly is the ‘remainder’, once the color in question has been categorized as orange?

Clarke would maybe argue that the ‘remainder’ after categorizing a color as *orange* refers to the color in question being dark or light orange, or closer to red or closer to yellow. This seems appropriate to me because no numbers, evoking the appearance of precise quantification, are yet involved. Measuring IOIs can be done relatively exactly, but I do not think that there is enough empiric evidence to justify speaking of some note durations as more ‘ideal’, ‘perfect’ or ‘targeted’ than others.

Example 2. Let us compare the situation to rounding real numbers to e.g. one digit after the decimal point: This process can be understood as putting the real numbers into categories, or equivalence classes. That the category is called *1.5*, including all values ≥ 1.45 and < 1.55 , must not be confused with the question whether 1.5001 or 1.547 has a ‘better categorical fit’. In this example, the word ‘remainder’ could be equated with the exact mathematical concept of *rounding error*, the deviation of the rounded value 1.5 from the exact value. It is questionable, however, whether note durations are heard as ‘rounded’. Just because they are heard categorical, as falling into a certain category, does not necessitate that there is a certain representative of that category that is ‘special’ in any way, or to which the

actual duration is compared, or to which it is ‘rounded’. A better analogy to music is maybe achieved when ‘remainder’ is equated with deciding whether a certain number, within the category *1.5*, is relatively *high* or *low*. This is less precise than speaking of a certain numerical *rounding error*. In the case of rounding numbers, the *category* (equivalence class), for example *1.5*, is incidentally called just as one of its members (namely the exact real *number* 1.5). This, however, does not necessarily mean that the number 1.5001 is a more ‘ideal’ representative of the category *1.5* than the number 1.547.

Of course none of the above theorists would say that an ‘ideal’, ‘perfect’ or ‘theoretical’ musical performance in the above sense is in any way ‘better’ than any other musical performance. If such a misconception ever existed, they all rather tried to demonstrate the opposite in their work. Still, I think it might be counterproductive to imply the existence of abstract ‘idealized’ reference systems for note durations that are probably not there in the perception of listeners.

Small Integer Ratios?

In particular the idea of *one* very specific ‘norm’, intimately related to the concept of isochronicity, is very persistent in the theory: that of ratios of small integer numbers. This might stem from the fact that, firstly, these ratios have an undeniable mathematical aesthetic, already highly appreciated by the Pythagoreans, and, secondly, are a theoretically appropriate concept for describing the *categories* of rhythm perception. A beat is divided in e.g. three or four subcategories (subdivisions), a measure in e.g. three or four beats, a certain section of the form in e.g. eight measures, and the composition in a certain number of form sections.

However, I do not see a reason why, or empiric evidence that, *within* the smallest of these categories, when describing the *actual durations*, the *unrounded* ones so to say, these should ‘ideally’ stand in ratios of small integers, or why such ratios should determine the ‘perfect fit’ or the ‘target value’ of a category. Rather, a wealth of analytical microrhythmic studies, and also some evidence from experimental reproduction tasks,¹⁰ stand in obvious contradiction to such a conception.

¹⁰Even some of the very data provided by Clarke in [Clarke, 1987] speak at least against small integer ratios as being the *only* possible perceptual reference. Experiments by Povel from 1981 also partially question the concept, reported in [Hähnel, 2008, pp. 21–26]. For an interesting theoretical framework and a review on the topic, see [Kvifte, 2007].

Alternatives?

In deferring the discussion on the existence of microrhythmic timing ‘norms’ and possible alternative concepts to Section 4.4.4, I now want to properly introduce terms that I feel are hopefully less biased and freer of implications.

4.4.2 Macro-/Microrhythmic, (Sub-)Syntactic

Every sound has properties like for example volume, timbre, potentially a certain pitch, and the place and time of its occurrence. (Some of) these properties are traditionally notated in Western standard music notation, be it via notes or verbally¹¹, but only up to a certain accuracy. They are never notated *exactly*. This applies likewise to both prescriptive notation, as for example written by composers, and descriptive notation as transcriptions of improvised music written by musicologists.

The Limits and Resolution of Musical Notation

This is inherent in musical notation: It is a *discrete* system, whereas volume, timing, timbre and so on in the ‘real’ world are *continuous*. The sound is *quantized*, in other words *categorized*, to notation. The difference between the two is the same as the difference between a sound and its digital recording. Only that in digital recording the *resolution* is typically much higher than in musical notation, for example a sampling rate of 44.1 kHz¹² with a 16 bit depth.¹³ Compare this to a resolution of—already unrealistically high—28 Hz which would correspond to un-performable nor perceivable 32nd notes at tempo 210 bpm (of a duration of ~36 ms each)¹⁴ and a 3 bit depth, corresponding to around 8 dynamical steps (*ppp* to *fff*) more or less commonly

¹¹Examples for the latter include: *mezzo forte*, *col legno*, an instruction with which instrument a part shall be played, or where in the concert room the speakers for a tape piece shall be positioned.

¹²44 100 samples per second

¹³16 bits, i.e. a number between 0 and 65 536, for each sample. This corresponds—roughly speaking—to a number almost as high of different possible volume levels.

¹⁴See the discussion on the magnitude of the numbers on p. 104 in Section 4.1. For the sake of completeness, it should be noted that on the other hand, there are no hard theoretical boundaries to the temporal accuracy of Western standard music notation. If a very high tempo is chosen as a basis (this corresponds to assigning note symbols of greater value, like whole notes, to the metric level of the beat, instead of the usually chosen quarter note), then real durations can be approximated arbitrarily exact (in exactly the same way as in mathematics real numbers can be approximated by rational numbers). Isochronous 64nd at tempo 1680 bpm have a duration of ~2.23 ms, which would be accurate enough for notating the results of most microrhythmic studies. It is obvious, unfortunately, that the resulting notation would be completely illegible and useless for practical purposes.

notated. Similarly, a description of which instruments shall be used and in which way it shall be played can only ever be a relatively loose approximation to timbre: When described exactly with the aid of Fourier analysis through its spectrum, timbre is represented by a vector in an infinite-dimensional vector space over the real numbers.¹⁵

Different Notations for Different Purposes

Since humans have only limited capacities of processing information, it is exactly this reduction, the rather ‘coarse’ quantization, that makes music notation feasible at all for practical purposes and the needs of musicians, musicologists and music lovers. On the other hand, what must not be overlooked is that a lot of information is lost in music notation, compared to the real sound event. This information might be irrelevant for some purposes while highly interesting in other contexts.

As a consequence, different pieces of music notation may contain information of hugely differing precision. For instance, prescriptive music notation by Western composers has tended to become more and more precise over the past centuries. Also, descriptive transcriptions provided by musicologists tend to contain more precise information than, for example, prescriptive notation used as instructional material.¹⁶ The term *microrhythmic* is meant to refer to the information about the timing of musical events which is lost in music notation due to its coarse quantization.¹⁷

Definition 1. ‘Approximate’ information about musical events captured by the (relatively coarse) quantization of a given piece of music notation M is called *syntactic with respect to M* . The term *macrorhythmic with respect to M* more specifically only refers to the temporal information of these events. More precise information, lost in the quantization, is called *sub-syntactic with respect to M* respectively *microrhythmic with respect to M* .

A General Definition

Definition 1 has the drawback that it depends on the given piece of notation; its advantage over the following heuristic definition—which tries to overcome

¹⁵In other words, to describe timbre exactly, an infinite sequence of numbers, each number from an infinitely large possible range, is needed.

¹⁶Compare this to the remarks I made in Section 4.2 on the non-universality of the categories in categorical perception.

¹⁷In this work, only temporal matters are discussed, but the same idea could be applied to all other properties of musical events, like volume or pitch, resulting in terms like *micro-* and *macrodynamics* or *micro-* and *macropitch*.

this drawback and is, I think, closer to how most authors use these terms—is that it is more precise.

Definition 2. ‘Approximate’ information about musical events captured by the (relatively coarse) quantization of a typical piece of Western standard music notation is called *syntactic*. The term *macrorhythmic* more specifically refers to only the temporal information of these events. More precise information, lost in the quantization, is called *sub-syntactic* respectively *microrhythmic*.

4.4.3 The Metric Hierarchy

The perception of rhythm and meter is usually theorized as to take place on several *metric levels*. I have not attempted to define *meter* precisely, and likewise I cannot provide an exact definition of *metric levels*. But at least an approximate, heuristic understanding of the idea seems both essential and sufficient for the analyses conducted in Part III.

Metric Levels

The output of a syntactic quantization or categorization process as described in the last sections is, ideally, for each musical event, sounding or not, a certain *syntactic* or *metric position* and a *syntactic duration*. This syntactic timing information can be thought of as structured in *groups* of varying sizes. A group of a certain size is the element of a certain metric level. The different levels correspond roughly to repeated durations of different magnitude. It is important to point out that these durations are not necessarily repeated *exactly*, but are, as said, only *of a certain magnitude*. The most important metric levels are the following.

Beat Level

Typically, there is a *beat level* taken to exist, which is frequently used for defining the *tempo* of music, which serves as a basis for dance, and in which one period has a medium duration of around 200—2000 ms (30—300 bpm), most frequently 500—700 ms (85—120 ms).¹⁸ In musical notation, most often *quarter notes* are employed to represent *beats*, the elements of the *beat level*; *eighth notes* or *half notes* can also be found on a regular basis. I used

¹⁸All these numbers are by Justin London, taken from [Pfleiderer, 2006, p. 70]. For corresponding estimates from various authors, see Table 4.1 in Section 4.5. In close relation to the beat level stands the concept of *preferred tempo* (spontaneously chosen tempo by subjects in experiments).

quarter notes in the transcriptions in Part III and will hence use *beat* and *quarter note* interchangeably.¹⁹

Subdivision Level

The *beats* are often *subdivided* into smaller syntactic categories, which are called *subdivisions*. Most often, the division is *binary*, *ternary*, or *quaternary* (i.e. into 2, 3, or 4 smaller units), resulting in subdivision durations of $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$ of the beat duration. Subdivisions of higher order are possible.

The subdivision could potentially be subdivided again, resulting in a deeper metric hierarchy. Alternatively, intermediate levels between the subdivision level and the beat level could be used in description of music (e.g. eight notes in the case of quaternary subdivided quarter notes). Also, I do not think that it makes sense to impose restrictions such as claiming that all beats need to be subdivided into the same number of subdivisions, or that the beats or the subdivisions all need to be of the same length.²⁰ Generally, it seems improbable to me that there are cases in which *one* theoretic model of nested metric levels can accurately represent the perception of *all* possible listeners.

In my transcriptions in Part III the subdivisions will be quaternary, and I will synonymously refer to them as *sixteenth notes*.

Higher Metric Levels

The beats can themselves be seen (or heard) as subdividing longer groupings, as for example the *bars*. This can potentially be extended to the whole *form* of a piece of music, resulting in a unified theoretical model of the temporal structure of it. If this has explanatory value for how rhythm is perceived remains doubtful, as empirical evidence strongly indicates that fairly different processes are underlying the perception of small durations, e.g. up to 2 s, and long durations of several minutes or more.

¹⁹It is not necessarily unambiguous which metric level of a certain piece of music is the beat level, in the somewhat vague sense presented here. For instance, drummer Jojo Mayer reports on the dancing in the audiences of his *drum 'n' bass* group *Nerve*: “People dance differently throughout the world. In Japan they dance very fast to the drum 'n' bass beat. In the Jamaican suburbs of London they dance with more of a half-time feel to the same music. [Micaleff, 2008, p. 57]”

²⁰For a relatively open and broadly applicable approach towards the metric hierarchy, see [Kvifte, 2007].

Meter

Based on the syntactic ideas presented above, which are clearly theoretical and possibly not accurately representing human perception, *meter* of a piece of music could be defined as a particular set of metric levels according to which the musical events of the piece are timed. As already stated several times, this can be ambiguous for a given piece of music and depend, e.g., on the listener or the context.

Lower Metric Levels—Many Meters Hypothesis

Taking the metric hierarchy, and the idea that meter has to do with *expectations* of the listener towards the timing of subsequent musical events, one step further, the sub-syntactic timing information, below the lowest syntactic subdivision level, could also be taken into account.

According to the “Many Meters Theory”, formulated by Justin London in 2004, musical meters that are equivalent on all syntactic levels may be differentiated according to the sub-syntactic timing. This means that a characteristic durational pattern of the smallest syntactic categories, the smallest subdivisions,²¹ is part of the meter of that music. He thinks that expressive “lengthenings and shortenings [of musical events] are not deviations from the norm—they are the norm (cited in [Polak, 2010, par. 17])”.

This idea is strongly supported and illustrated by Rainer Polak’s study on *jembe* music from Mali [Polak, 2010]. This study is one of the most convincing, interesting and comprehensive works on any microrhythmic topic that I know of, due to its large body of data on which it is based, its detailed analyses, and its discussion on a nesting of ternary into binary or quaternary subdivisions. It demonstrates in detail how meters equivalent on a syntactic level are clearly distinguished by sub-syntactic level timing in the examined type of music.

I find the idea that a certain durational pattern of the smallest syntactic units is expected by the listeners, and also consistently played by performers, and hence belongs to the meter, highly plausible. It is a powerful theoretic tool to convincingly explain why, for example, meters characterizing certain musical *genres* can seem and sound clearly distinct while being syntactically equivalent.

I am also of the opinion, however, that the sub-syntactic timing patterns might be structured differently, maybe in a more complicated way, than the syntactic ones. Not too narrow a preconception should be imposed on how those timing patterns are described most accurately (see Section 4.4.4).

²¹As mentioned above, these are not necessarily isochronous.

Terminology for Syntactic/Metric Positions

If not referring to a specific beat of a specific bar of some recording, but rather to a certain metric position in any bar, I will denote the four different syntactic categories for beat positions in a $\frac{4}{4}$ bar by

$$\mathbf{1, 2, 3, 4.} \quad (4.1)$$

If not referring to a specific note of a specific bar, but rather to a certain metric position in any bar, I will denote the 16 different syntactic categories for sixteenth note positions in a $\frac{4}{4}$ bar by

$$\mathbf{1_{beat}, 1_e, 1_+, 1_a, 2_{beat}, 2_e, 2_+, 2_a, 3_{beat}, 3_e, 3_+, 3_a, 4_{beat}, 4_e, 4_+, 4_a.} \quad (4.2)$$

If not referring to a specific note of a specific beat, but rather to a certain metric position in any beat, I will denote the 4 different syntactic categories for sixteenth note positions in a quaternary subdivided beat by

$$\mathbf{beat, e, +, a.} \quad (4.3)$$

Hence, for example, the metric position **a** of beat **4** is the metric position **4_a**. I will reference specific notes and beats by descriptions like “**1_a** of bar 3”, or “beat **2** of bar 7”.

Durational Categories: **S**, **M**, **L**, and **F**

I will borrow the symbols introduced by Rainer Polak in [Polak, 2010], extending on an earlier suggestion by Justin London, to qualitatively describe the durational nature of syntactic note positions (subdivisions and beats). The only other person I know of, who has so far conducted microrhythmic analyses of *maracatu* recordings, French musicologist G erald Guillot, has also used the same notation in his analysis [Guillot, 2011a, pp. 146, 178–179]:

$$\begin{array}{ll} \mathbf{S} & \text{short} \\ \mathbf{M} & \text{medium} \\ \mathbf{L} & \text{long} \\ \mathbf{F} & \text{flexible} \end{array} \quad (4.4)$$

The flexible category **F** is meant to represent a situation where notes at a certain metric position tend to typically vary in length. For example, the general **SFL** model might contain instances of **SSL**, **SML**, or **SLL** in different beats.

These categories are meant to only qualitatively, not quantitatively, describe musical durations. They shall not imply exact numerical bounds between them. The assignment of a note to a category might in particular depend on the lengths of the neighboring notes.

According to Justin London, only the two basic categories of **S** and **L** should be used. In his opinion, it is improbable that the finer categorization, using the additional **M** category, corresponds well to human perception of such small durations [London, 2010, par. 9]. I will remark on this in Section 4.5.1.

4.4.4 *Static* and *Flexible* Microrhythmic Models

In reference to a “mechanical norm”, which is often used as a “ruler” when describing sub-syntactic musical timing, Bengtsson wrote in 1987 that “[w]e have no other ruler, mainly because we know far too little about such microstructures (cited in [Kvifte, 2007, p. 65])”. I think this is still true. What might have changed since then is that the “norms” typically used in microrhythmic studies are not necessarily isochronous anymore, but are nevertheless often “mechanical”.

A *Static* Model

The calculation of average ratios, between e.g. subdivision durations and the cycle of a repeated pattern during which they are played, implies in a way the existence of a (this time: possibly non-isochronous) ‘grid’, or succession of theoretical points in time, which is repeated exactly the same way in each cycle. ‘Deviations’ from the resulting ‘grid of averages’ are further often classified as ‘expressive’ or ‘accidental’.

I think it needs to be examined carefully in every case how close such a *static* microrhythmic model comes to the actual musical performance. Mere average values do not allow for any conclusions on how static or fluctuating the actual durations of the performance were. One indicator of how accurate sub-syntactic timing structures can be modeled using a *static* microrhythmic model is the variance resp. the standard deviation of the sample. Relatively small values of these numbers can correspond to a fairly accurate representation via a *static* model: For example Rainer Polak’s results for Malian *jembe* music seem to point in this direction, the various repetitions of certain timing patterns seem to indeed resemble each other to a great extent, and this is what he focusses on:

My theoretical aim is to show that rhythmic feel—the consistent characterization of subpulses by stable timing patterns—is inher-

ent in the repertoire and fundamental to the metric system of jembe music. [Polak, 2010, par. 3]

Similarly, the repetitions of specific timing patterns were what Christiane Gerischer was mainly concerned with in her study of Bahian *samba*:

Das metrische Feeling zeigt sich jedoch am deutlichsten in spezifischen mikrorhythmischen Zeitverhältnissen, die sich unabhängig von Klangstrukturen regelmäßig wiederholen.²² [Gerischer, 2003, p. 181]

A *Flexible Model*

However, Gerischer nevertheless emphasizes that a perspective must be put on ‘repetition’ when talking about patterned repetitions:

Though the microrhythmic phenomena described here seem to be based on an underlying microrhythmic structure, and seem significantly regular, one should not forget that all the phenomena depicted are tendencies in the time-relations of a performance. There are neither regular exact values, nor exact repetitions of the given periods of time. The articulations vary from cycle to cycle and also between musicians and groups. Musicians, in my conversations with them, repeatedly stressed the abundance of playful variations of familiar patterns, and the importance of distinctive interpretations by individuals and bands within various styles. Though microrhythmic phenomena occur with regularity and seem to be crucial to the rhythmic feeling and drive, they do not have the precision implied in the equidistant time-values of standard notation. [Gerischer, 2006, pp. 111]

...or by the precision implied by the mere presentation of non-equidistant arithmetic means, as I would want to add. A similar point of view is propagated by Olavo Alén:

The relationship between the duration of two sounds should not be calculated with probabilistic formulas in place of exact values, because there are multiple values for the occurrence of a single durational or temporal relationship between the two sounds. It is precisely in this multiplicity that we find the richness of musical interpretation which the performer uses to recreate, time and

²²Ger. “The metric feeling is most apparent in specific microrhythmic timing proportions that repeat independently of sound structures in a patterned way.”

again, a single work that never ceases to be itself. [Alén, 1995, p. 59]

Rainer Polak summarizes the findings of Bruno Repp (1997) as follows:

Bruno Repp’s study argues that typical timing patterns in performance constitute norms or aesthetic standards and should be seen as “integral part of the music, not as ‘deviation’ from the mechanical timing suggested by the score.” (cited in [Polak, 2010, par. 17])

Exact repetition, as implied by ‘static’ averages values, is only ever an approximation. The ‘norms’ could require a more ‘flexible’ description. In contrast to Alén, I do think that employment of more sophisticated probabilistic tools than simple calculation of average values could ultimately deliver more accurate models which are inherently flexible.²³

4.5 Perceptual Boundaries: Numerical Values

It is save to assume that musical timing is only perceptually relevant down to a certain magnitude. But which numerical values can be given as boundaries to describe what is perceptually relevant in the timing information of musical events? This is a question of utmost importance for microrhythmic study in two respects:

1. Is the precision of the methods high enough that it can be hoped to capture all that is perceptually relevant?
2. What part of the resulting numbers can be discarded as being irrelevant resp. to what extent should they be interpreted as meaningful?

Let us look at examples and empiric studies offering an orientation.

Durations of Syntactic Note Postions

What are the smallest possible values for the IOIs of musical notes that fall on *syntactically distinct* metric positions?

From (something related more or less closely to a) musical context, the most extreme examples I know of come from the *WFD World’s Fastest Drummer Extreme Sport Drumming* organization. Competitions are held in which

²³See, e.g., [Berndt and Hähnel, 2009].

drummers try to play as many strokes in 60 seconds as possible. The record at the moment (for single strokes played with the hands via sticks) is already at over 1200 strokes, which thus have an average duration of 50 ms [Various Authors, 2013a], [Various Authors, 2013b].

Stemming from a really musical context, fast tempo *blast beat* drumming, especially as used in genres like *black metal* or *grindcore*, offers some of the fastest playing found in any music. This arguably delivers a more reliable indicator for the numbers we are looking for. However, values almost as low can be found: For example, in an article in renown drummer's journal *Modern Drummer* by Mike Haid on drummer Derek Roddy, sixteenth notes at tempo 270 bpm are reported [Haid, 2007, p. 106], having an average duration of hence 55.5 ms.

It appears more than improbable though, that notes of such short duration could clearly be distinguished as falling into specific categories of distinct metric/syntactic positions, if there was no slower reference pattern on a higher metric level, like quarter notes (which, in the last example would have an average duration of 222 ms) played on some instrument. Hearing an unstructured succession of drum notes with a duration of only 55 ms, even if all the notes are very short sounding events that do not 'overlap' each other, I definitely perceive a *roll*²⁴ In fact, short click sounds played at an IOI of 50 ms can already trigger the sensation of a pitched sound at 20 Hz. Christiane Gerischer reports this value as a typical value for the IOI in a *flam*²⁵ [Gerischer, 2003, p. 45–46], Rainer Polak reports IOIs of 15–85 ms for *flams* in *jembe* music from Mali [Polak, 2010, par. 89]. At what point two sounds (of similar timbre) are 'merged' into one musical event, however, strongly depends on the nature of the sounds, among other factors on the *duration* of the sounds. Using very short click-like sounds in an laboratory setting, much smaller values can be observed (see the table below).

I would hence believe that 50 ms is a save lower bound for categorizing sounds into different metric/syntactic positions. In most music, the threshold lies probably much higher. Justin London reports the shortest average note durations on the lowest metric level, the fastest subdivisions that appear in most styles of music, as 90–120 ms (cited in [Polak, 2010, par. 88] and [Pfleiderer, 2006, p. 55]).

²⁴A *drum roll* is commonly thought of as being characterized by the precise *lack* of the possibility to assign the single strokes or attacks of which it consists to small syntactic note categories. It is rather conceptualized as one sustained sound, just like a long note of e.g. a violin.

²⁵Two strokes played on a drum so shortly one after the other that they are perceived as one musical event, occupying only one and the same syntactic note position.

Sub-Syntactically Relevant Durations

In a brilliant recent study from 2011, a team of Japanese researchers asked professional drum kit players to synchronize a basic drum pattern as precisely as possible to a metronome at 60, 120 and 200 bpm [Fuji et al., 2011]. I would argue that due to the specific training they undergo, involving years of practicing on a daily basis to precisely synchronize with a metronome, professional drum kit players trying to do just that are an excellent indicator of how small or big the numbers are we have to look at, when trying to determine a numerical range of time spans that might and might not be relevant for our perception of rhythm. Although I have not heard it, I would assume that their playing in the experiment might have been perceived by most people, to borrow a phrase from Fernando Benadon, as “sound[ing] as metronomic as is humanly possible. [Benadon, 2007, par. 16]” The “synchronization errors” that were detected in the study were mostly in a range up to 10 ms, and therefore I would argue for taking this as an approximate threshold below which timing differences are close to being irrelevant.

In order to *support* the possibility of relevant effects of very subtle durational nuances under 10 ms, Butterfield in 2007 proposed:

If PDs are to constitute a meaningful aspect of our engagement with groove patterns, then, we must overcome our natural proclivity to normalize timing deviations, we must be prepared to accept small deviations as potentially consequential. [Butterfield, 2007, par. 19]

It should be noted, however, that Butterfield in general tends to doubt the relevance of such small timing differences. In a more recent article on a listening experiment, for example, he comes to the conclusion that

[...] most ordinary listeners, irrespective of music training or stylistic preference, are unable to discern a discrepancy of 30 ms or less between bass and drums on the jazz rhythm section with any consistency across a range of tempos and timing values [...] [Butterfield, 2010a, pp. 165–166]

Judging from my own impression, listening to the (admittedly somewhat clinical and synthetic) audio examples Butterfield provides in his 2006 article [Butterfield, 2006], to demonstrate the effect of subtle timing differences, I dare say that nuances of 30 ms can, at least in some context, definitely already be perceptually relevant.

Looking at the other end of the scale, the lowest values from the reported ranges of *preferred tempi*, spontaneously chosen tempi by subjects in experiments, and typical durations of IOIs on the *beat* level, are 200 ms. Most

often *beats* have much longer durations (for example, the preset of most commercial electronic metronomes, when switched on, is 500 ms / 120 bpm), but the shortest possible durations for *beats* impose a safe upper bound for a durational magnitude that is very improbable to be perceived as sub-syntactic. A more realistic estimate would maybe stem from typical durations of the shortest *subdivisions*, which several studies report as lying around 100 ms. Comparing the numbers of various authors, I would estimate the range of sub-syntactic timing which is perceptually relevant and typically employed in musical performances at 10–80 ms.

All of these numbers, together with some other data putting them into a broader perspective, are summarized in Table 4.1.

Table 4.1: Musically relevant duration ranges from various authors.

Dur. (ms)	Remarks	Author, Year	Source
Minimum IOI to discriminate two acoustic stimuli as distinct (clinical laboratory situation)			
2	Short click sounds	Grüsser	[Pfeiderer, 2006, p. 55]
5–9	Depending on angle of incidence; Sounds were <5 ms, which hardly occurs in music	Burgtorf 1961	[Gerischer, 2003, p. 54]
17–20	Only 5 subjects	Hirsh 1959	[Gerischer, 2003, p. 54]
20	Minimum IOI for reliably deciding the <i>order</i> of two sounds	Hirsh 1959 and independently Warren 1993	[Pfeiderer, 2006, p. 55]
50		Handel 1982	[Gerischer, 2003, p. 54]
10–90	Depending, among others, on frequency, duration, angle of incidence	Reuter 1996	[Gerischer, 2003, p. 54]
Typical IOIs of <i>flams</i>			
15–85	For <i>jembe</i> music from Mali	Polak 2010	[Polak, 2010, par. 89]
≤ 50	For hand drums in African and Afro-Brazilian <i>Candomblé</i>	Gerischer 2003	[Gerischer, 2006, p. 118]
Initial Transient States in the Oscillations of Percussion Instruments			

Table 4.1: Musically relevant duration ranges from various authors.

Dur. (ms)	Remarks	Author, Year	Source
ca. 6–12		Gerischer 2003	[Gerischer, 2003, p. 136]
Duration of the Sounds of Percussion Instruments			
30–50	bells, <i>tambourims</i>	Gerischer 2003	[Gerischer, 2003, p. 134]
80–100	<i>congas, surdos</i>	Gerischer 2003	[Gerischer, 2003, p. 134]
Typical ranges for sub-syntactic and perceptually relevant timing of musical events			
≥ 6 –25	Lower bound for the perception of timing differences in successions of sound at 60–600 bpm, laboratory setting	Friberg, Sundberg 1995	[Pfleiderer, 2006, p. 55]
≥ 10	I conjecture no perceptual effects of these “synchronization errors” by professional drum kit players	Fujii et al 2011	[Fujii et al., 2011]
≥ 10	Rather clinical synthetic drum computer examples	Benadon 2007	[Benadon, 2007, par. 14–17]
≥ 10 –20	Rather clinical synthetic drum computer examples	Butterfield 2006	[Butterfield, 2006, par. 38, audio ex. 1, par. 42, audio ex. 2]
10–90	“Generally audible”	Prögler 1995	[Prögler, 1995, fn. 11]
≥ 20	“Musical or pseudo musical setting”	rose 1989	[Klavacs, 2011, p. 17]
≥ 30	Definitely discernible in clinical drum computer examples	My own listening impression	
≤ 48	Experimental setting with a <i>swing</i> groove at 132 bpm	Klavacs 2011	[Klavacs, 2011, p. 19]

Table 4.1: Musically relevant duration ranges from various authors.

Dur. (ms)	Remarks	Author, Year	Source
50–80	Phrasing “behind the beat” in a solo by John Coltrane	Benadon 2006	[Butterfield, 2007, par. 13]
50–80	For phrasing in <i>jazz</i> solos at 120–200 bpm	Friberg, Sundström 2002	[Butterfield, 2007, par. 13]
Lower bounds for <i>Syntactic</i> Discrimination of Musical Events			
≥ 50	Short clicks in more rapid succession are perceived as a pitched sound (20 Hz)	Pfleiderer 2006	[Pfleiderer, 2006, p. 55]
≥ 50	IOIs played by the ‘world fastest drummers’		[Various Authors, 2013a], [Various Authors, 2013b]
≥ 55.5	Sixteenth notes played in extreme metal drumming		[Haid, 2007, p. 106]
75–90	Absolute duration of the shortest subdivisions in Malian <i>jembe</i> music	Polak 2010	[Polak, 2010, par. 89]
~ 90	Average duration of the shortest subdivisions in Rio <i>samba</i>	Gerischer 2003	[Gerischer, 2003, p. 55]
100		London 2004	[Polak, 2010, par. 88]
115		Bolton 1894 (!)	[Fraisie, 1982, p. 156]
100–120		London 2002	[Pfleiderer, 2006, p. 55]
120	Interval between loudness maxima	Zwicker, Fastl 1999	[Pfleiderer, 2006, p. 54]
<i>Preferred Tempo/Typical Beat Durations</i>			
200–1400	Average: 500–600 ms	Handel 1989	[Gerischer, 2003, p. 55]
200–1400		Fraisie, Pichot, Clairouin 1949	[Fraisie, 1982, p. 153]
200–2000	Average: 500–700	London 2002	[Pfleiderer, 2006, p. 70]

Table 4.1: Musically relevant duration ranges from various authors.

Dur. (ms)	Remarks	Author, Year	Source
480–500		Moelants 2002	[Moelants, 2000, p. 580]
500	Typical Metronome Preset: 120 bpm		
330–880	Average: 600 ms	Fraisse 1972; 1982	[Pfleiderer, 2006, p. 46]; [Fraisse, 1982, p. 153]
IOIs at which two acoustical events are no longer perceived as musically related			
1500–2000		Fraisse 1972; Handel 1989	[Gerischer, 2003, p. 55]
1500–2000		MacDougall 1903 (!)	[Fraisse, 1982, p. 156]
1580		Bolton 1894 (!)	[Fraisse, 1982, p. 156]

4.5.1 Learning Rhythmic Categorization

I think that most data concerning perceptual timing borders, as presented in the previous section, are not universal, but subject to individual and contextual differences. I strongly support the idea that the perception of musical timing and corresponding categorizations are *learnable*. In adopting the view of my drum set teacher Herbert Pirker²⁶, developing a very precise *perception* and *idea* of subtle timing nuances is *the* central aspect of gaining rhythmic proficiency.²⁷

For example, I know from my own teaching experience, that it is possible for students who initially are not able to perceive differences between *binary* and *ternary* phrased subdivisions, to *learn* to hear and subsequently consistently reproduce these different phrasings. Likewise, Rainer Polak reports a process of learning to perceive subtle timing nuances in Malian *jembe* music [Polak, 2010, par. 22–26]. If I am not misinterpreting him, he ultimately

²⁶Herbert Pirker is one of Austria’s most renown jazz drummers and drum instructors.

²⁷The technical, motor aspect of being physically able to realize the ideas also plays a role. For *most* musical purposes, however, I think that this is by far the ‘easier’ part. Consequently, I judge ‘physical’ explanatory models of sub-syntactic timing, like the one offered by Olava Alén, who correlates the microtiming of Cuban *tumba francesa* to the distribution of the strokes on the drum head and the resulting body movements of the drummer [Alén, 1995, pp. 69–70], for highly implausible.

developed a perception of different sub-syntactic durational categories, such that it is to certain extent possible for him to tell without precise measurement whether a certain, say, ternary Malian *jembe* pattern, is phrased **SLL** or **LSS**. In both of these examples, a *finer* categorization has been learned.

Christiane Gerischer equally thinks that “die Fähigkeit, kleine Zeitintervalle zu differenzieren, vermutlich auch von Hörgewohnheiten abhängt.”²⁸ [Gerischer, 2003, p. 55]” Hans-Henning Schulze, in 1989, conducted a listening experiment similar to Eric Clarke’s 1987 experiments, only that it included an extensive training phase. Clarke in 2000 summarizes the outcome:

In short, although Schulze’s study does provide some evidence for categorical perception of rhythm, it also suggests that categorical perception is a function of perceptual learning: if sufficient training is provided, perceivers may learn to identify and discriminate between rhythmic categories which without training might have been part of a single more undifferentiated category. [Clarke, 2000, Section 3]

That not only learning processes but also musical context plays a crucial role in how categorial boundaries are perceived, was examined by Edward Large. In an experimental study with musicians in the year 2000, he finds that “category boundaries shift depending on context. [Large, 2000, Section “Results”]” And, furthermore: “There are strong individual differences among musicians and there is some evidence that perceptual categorization operates differently depending on the absolute time intervals involved. The context effects observed constitute evidence that processes responsible for rhythm categorization within a metric context are nonlinear. [Large, 2000, Section “Discussion”]”

²⁸Ger. “the ability to differentiate small time intervals probably also depends on listening habits.”

Chapter 5

Methods and Methodology

In this chapter, I will describe and discuss the methods I employed in the subsequent analyses in Part III of this text.

5.1 Recording

During my stay in Recife, I recorded quite a lot of material at a variety of occasions, including rehearsals, public presentations (on stage as well as parading through the streets), and interviews. I mostly recorded using the following two pieces of equipment simultaneously—positioned next to each other—and settings:

- An *Edirol R-09HR* digital audio field recorder, using the internal microphones, recording to digital audio WAV-format with a bit depth of 24 bits and a sample rate of 48 kHz (i.e. 48 samples per ms¹)
- A small digital *Sony HDR-CX130* video camera with a built-in microphone, recording to the digital video files with the .MTS extension. The settings I chose were: aspect ration 16:9, color, high-definition video (HD, resolution 1080i, using a device-specific preset called “HQ”), frame rate 50i², recording to the digital video format AVCHD 1440 x 1080/50i

5.2 Selection

In order to be able to conduct the analysis as easily as possible, I chose to start by examining recordings of only one instrument at a time. It is not obvious

¹millisecond

²i.e. interlaced, 50 half frames per second

at all whether the results of analyses of this very particular situation which by no means is typical for the *maracatus-nação*, allow for generalizations to other instruments or various instruments playing together, see my remarks on group size on Section 3.1.

However, due to the limited scope of this thesis, I decided to make this reduction. This choice later in the process hugely facilitated the step of determining onset times for the notes played (see Section 5.4).

What Instrument to Choose?

In order to be able to (at least partly) verify some of the hypotheses for the case of one instrument playing alone, I decided to pick an instrument that typically plays all the sixteenth notes. Summarizing, the criteria were

- only one instrument playing alone, which
- typically plays all the sixteenth notes

This narrowed the possible choices basically down to *caixa/taról* or *ganzá*.³ Although I have never tried it out, I felt that the latter could have the drawback that exact note-onsets might be much more difficult to determine, due to the softer attack, especially for the quiet notes between accents.

Moreover, several *maracatuzeir@s* mentioned to me that the *caixa* is an instrument of particularly great importance for the *suíngue* of the music in *maracatu*. *Mestre* Hugo Leonardo of the *Nação do Maracatu Leão da Campina* remarked on the *suíngue* of *maracatu*, in connection with the *caixa*:

“[...] porque sem um caixa, a gente [...] não dá o *suíngue* ao tempo da música.”⁴ [Leonardo, 2010]”

Marco Antônio Carreço de Oliveira reports similar information he was given by some *mestres*:

As “caixas” [...] são tambores [...] que “seguram” o baque ou, segundo alguns diretores de apito⁵, são os que mantêm e definem o andamento do ritmo da “nação”.⁶ [Oliveira, 2006, p. 21]

³Quite occasionally, one might see continuous sixteenth notes played on the *abê* as well, or on the *alfaia* in some groups. In fact, in the case of the *alfaia*, the pattern of the *alfaia meião* of the *Nação do Maracatu Leão Coroado* with its continuous sixteenth notes, some of which are accented, is the only example I am aware of.

⁴Port. “[...] because without a *caixa*, we [...] don’t get the *suíngue* into the music’s flow.”

⁵This refers to the *mestres* of the *maracatus-nação*.

⁶Port. “The ‘caixas’ [...] are drums [...] that ‘secure’ the *baque* or, according to some *diretores de apito* [*mestres*], are the ones that maintain and define the *andamento* [this word could maybe be translated by *flow*] of the rhythm of the ‘nação’.”

The *caixa* hence was an obvious choice for the kind of analyses I had in mind. The material I selected, which in my opinion delivered the most suitable examples, originated from three different occasions: Two interviews in which the *maracatuzeir@s* I interviewed also played for me, and one *ensãio de caixas*⁷ I participated in, held shortly before carnival.

5.3 Transcription

To broaden the perspective of the microrhythmic analysis I was to conduct, I transcribed all of the excerpts that I wanted to use. This was also a necessary preliminary for relating sub-syntactic phenomena to syntactic ‘phrasing’ and ‘patterns’—the results of similar studies let it seem very probable that the various hierarchic levels of the rhythmic structure are not independent of each other but are interrelated to a certain degree.

The fact that I had not only audio recordings of reasonably good quality at hand, but also supplemental videos for almost all of them, proved very useful and helped the analysis, especially the step of transcribing the recordings, in the following ways:

- The unaccented notes were sometimes played inaudibly soft. During transcription of the recordings, I often referred to the videos when I was not able to decide from the sound files whether at a specific point a note had been played or not.
- From the videos, I transcribed the sticking patterns.
- The sources of all sounds (different instruments, noise) could be traced easily via the videos.

The transcriptions should not be regarded as prescriptive notation as it would be used in an instructional book. I tried to roughly capture what can be heard on the recordings to give an overall idea. A list of onset time codes of the notes is much more exact than a transcription using standard music notation, but it is hard to get an overview over the data with the time codes only. On the other hand, although the indication of volume levels I give in the transcription is a severe simplification, just as is the case with the timing, it is still far more accurate than would be suitable for an instructional book. Also, it may vary from one repetition of a certain pattern to the next, which is something that would usually not be suitable in the context of instructional notation.

⁷Port. “*caixa* rehearsal”

I used symbols to represent three different volume levels and indicated whether or not a certain stroke was played as a press stroke. The following things can be inferred from the transcriptions:

- how many notes were played
- the sticking
- the macrorhythmical grouping / approximate timing structure
- the accentuation / approximate volume levels
- whether or not a certain stroke is played as a press stroke

The following things cannot be inferred, resp. shall not be implied by the notation:

- the exact timing
- the exact volume levels
- a certain structure of ‘strong’ and ‘weak’ beats or related concepts often connoted with the ‘4/4’ time signature

Meter

Almost all authors use a $\frac{4}{4}$ meter with a sixteenth note subdivision of the beat for transcribing *maracatu* music.⁸ I definitely agree on this point. Important to note, however, is that traditional conceptions of ‘strong’ and ‘weak’ beat from European classical music shall not be implied by this. The *toadas* of *maracatu* almost invariably end on beat one, which is also usually the entrance point for almost all instruments and patterns.

The $\frac{4}{4}$ meter with a sixteenth note subdivision was found in all the recordings. In all cases, the performances started on beat **1** and in all but one case they ended on beat **1**. In the recording *2012.02.16 Ibura excerpt 2*, a *caixa* pattern is used that has an accent pattern that seems to logically conclude on beat **4**, and the recording indeed ends on beat **4**.

In the recording *2012.02.16 Ibura excerpt 4*, in which the *caixa* pattern for a specific, non-traditional arrangement of the group *Leão da Campina* is played, an extra $\frac{2}{4}$ bar is inserted at one point.

⁸The following are exceptions of which I know: Ascenço Ferreira [[Ferreira, 1951](#), pp. 15–32], Mário de Andrade [[Andrade, 1982](#), pp. 155–174], Larry Crook [[Crook, 2001](#), p. 238], [[Neto, 2011](#), pp. 7–8]. They all notated in $\frac{2}{4}$ with a sixteenth note subdivision instead. Apart from this, occasionally, in the introductory phrases of some of the *maracatu* groups a phrase which is only $\frac{2}{4}$ long is played.

5.4 Finding the Onsets

After selecting suitable pieces of the recording that I wanted to examine and extracting them from the original audio files via the freely available software *Audacity* [Team, 2010], the next step was to determine certain points in time, describing the played notes, on which all further microrhythmic analysis would be based. This is a crucial step of the analysis in which a certain amount of subjectivity and a source of potential errors necessarily enters the analyzing process. The ultimately resulting precision of the results depends largely on it.

5.4.1 Note Endings

All empiric rhythmic studies that I know of, and in particular the microrhythmic ones, are based on analysis of the beginnings of notes (and the intervals between them).⁹ This is due to the assumption that note beginnings are more salient events in most musical structure that contribute more to the human perception of the temporal structure, respectively rhythm, than note endings. Nevertheless, in his 1995 essay, Charles Keil suggested that the endings of notes should also be taken into account in microrhythmic empiric studies:

Logically, how sounds cease must be half of the story, and more than half of the PDs [Participatory Discrepancies] that count in making grooves may be in releases rather than attacks. And, finally, how do individual attacks and releases interact in ensembles? [Keil, 1995, p. 7]

Apart from the maybe more difficult perceptual argument for considering only the beginnings of notes, there are numerous practical reasons for this choice that I took in the present study. Snare drum strokes in any music genre in which snare drums are used, are very rarely ended actively. Usually, and this holds true in particular for *maracatu de baque virado*, the head is just struck at the beginning of the note, not dampened at some later stage, as is for example very common for *surdo* playing in *samba*. Loud notes end up being longer and soft notes shorter.¹⁰

⁹See for example [Clarke, 1987], [Alén, 1995], [Gerischer, 2003], [Butterfield, 2006], [Polak, 2010], [Butterfield, 2010a], [Fujii et al., 2011], [Guillot, 2011a], [Klavacs, 2011] as well as the studies reported about in [Bengtsson, 1975], [Fraisie, 1982] and [Pfleiderer, 2006].

¹⁰To a certain degree, the duration of a note played on a snare drum might also possibly be influenced by how tight the stick is gripped (although this has a much stronger influence

In general, exact points in time for drum note endings are much more difficult to determine than for drum note beginnings, due to the fact that the decay slope of the oscillation is much more gradual than the fairly steep slope of the note attack. This means that timing analyses could probably involve note endings only at the cost of a loss of precision.

In my particular case, consecutive notes played on the snare drum recordings I examined usually ‘overlapped’ each other. When a note was played, the sound of the last one was often still audible. In all these cases the note was in fact ended by the onset of the subsequent note, such that a more complex analysis involving note endings would have amounted to the same anyway.

5.4.2 When does a note begin?

There are various ways in which exact time could be chosen as reference points for the note beginnings, for example the loudness maxima of the notes. According to the empirical findings of Joos Vos and Rudolf Rasch from 1981/1982, the note beginnings are perceived when the amplitude lies around 6–15dB below its maxima:

- (a) the perceptual onsets of successively presented tones can be defined as the times at which the envelopes pass a relative threshold level; (b) within a range of 20 to 70 dB above masked or absolute threshold, the relative threshold for the perceptual onset lies about 6 to 15 dB below the maximum level of the tones. (cited in [Pfleiderer, 2006, p. 56–57])

I opted for the onset times, i.e. the relatively short moments when the stick hits the drum head and the transient state of the oscillation of the drum head, the attack, begins. Obviously, these times precede the, musically probably more relevant, times when we actually *hear* the notes. According to Christiane Gerischer, who took the same approach and examined the time inter-

on the timbre of the note). Moreover, the duration of the note can be influenced when executing the stroke as a *press stroke* (see Section 3.6.4). *Press strokes* are indeed a technique frequently employed in *maracatu caixa* playing, and I do think it is possible that the endings of *press strokes* are relevant for the perception of sub-syntactic timing in *maracatu*, especially with regards to a remark that Nathalia, one of the *batuqueir@s* I recorded, who was still not quite satisfied with her control of the *caixa*, made about her sound, missing what she called “cadência”, see Section 7.1.3. I rather conjecture, however, that the more important factor regarding *press strokes* in *maracatu* are timbral aspects; due to the short durations of the sixteenth notes, they usually are ringing until the beginning of the next note in either case, at least to a certain extent, whether the stroke is *pressed* or not.

val between note-onsets and amplitude-maxima more closely, for percussive instruments with short initial transient states, this simplification do not impose severe restrictions on the generalizability of the results [Gerischer, 2003, pp. 134–137, 243–245]. My choice had mainly practical reasons, such as

1. these times are relatively easy to determine through graphical waveform representations of the audio signal
2. differences in the length of the initial transient state of oscillations of different amplitude (i.e. notes of different volume) do not need to be accounted for
3. differences in the length of the initial transient state for different instruments do not complicate the process further
4. the process stays transparent and easy to verify

As I analyzed recordings of only one instrument at a time, the only possible drawback, compared to more sophisticated methods to choose points in time as a reference for the beginning of a note, stems from item 2 in the above list. If all the notes would have had the same volume (and hence the same length of their initial transient state), it would not matter if the onset times or, for example, the times of maximum amplitude would have been chosen as reference points, as in the subsequent analysis, the only data used are the IOIs¹¹, the differences between the marked times. But following Gerischer's argumentation, even so, all conclusions potentially drawn from an analysis based on onset times can be assumed to apply to what is actually heard by listeners of the analyzed musical excerpts.

Example 3. For an illustration of the fact that notes played on the same instrument with the same technique but at different volume levels might have attacks of different lengths, observe Figure 5.1 on page 120.

In this waveform representation of a sample from one of the recordings I analyzed,¹² the oscillations of two notes, a rather soft one on the left and a subsequent louder one at the right, are visible. The soft one has a gradual envelope. The time between the note-onset and the amplitude-maximum is around 20–30 ms. The loud note, having a very steep initial slope, reaches its first maximum substantially earlier, in less than 10 ms after the onset of the note. Gerischer reports even shorter typical time-spans of 4–10 ms (depending on volume) after the note-onset in which *caixa*-strokes reach their maxima [Gerischer, 2003, Tabelle 1 on p. 244].

¹¹inter onset intervals

¹²2012.02.16 *Ibura excerpt 3.wav*, 00:10.13–00:10.37 approx.

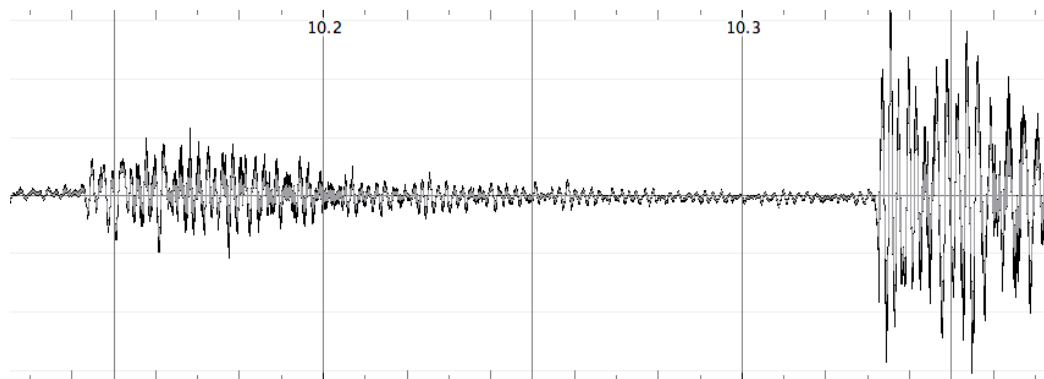


Figure 5.1: Waveform representation of two notes played on the *caixa* at different volume levels. The scale at the top of the pictures is the time in s. The time between “10.2” and “10.3” is 100 ms, one of the small markings hence represents 10 ms. The vertical axis represents the amplitude of the oscillation. Note the different envelopes of the oscillations. The slope of the second note’s attack is much steeper.

In most cases, however, the differences between the initial transients were fortunately not as big as in this example.

5.4.3 Onset-Detection Algorithms

After trying out different possibilities of determining the onset times of the notes, I settled for the handy and easy-to-work-with program *Sonic Visualiser*¹³, which is available freely. It works with the same resolution as the respective audio files, which in this case was 48 kHz.

I used a *Vamp-Plugin Note Onset Detector* [Duxbury et al., 2009]. This *Sonic Visualiser* plugin automatically detects the onset times of acoustic events such as musical notes in the audio signal. The algorithm basically detects significant increments of amplitude and uses a FFT¹⁴ of the audio signal as input. The parameter settings I used were derived by trial and error, until I found a setting¹⁵ that seemed to work best. However, the settings are only partially relevant, as I went through all the detected notes and corrected

¹³It is described in [Cannam and Queen Mary, 2011], also consult the brief overview [Cannam et al., 2010].

¹⁴Fast Fourier Transformation

¹⁵Onset detection type: “Complex Domain” (The underlying algorithm is described in [Duxbury et al., 2003]); Sensitivity 100 %; no Adaptive Whitening; use mean of source channel (the plugin only has a single input channel); Fast Fourier Transformation window: window size 1114, window increment 557, window shape rectangular.

them by hand, which turned out necessary in most cases.

5.4.4 Manual Correction

It was hence a little more difficult to determine the onset times than I had hoped. Although the algorithm correctly identified most note-onsets, they were usually not marked precisely enough for the analysis I wanted to conduct. The possible accuracy of the results is limited by the resolution of the underlying FFT of the algorithm. In the case of percussive sounds, the time-resolution is more relevant than the frequency-resolution: percussive sounds are characterized by a broadband, relatively broadly or equally distributed, sound spectrum, hence a fine resolution of frequency does not offer much advantages. This holds true especially in the case where recordings of only one instrument are analyzed. But even by experimenting with various window-sizes and -increment-steps and lowering them (which increases the time-resolution at cost of the frequency-resolution) dramatically, no satisfying improvements could be achieved.

Example 4. In Figure 5.2, a screenshot from the *Sonic Visualiser* session *2012.03.29 Ibura excerpt 8.sv*, 00:01.805–00:01.835 approx. (mm:ss), is shown. In this waveform representation of the underlying recording *2012.03.29 Ibura excerpt 8.wav*, the horizontal axis represents time, the vertical axis amplitude. The point of the note-onset is easily identifiable as the moment shortly after 00:01.82 when the graph ‘leaves’ the horizontal axis. The scale on the top of the pictures is in seconds, thus one of the small markings represents 1 ms (this corresponds to 48 audio samples in our case). The time code saved by the program as a reference for this marker is taken as the position of the left margin of the grey shaded area. Hence the difference between the marker suggested by the detector algorithm (top) and the one set by me manually (bottom) is around 13 ms. For comparison, the shortest sixteenth notes I measured around that point of the recording, had a duration of around 160 ms¹⁶. Hence, the correction of the marker might have had a noticeable impact on the analysis’ final results.

In some instances I found even greater discrepancies than described in Example 4. To conduct a detailed microrhythmic study, it consequently seemed necessary to make the manual corrections. For this process, I switched back and forth between the waveform representation of the audio signal, the spectrogram¹⁷ and listening to the recording at various speeds.

¹⁶The tempo was around 80 bpm, and some of the sixteenth notes were markedly shorter

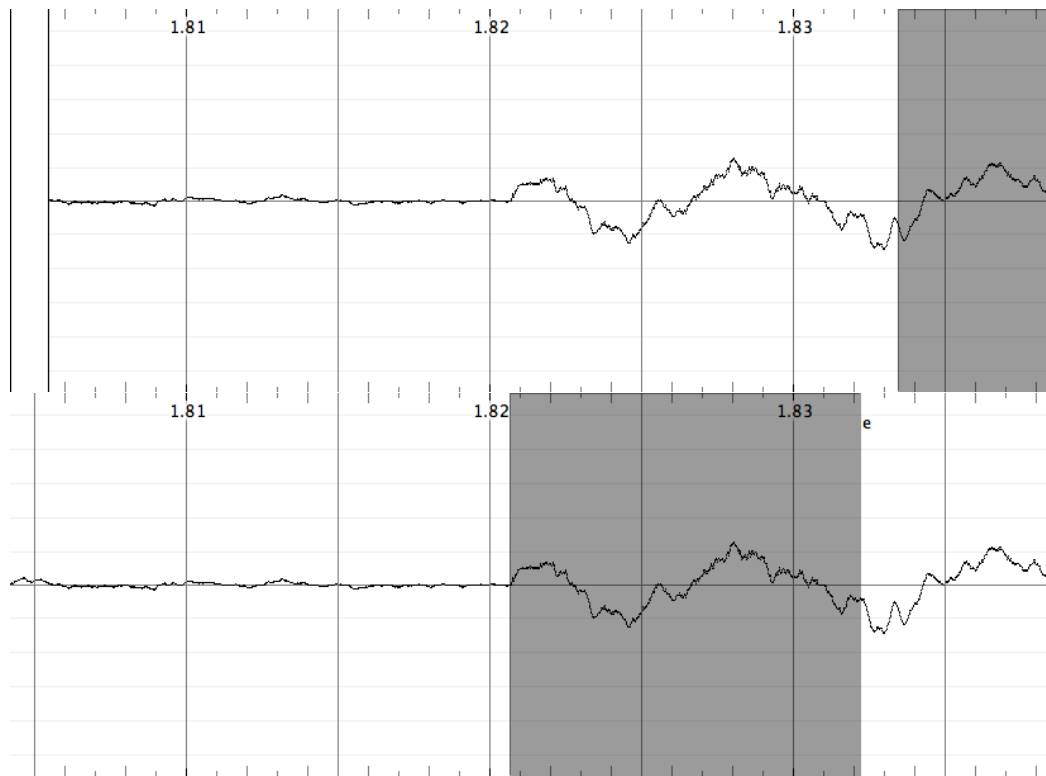


Figure 5.2: Note-onsets as marked automatically (top) and as modified by hand (bottom). The scale at the top of the pictures is the time in s, the difference of the position (left margin) of the two markers is approx. 13 ms.

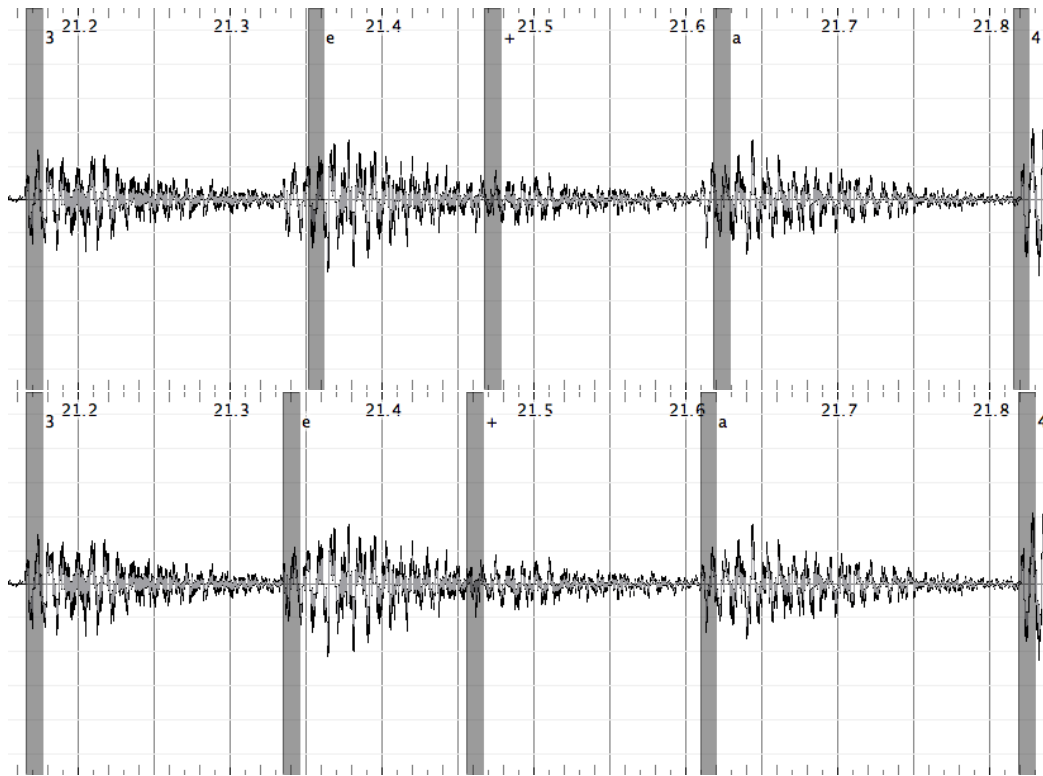


Figure 5.3: Note-onsets as marked automatically (top) and as modified by hand (bottom). The scale at the top of the pictures is the time in s. For example, the second marker labeled “e” in the lower picture is hence approx. 15 ms left of the perspective marker in the picture at the top.

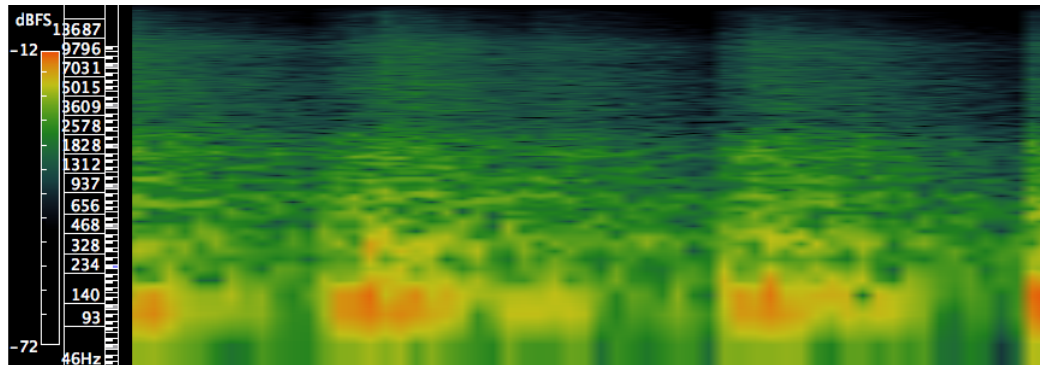


Figure 5.4: The spectrogram of the excerpt from Figure 5.3

Example 5. In order to get a better idea of the working process and to give an overview, another example is included in Figure 5.3. In this screenshot of *Sonic Visualiser* session *2012.03.29 Ibura excerpt 8.sv*, 00:21.2–00:21.8 approx., the onsets of five notes are visible. The zoom level is not as close as in Figure 5.2, one of the small markings at the top represents 10 ms. The top picture shows the note-onsets as marked by the detection algorithm. To arrive at the situation depicted in the bottom one, I left the first note where it was, moved the second, third and fourth marker to the left and the last marker to the right. Note that the duration of the fourth note inferred from the bottom picture has been prolonged twice in comparison to the top picture: by moving its onset-marker to the left and by moving the onset-marker of the subsequent fifth note to the right.

While the onsets of the relatively loud notes one, two, four and five were easy to identify in the waveform, due to their steeper initial transient slope, the third note with its gradual slope imposed greater difficulties. Also note that the the second note is still sounding at the onset time of the third note, the two are ‘overlapping’. The spectrogram corresponding to Figure 5.3 is depicted in Figure 5.4. The horizontal axis represents time, the vertical axis frequency, and the amplitude is represented by the various colors. The onset of the third note in this excerpt was much easier to identify with the aid of this spectrogram. The note is identifiable via the yellow shaded area in its lower frequency range, visible right in the lower centre of the Figure. The approximate onset can be inferred from the left margin of the yellow shaded

than 25 % of one beat.

¹⁷The parameters of the FFT used by *Sonic Visualiser* to calculate the spectrogram from the underlying .wav-file I left at the default values. These are: Hann-windows of size 1024 audio samples (21.3 ms in our case), overlap 50 % (i.e. window step is 512 audio samples, or 10.6 ms).

area. Note, however, that for ultimately setting the onset-marker, I always switched back to the waveform since its much higher resolution allowed for more precise results.

5.4.5 Missing Notes

As already pointed out in the previous example, soft notes preceded by loud notes were sometimes difficult to identify. If the precedent loud notes were played as press strokes¹⁸, an embellishment employed frequently in this style of music, things got even more complicated. In a few cases, I could resolve the difficulties by listening to the recording at a very slow speed (down to $1/2$ or $1/3$ of the original speed) and/or by consulting the spectrogram representation of the recording.

In other cases, however, I was not able to determine the precise onset of a note, even if I knew from the transcriptions and videos that at that point a note had been played. As mentioned earlier, I had intentionally chosen an instrument that usually plays almost all sixteenth notes in order to develop a model for an underlying ‘grid’ for the analyzed recordings. The fact that some onsets could not be determined was a little unfortunate, but the amount of ‘missing’ notes was by far not so great that it would have hindered the evaluation severely.

Still, one point should be mentioned explicitly: Most of the recordings consist of repetitions of one-bar-patterns. In many of these patterns, the third sixteenth note of each the third and the fourth beat, for example, are played particularly soft and are preceded by two of the main accents of the patterns (on the second sixteenth note of the third and fourth beat). This led to a systematic underrepresentation of these two soft notes during the statistic evaluation. As a consequence, the statistic values derived for some of the notes of the bar are based on a greater sample than others.

5.5 Statistic Evaluation

I exported the lists of onset time codes that I had determined via a built-in export function of *Sonic Visualiser* into a text file of the .csv¹⁹ format and imported them into a standard spreadsheet application²⁰ where I conducted

¹⁸Triggered by one stroke/movement of the player, the stick hits the head various time, controlled by the player through a certain amount of pressure. The stick is ‘pressed into’ the drumhead. The process is comparable to the bouncing of a ball, only that it happens very rapidly.

¹⁹comma-seperated values

²⁰*Microsoft Excel 2008 for Mac*, Version 12.2.6

some statistic evaluations using the native .xlsx²¹ file format of that program.

The only information from the recordings that I used for this part of the analysis are the note-onset times that I had measured. The rest is calculation.

5.5.1 Sample Size

I want to give an overall idea of the sample size that was the basis for my analysis. I evaluated 14 recording excerpts of different length, ranging from 7–57 s, and adding to a total duration of 4.5 min of analyzed material. This covers 105 bars of music, 417 beats, or altogether 1521 note-onsets that I determined.

5.5.2 Tempo

Precisely measuring the tempo of a musical performance²² cannot be done just at one certain *point in time*. Two points in time, a *time span*, is necessary.

Example 6. Given two points *A* and *B* in space, whose distance is known, the speed of an object (like a car on a highway) can be determined by measuring the time the object needs to get from *A* to *B* and calculating the quotient $\frac{\text{(distance)}}{\text{(time)}}$. However, what the result indicates, is the *average* tempo which the object had on the way from *A* to *B*. The object might have stopped for a while and then moved on at a speed of twice the average tempo.

The analogy to music is obtained by equating the spacial distance with syntactic durations and time with time. Take for example a quarter note, the metric ‘distance’ between the beginning of the first notes of the given and the next beat. The musical tempo at that stage of the piece is usually considered to be the quotient of the metric value (quarter note) and the time it needs to pass by, i.e. the IOI of the beginning of its first note (corresponding to *A*) and the beginning of the first note of the subsequent beat (*B*). If the quarter note needs 2 s to pass by, then the tempo would be ‘ $\frac{\text{(quarter note)}}{(2 \text{ s})}$ ’, i.e. 1 quarter note per 2 seconds, in other words 30 quarter notes (beats) per minute. But from this we cannot exclude the possibility that, e.g., during the quarter note a slight *ritardando*, followed by an *accelerando* had happened.

²¹Office Open XML file format

²²As, to my knowledge, no precise definition exists, this is the same as *defining* the tempo of a musical performance.

Example 7. Consider a sequence of four beats of the following durations (in ms): 995, 980, 1010, 1005.²³ One could think of this sequence as

- four beats at tempo 60 bpm²⁴ with some of the beats played a little earlier or later than indicated by the tempo designation
- two beats at tempo 60.7 bpm²⁵ followed by 2 beats at 59.5 bpm²⁶
- four beats all at different tempi, ranging from 59.4 bpm²⁷ to 61.2 bpm²⁸

It is not clear how the metric distance of measuring points A and B should be chosen to obtain a suitable tempo definition. If in the last example a lot of musical information is present, notes played on top of the 4 beats, then probably nobody would perceive the tempo as changing from beat to beat. Likewise, if sixteenth notes follow a timing pattern which is not isochronous but recurring from beat to beat, then it would seem utterly inappropriate to define the tempo as changing from subdivision to subdivision. Rather, the beat level might be chosen as reference. If there is any isochronously organized metric level, the IOI between two events of this level can be used as a reference. Only, in music played by humans, there are *no* strictly isochronous levels, and it is not as clear how to exactly measure tempo.

In my opinion, it would in fact be quite a severe abstraction to think of the tempo as changing abruptly and stepwise at all (discontinuously, in mathematical terms), be it from bar to bar, beat to beat or subdivision to subdivision. Rather, I suggest to think of the tempo being a *smooth* (infinitely differentiable) function of time. For this, a more sophisticated model than just determining average tempos, constant over certain intervals A – B , would be needed.

However, as it is not clear how a more plausible (in other words, *ecological valid*, see the discussion below) model would be constructed, and as the overall tempo changes were not drastic, I simply approximated tempo values from bar to bar as 240 divided by the duration of the respective bar. The tempo values shall only give a rough idea of the analyzed recordings and illustrate that the recording excerpts are all from a rather limited tempo range (mostly 90–110 bpm, with a few exceptions, such that the total range from all the examined recordings is approx. 74–118 bpm).

²³This is a realistic sequence. In the recordings I analyzed, I frequently measured differences of 30 ms or more of the durations of successive beats.

²⁴ $= (4 \cdot 60s) / (995 + 980 + 1010 + 1005)ms$

²⁵ $\approx (2 \cdot 60s) / (995 + 980)ms$

²⁶ $\approx (2 \cdot 60s) / (1010 + 1005)ms$

²⁷ $\approx 60s / 1010ms$

²⁸ $\approx 60s / 980ms$

5.5.3 Absolute Durations

From the note-onset times I calculated the IOI between two given notes as the difference between the onset times of these notes. I refer to the IOI between two successive notes as the *absolute duration* of the first of these notes. Similarly, I refer to the IOI between the first notes of two successive beats or bars as the *absolute duration* of the first of these beats or bars.

I used absolute durations mainly for the direct durational comparison of successive notes. This is based on the idea that maybe, even if durational patterns should turn out difficult to quantify exactly, for example because the standard deviation is too high to allow for general statements, the qualitative distinction of long vs. short could prove relevant.

Paul Fraisse thinks that qualitatively there are only two fundamental categories for the perception of rhythms and durations: long and short [Fraisse, 1982, p. 171–173]. Justin London’s approach is the same, he likewise argues that perceptually the durations of the non-isochronous subdivisions are categorized into only two different classes, a longer and a shorter one [London, 2010, par. 7–14].

I thought that if a musician clearly categorizes a pair of two successive notes into a shorter and a longer one, than a high consistency can be expected when comparing the durations of these notes in the repetitions of the pattern. In lack of such a consistency, this distinction might perhaps not be as relevant for a pair of notes at that metric positions.

5.5.4 Relative Durations

In order to be able to carry out the quantitative evaluation as independent of tempo as possible, I used *relative durations*. Almost all authors of similar analyses use such a method in order to make the results comparable independently of tempo. Renown rhythm theorist Justin London remarks:

Comparisons of timing data always present challenges, as one cannot simply compare the absolute value of each duration; one must find a means of normalizing variations in tempo within and across performances. [London, 2010, fn. 2]

This seemingly necessary step can be criticized for losing potentially relevant information. The problems amount to exactly what I just discussed in Section 5.5.2: Making something independent of tempo means discarding the information about the metric level that is used as reference. If the durations of the sixteenth notes are calculated as a percentage of the duration of the respective quarter note (and the quarter notes are used to calculate the tempo),

the statistic evaluation based on the percentage numbers does not contain any information about the quarter notes anymore. From the point of view of the calculations with these percentage values, they are quasi-isochronous. By taking the percentages, they become ‘isochronized’, so to speak.

Example 8. For example, concerning the *swing* groove in *jazz*, in a $\frac{4}{4}$ meter, Richard Rose concluded in a study from 1989 a **SLSL** pattern for the quarter notes, recurring from bar to bar. Beats **2** and **4** are systematically played longer than beats **1** and **3**.²⁹ If the *swing ratio*, the ratio between the two eighth notes of a beat, is calculated in terms of percentages of the respective beat, a relatively stable pattern of two alternating eighth note durations (**LS**) results which is repeated beat after beat. It should be kept in mind, however, that as the second and fourth beat are longer than the first and third, this would mean that the eighth notes actually follow a pattern involving four different note durations, which is repeated not every beat but only after two beats.

Example 9. Consider a sequence of isochronous quarter notes, with subdividing sixteenth notes of note lengths 20 %, 20 %, 40 %, 40 % of a quarter note. If one calculates the tempo from the duration of the eighth notes, and relative sixteenth note durations as percentages of the eighth notes, one would find that *all* the sixteenth notes take up exactly 50 % of the duration of the current eighth note, only that the tempo changes fairly rapidly from eighth note to eighth note.

Example 10. On the other hand, if for a musical passage that tends to speed up (which was the case for the recordings I analyzed), the tempo is calculated on the basis of the length of a four-bar-sequence, and relative sixteenth note durations are calculated as a percentage of the duration of this four-bar-sequence, one would find that all the sixteenth notes towards the end of each four-bar-sequence are played especially short and the ones at the beginning of a four-bar-sequence are played especially long.

How to Make Note Durations Comparable? *Ecological Validity*

In the light of these considerable theoretical difficulties, I always tried to work with absolute durations as long as possible. Many qualitative conclusions can already be drawn from comparing straightforward which of two notes has the longer absolute duration and by considering the ranges between the minimum and the maximum occurring value of the absolute durations. For quantification, however, a means of making note durations comparable to

²⁹Cited in [Pfleiderer, 2006, p. 268] and [Klavacs, 2011, p. 10].

a finer degree is indispensable. There are various legitimate ways how this step can be carried out. I think the possible choices can be condensed to the following central points that (at least almost) completely determine the method.

1. Shall the note durations be compared with information from the past (the preceding notes) or as part of a current entity (like the beat or bar that it is part of)?
2. How local or global should the basis for the evaluation be chosen?
3. (If more of these options are chosen simultaneously, resulting in a possibly more sophisticated model:) To which extent shall all these options contribute to the model?

I think a decision for a certain method should be based on the question which calculation methods delivers the most meaningful results. In my understanding, these would be those results that represent human perception best, in other words being the most *ecologically valid* ones. It is an intricate task to decide which model achieves this.³⁰ Certain assumptions are implied and enter the process, depending on the calculation method. For example, the duration of subdivisions could be calculated as a percentage of the beat to which they belong, i.e. relatively to the IOI between the first note of the given beat and the first note of the *following* beat. This might seem an obvious and simple choice. But maybe it would represent human perception better to calculate them as a percentage of the *precedent* beat, as at any stage of a musical performance, the durational note expectations of the listener can only stem from the past, and not from the future.

Methods from Earlier Studies

Let us take a look at the choices other authors made in their microrhythmic analyses.

Olavo Alén, in his study of Cuban *tuba francesa* calculated the relative durations of the played notes (calling them “standardized values”) as percentages of the repeated pattern-type phrase to which they belong [Alén, 1995, p. 58]. These phrases in most cases spanned over 6, 8 or 12 eighth notes.

Christiane Gerischer also calculated the relative durations as percentages of one quarter of a rhythmic cycle, which usually spanned over four beats [Gerischer, 2003, p. 139].

³⁰In the simple case of isochronous events all of the above options amount to the same.

Rainer Polak similarly calculated the relative note durations as percentages of what he calls “normalized beat durations”. He used the metric cycle, in most cases four beats long, subdivided binary, ternary or quaternary, and calculated the relative durations as percentages of this metric cycle. This amounts to exactly the same procedure that Alén and Gerischer chose. The resulting percentage ratios he calls “(pulse) timing ratio” [Polak, 2010, par. 34].³¹

In his 1968 article *Anteckningar om 20 sekunder svensk folkmusik*³², Swedish musicologist Ingmar Bengtsson used yet another approach. He derived relative beat durations by comparing the absolute durations of the beats of each bar with the absolute duration of the first beat of that bar, as he reports in [Bengtsson, 1975, p. 212].

An Exemplary Debate

Especially illuminating is the detailed debate between Matthew W. Butterfield and Fernando Benadon on how the timing of bass and drum notes in Herbie Hancock’s *Head Hunters* recording of his tune *Chameleon* should be judged.³³ Altogether, they suggest a number of different ways of measuring whether the notes in question were played “early” or “late”. Besides comparing the note durations to the duration of the bar to which they belong [Butterfield, 2006, par. 50], Butterfield proposes to compare them to the duration of the previous bar [Butterfield, 2006, par. 51]. Both these methods rely on the calculation of the bar durations as IOIs between the notes played on the first beats of successive bars, relatively far from each other (temporally). Both authors seem to favor more local criteria for the assessments, since “[w]hen trying to determine whether a listener hears a slight timing deviation, a scenario that involves local timing comparisons seems more realistic than one that does not. [Benadon, 2007, par. 6]” But (at least) Butterfield does so only under the condition that they do not “involve metrically un-

³¹A minor drawback of the method these three authors employed is, that the resulting relative note durations are expressed in a somewhat unintuitive way, because they do not add up to 100 %. Rather, they usually add up to a little more or less than 100 % within one beat, depending on the length of the beat, and for the whole bar or phrase, they add up to 100 % times the number of beats of that bar or phrase (e.g. 400 % in a 4/4 meter). I strongly conjecture that their approach is informed by the connoted idea that the beat level is quasi-isochronous, and hence the durations *do* add up, more or less, to 100 % within each beat.

³²Swe. “Notes on 20 seconds of Swedish folk music”

³³Butterfield’s 2006 article *The Power of Anacrusis: Engendered Feeling in Groove-Based Musics* [Butterfield, 2006] provoked a commentary by Benadon [Benadon, 2007]. Butterfield’s response to this is [Butterfield, 2007]

stable or perceptually implausible durations to be used as a basis for the judgement of duration [Butterfield, 2007, par. 10]”. These more local criteria include the duration of a (part of a) phrase leading to a certain note, the duration of a (part of a) phrase to which the note belongs, as suggested by Benadon [Benadon, 2007, par. 4], or the duration of preceding quarter note (beat) as Butterfield suggests [Butterfield, 2007, par. 10]. Similarly the duration of the beat to which the note belongs could be used as a reference.

To develop an ecological valid model for measuring note durations *exactly*, probably many contributing factors would have to be considered. Butterfield finds the following:

An ecological approach to perception should model a subjects perceptual engagement with his or her environment. It should take account of the structural attributes of the environment (with a special focus on invariant features), the perceptual and cognitive faculties of the subject, and his or her historical and cultural situatedness, all of which help the subject to understand what it is that is going on in a particular situation. [Butterfield, 2007, par. 3]

This amounts to saying that a perfect model would possibly be different for every listener, which cannot be hoped for to be achieved in the near future.

A Practical Approach

The approach I have chosen, though admittedly not being very elegant, is comparatively simple and practical: Firstly, I will work as much with absolute durations as possible, which will hopefully prove to have high ecological validity. I secondly aim at drawing only prudent conclusions as soon as concrete relative durations or statistic methods are involved. Thirdly, I rely on two different methods of calculating relative note durations, one more locally and one more globally oriented, hoping that they will point towards the same tendencies.³⁴ Most conclusions I will draw in relation to the microtiming of the recordings examined will be based on evidence from the comparisons of the absolute note durations and be supported by two sets of relative note durations (these will turn out to differ only slightly). Thus I conjecture that

³⁴Of course the exact numerical values resulting from this will be different in all the cases not involving perfect isochronicity or, in other words, perfect repetition. However, in the above mentioned debate between Butterfield and Benadon, *all* of the four ways of judging the timing of some specific notes they carried out pointed towards the same tendency (namely that the notes in question were played “late”).

any more ecological valid models than the ones I used would probably result in numbers only differing relatively slightly.

The ecological validity of the approach could now be argued with the fact that firstly, it seems very likely that not arbitrarily small durations have relevant perceptual relevance. With regards to the discussion in Section 4.5, it seems save to say that a quantization or exactness of 5 ms could be enough to capture all relevant temporal information about musical events. In the lights of my account of the precision of my measurement methods in Section 5.6, setting a boundary to the accuracy of the whole analysis, I think I could not achieve a higher ecological validity in this study anyway, even not by applying a more sophisticated model or statistic methods.

5.5.5 Means and Deviations

In order to quantify and describe the *central tendency*³⁵ of the data produced so far, some *central value* and some measure of the tendency of clustering around—or deviating from—it is needed.

The most important statistic tools I decided to base the analysis on, are the arithmetic mean of the relative note durations (i.e. the ‘average’ relative durations) as a central value and the corresponding standard deviation as a measurement of the central tendency.

The arithmetic mean μ and the standard deviation σ of a given set x_1, \dots, x_n of measurements is calculated in the following way:³⁶

$$\mu := \frac{x_1 + \dots + x_n}{n}, \quad \sigma := \sqrt{\frac{\sum_{i=1}^n (x_i - \mu)^2}{n}} \quad (5.1)$$

Calculating the arithmetic means corresponds to the idea of a certain repeated ‘standard’ timing pattern, around which all the real measured notes are distributed, following the pattern more or less closely—“more or less” being quantified by resp. a smaller or greater standard deviation. Keep in mind, however, that by taking the average values, potentially important information is lost. The way in which the real measured values are distributed around abstractly calculated mean values cannot be investigated by only considering the means. To learn about the properties of this distribution, more

³⁵The way in which data is distributed around some ‘center’.

³⁶This way of calculating the standard deviation is called *biased* or *n-method*. (The latter name comes from the denominator of the fraction under the square root.) It is commonly used for the case where the sample (the set x_1, \dots, x_n of measurements) is the whole population, i.e. no conclusions about a larger underlying population are drawn, of which only a smaller sample is examined. I found this suitable in this case. For a number of reasons it is in my opinion highly uncertain anyway whether any conclusions about other recordings may be drawn from the results of this analysis.

elaborate statistic tools would be required. I believe this is exactly what Olavo Alén tries to express in the following passage:

The relationship between the duration of two sounds should not be calculated with probabilistic formulas in place of exact values, because there are multiple values for the occurrence of a single durational or temporal relationship between the two sounds. It is precisely in this multiplicity that we find the richness of musical interpretation which the performer uses to recreate, time and again, a single work that never ceases to be itself. [Alén, 1995, p. 59]

Alternatively, another statistic item that could have been used instead of the arithmetic mean is the median³⁷. I decided to work with only one of them, because for samples with finite standard deviation (in particular finite samples) the difference between the mean μ and the median m is bounded by the standard deviation σ of the sample: $|\mu - m| \leq \sigma$. This means that for ‘small’ values of σ , as in our case, the mean μ and the median m of a set of data are relatively ‘close to each other’ and thus contain similar information anyway.

Regarding the standard deviation, which is a popular measure for how close the real values are to the arithmetic mean, another such very simple measure that I also calculated is the interval between the minimum and the maximum value. The smaller this interval and the smaller the standard deviation are, the closer the values are to the mean. The *static* microrhythmic model corresponds to the case where the minimum equals the maximum and the standard deviation is 0.

Yet another tool often used to measure the central tendency is the *average (absolute) deviation*, the arithmetic mean of the deviations of the measurements from some fixed value, e.g. from the median m or mean μ . The average absolute deviation from the mean is smaller or equal to the standard deviation. I decided to work with the standard deviation. The difference between the two is that in the average absolute deviation all deviations from the regarded central value are taken into account to the same degree, whereas in the standard deviation ‘small’ deviations are more tolerated and ‘strong’ deviations are represented over-proportionally.

To get a rough idea of the significance of the numerical values of the standard deviation and the interval between the minimum or maximum value,

³⁷The median m of a set of values is defined as the ‘middle value’, separating the lower half of the sample from the upper half, i.e. the number of values $\leq m$ equals the number of values $\geq m$. In the case of an even number of values, the median is usually defined to be the arithmetic mean between the two values ‘in the middle’ of the sample.

consider the following. In the case of a set of data which is distributed normally³⁸, roughly 68 % of the real values deviate at most by σ from the mean, in other words are lying in the interval $[\mu - \sigma, \mu + \sigma]$, and 99.7 % are in the interval $[\mu - 3\sigma, \mu + 3\sigma]$. In the interval between the minimum and the maximum value, of course 100 % of the values are contained.

5.6 Error Estimation/Precision

The accuracy of the results depends almost utterly on the precision of the onset-markers, which I can only estimate. Generally, for loud notes with a steep envelope slope, there were no problems to determine the onset times to a precision of far less than 1 ms. The only real source of possible noteworthy imprecisions stems from the softer notes. Due to their more gradual attack and sometimes overlap from a preceding loud note, it seems possible that the onset-markings are in some cases less precise. I estimate possible errors at being at most 5 ms. This would result in a maximum error for absolute note durations (in the analysis, I will denote the absolute duration of a note n , i.e. the IOI between n and the subsequent note $n + 1$, by $d(n)$) of 10 ms (the onset-marker of a note could be 5 ms early, the one of the next note 5 ms late, or vice versa). But I think that a precision of 5 ms even for the absolute note durations can be assumed because the possibility of inaccuracies arose, as mentioned, mainly in the case of soft notes preceded by a loud note—and of course no two such soft notes are immediate successors:

$$\text{error for the function } d : \leq 5 \text{ ms} \quad (5.2)$$

The precision of the programs I used is much higher³⁹ and hence does not affect the resulting accuracy to a noteworthy degree.

As a basis for the statistics, I chose to use the intervals between the note-onsets, not between the moments when the notes might actually be heard

³⁸At this stage it cannot be said, whether in our case the data has normal distribution.

³⁹The overall resolution of *Sonic Visualiser* and its waveform representations is equal to the resolution of the underlying audio file (48 samples per ms in our case). The resolution of the spectrogram is much lower: It depends on the window-size (1024 audio samples) and -overlap (512 audio samples) of the underlying FFT, and was in this case hence lower by the factor 512 or 1024, depending on the point of view. However, this resolution is only partly relevant in this context, as I mainly worked with the more precise waveform representation of the recording and referred to the spectrogram only as an overall indication to identify the approximate onset times. Likewise, the resolution of the onset-detection algorithm and its underlying FFT need not be taken into account, as I controlled and corrected all of its output manually. The precision of the used spreadsheet application is 15 digits, which is by far sufficient.

by a listener. When drawing conclusions about what is relevant for human perception, it could be argued that this possibly effects the results. An upper quantitative limit to this effect is imposed by the differences between the duration of initial transient periods in the oscillations of different notes (mainly relevant are these differences for soft as compared to loud notes) which I estimated as $\leq 10\text{--}20$ ms in some extreme cases (see Figure 5.1 on page 120). In practice, however, I estimate that these time spans were almost constantly ≤ 5 ms, which corresponds to the already noted 6 ms, reported by Christiane Gerischer.⁴⁰ Also, keep in mind that this effect is almost inexistent for two or more successive notes of similar volume. Summing this number with the one from estimate (5.2), both rather roughly estimated, the following results:

$$\text{perceptually relevant error for the function } d : \leq 10\text{ms} \quad (5.3)$$

Let us put a perspective on these numbers: Even in the fastest tempos of the examined recordings, usually at most 110 bpm, the beats rarely had a duration of less than 550 ms. The sixteenth notes were only very occasionally shorter than 100 ms. The resulting worst case error estimates (using (5.2) and (5.3) respectively) seem acceptable:

$$\text{error for } d : < 1 \text{ \% of beat duration} \quad (5.4)$$

$$\text{error for } d : \leq 5 \text{ \% of sixteenth note duration} \quad (5.5)$$

$$\text{perceptual: error for } d : < 2 \text{ \% of beat duration} \quad (5.6)$$

$$\text{perceptual: error for } d : \leq 10 \text{ \% of sixteenth note duration} \quad (5.7)$$

To put this into perspective, observe that the standard deviations, that can be seen as a measure for the spread of the relative note durations, had in most cases values of 1–4 %-points of the duration of one beat (resp. $\frac{1}{4}$ of the duration of a bar). This corresponds at medium tempo 100 bpm to absolute duration differences of 6–24 ms.

⁴⁰6 ms is the difference between the minimum and the maximum that Gerischer measured for *caixas* [Gerischer, 2003, Tabelle 1 on p. 244].

Part III

An Explorative Study: Microrhythmic Phenomena in *caixa* Recordings of *Maracatu-Nação*

Chapter 6

Example Analysis: *2012.03.29 Ibura excerpt 3*

I would like to start the analyses with a detailed exposition of the recording excerpt *2012.03.29 Ibura excerpt 3.wav*. I felt that looking at a concrete example hopefully makes the conclusions later drawn from a much larger set of data more plausible.

6.1 Data and Calculations

I will first describe comprehensively the various steps of the process, which I carried out for *all* recording excerpts. The tables and graphs presented herein are with few exceptions taken from the .xlsx-files I constructed for the statistic analyses. These files, alongside the sound- and sonic-visualiser-files, can be found on the accompanying CD for all recordings. In Section 6.3, I will analyze and interpret the data presented herein.

6.1.1 General Characteristics

Some of the basic facts are displayed in Figure 6.1. For a discussion of the **names** of the various rhythms used for the various *baques* in *maracatu*, in this case *malê*, see Section 3.5. I denoted the **stickings**, if not a simple *hand-to-hand*-sticking was used, by listing the whole succession of right and left strokes, as in Figure 6.1. See Section 3.6.4 for explanatory remarks.

The values for the **tempo**, given in bpm, are the minimum and maximum calculated value over all beats of the recording. These numbers are only meant to give an overall idea of the tempo range, a theoretical discussion on the measurement of tempo, is found in Section 5.5.2. In most cases, the

Rhythm: Malê	
Sticking: RRLR RLRL RLRL RLRL	
Tempo in bpm [Min]	95,04
Tempo in bpm [Max]	98,33
Duration of Excerpt [in s]	ca. 13
Number of Bars	5
Number of Beats	20
Number of measured note-onsets	78

Figure 6.1: *2012.03.29 Ibura excerpt 3*—Basic Facts

tempo was speeding up through the course of the recording.

The remaining numbers (approximate **Duration of excerpt** in s, **Number of Bars**, **Beats** and **measured note-onsets**) are intended to give an idea of the sample size.¹

6.1.2 Transcription

In the transcriptions I indicated three different volume levels via different symbols: notes without an accent are quiet, accented notes are loud, notes with an accent in brackets are of medium volume. This certainly results in an only very coarse quantization of dynamics, which I chose because dynamics play a minor role in this analysis. The sticking is denoted by the letters “R” (right) and “L” (left).

In Figure 6.2, in addition certain notes are marked with an asterisk (*), this is to indicate that I was not able to determine the onset of that note. Note that both of the missing notes in Figure 6.2 are soft notes after accents—notes of which I could not find the onset were almost always soft notes after accents (consequently, it hardly ever occurred that two successive notes are missing in the analysis).

The excerpt consists of five repetitions of the basic *caixa*-pattern that is used in the group *Leão da Campina* for the *baque malê*, with a short ending phrase on beat 4 of the 5th bar leading to the concluding stroke on beat 1 of bar 6. The sticking is a mixture between one with predominant use of the

¹The number of beats is not always four times the number of bars (see the paragraph on meter on p. 116). The number of measured note-onsets is not always precisely four times the numbers of beats (although always close to that), because of the concluding note on beat one of the following bar, the fact that I was unfortunately not able to determine *all* the onsets (see Section 5.4.5) and since in some cases the patterns played involved occasional eight notes instead of uninterrupted consecutive sixteenth notes.

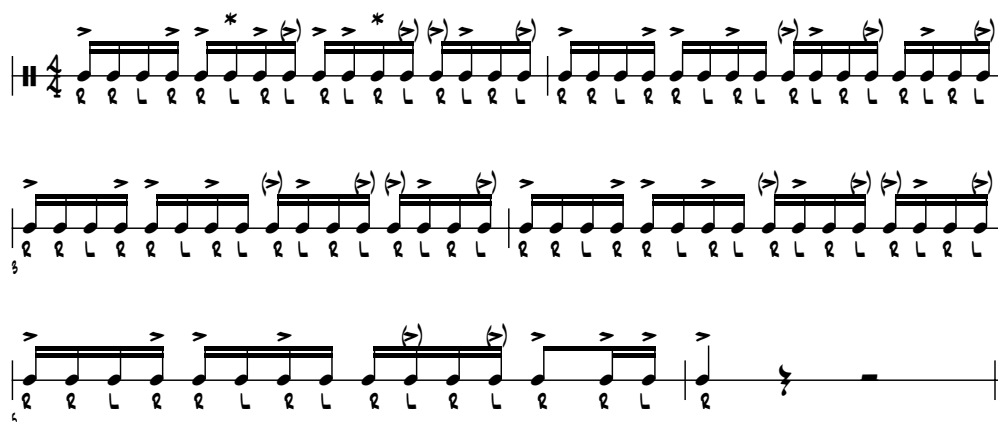


Figure 6.2: Transcription of the recording *2012.03.29 Ibura excerpt 3*, played by Hugo Leonardo. The *caixa* pattern used in *Leão da Campina* for the *baque malê*. Most other *batuqueir@s* in the group played it with *hand-to-hand* sticking.

leading hand in the first half of the pattern (beats **1** and **2**) and one with strict hand-to-hand alternation in the second half (beats **3** and **4**).²

The accentuations pointed out in Figure 6.2 only roughly approximate the rich dynamical variety of the recording. Similar remarks apply to the transcriptions of all the remaining recordings, which are found in Section 7.

Volume levels

This analysis is based on note durations only. The different note volumes are not accounted for, as they are yet more difficult to quantify exactly. I want to mention, at least, that it seems not improbable that the large differences in volume of the *caixa* notes of the examined examples could influence the temporal perception. Paul Fraisse in 1982, reporting the results of several earlier empirical studies, sums up one point on which there is generally a broad consensus: “More intense sounds are perceived as relatively lengthened and longer sounds as relatively more intense [Fraisse, 1982, p. 162].”

6.1.3 Concrete Data Example for two Bars

In Figure 6.3, the concrete analytical timing data for two successive bars of the recording excerpt *2012.03.29 Ibura excerpt 3* are presented as an example. I am going to describe the various numbers shown in the tables. Note that for

²Sticking variants were discussed on p. 76 in Section 3.6.4.

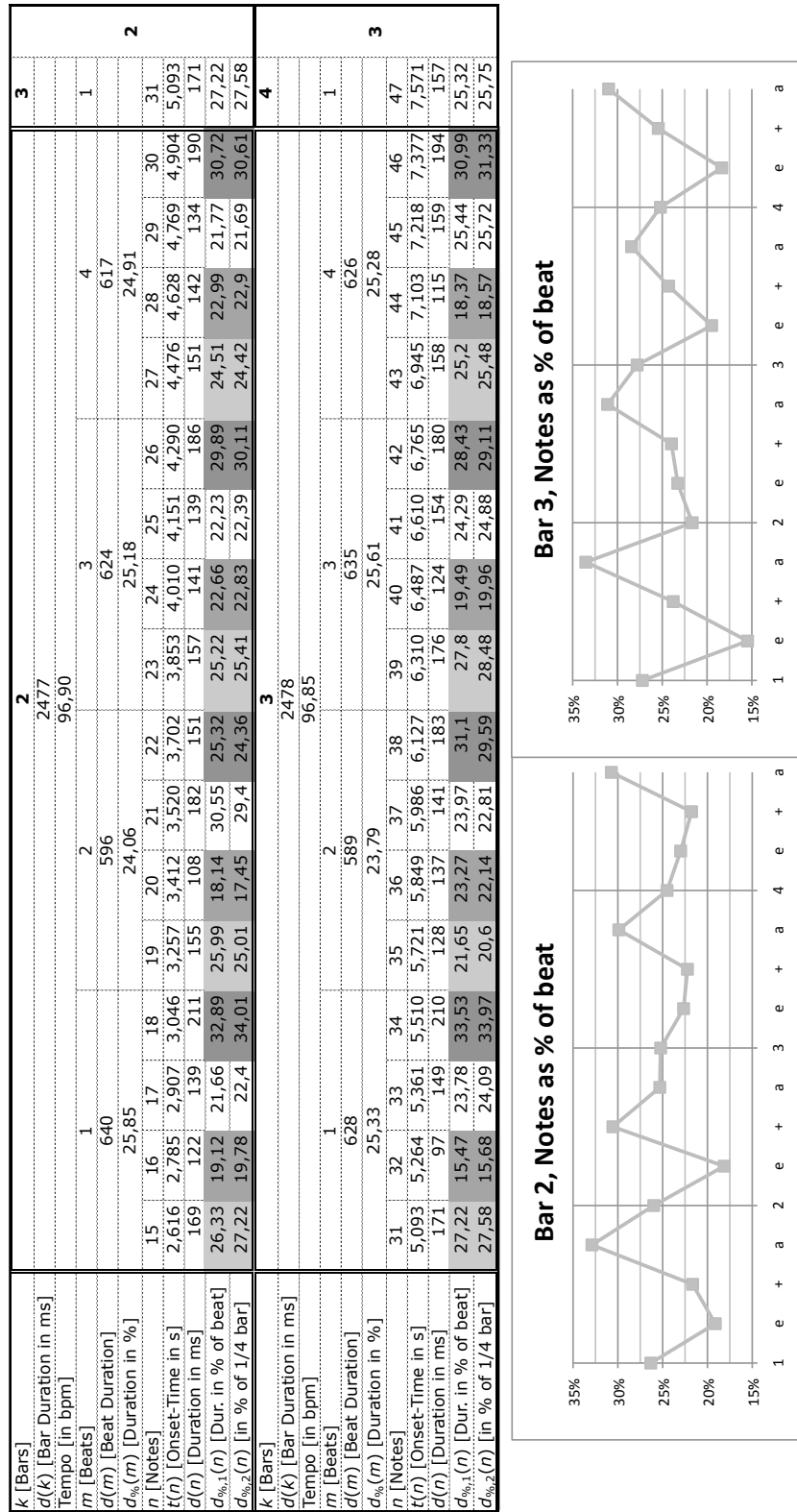


Figure 6.3: 2012.03.29 *Ibura* excerpt 3—Example Data: Bars 2—3

all calculations, more precise values than the rounded displayed ones, have been used.

Numbering

For orientation, in each recording, I **numbered** all the **bars** (ranging from 1 to the number of bars in the recording) and **note-onsets** I had measured (ranging from 1 to the number of measured note-onsets in the recording), and the four **beats** of each bar (ranging from 1 to 4). These numbers can be found in the rows with the following description in the leftmost column: k [Bars], m [Beats], and n [Notes].

Bar Level

The top three rows of the table contain data referring to the metric bar level. After the **number** of the bar in the first line (e.g. $k=2$), we have:

- In the row labelled “ $d(k)$ ”, the **absolute duration** of the bar (in ms; rounded to ms) is calculated as the difference between the onsets of the first note n_1 of it and the first note n_2 of the next bar: $d(k) = t(n_2) - t(n_1)$ (e.g. 2477 ms). This is the IOI between the onsets of beat **1** of this and beat **1** of the subsequent bar.
- The current **tempo** during that bar (displayed in bpm, rounded to 2 decimal places; e.g. 96.90 bpm) is approximated by taking the length of the bar as a reference, i.e. the number $\frac{2400}{d(k)}$.

Beat Level / Quarter Notes

The next three rows concern the metric beat level. Below the beat number (e.g. $m=1$ in bar 2), the following information can be found:

- In the row labelled “ $d(m)$ ”, the **absolute duration** of the beat (in ms; rounded to ms) is calculated as the difference between the onsets of its first note n_1 and the first note n_2 of the next beat: $d(m) = t(n_2) - t(n_1)$ (e.g. 640 ms).
- In the row labelled “ $d_{\%}(m)$ ”, the **relative duration** of the beat (in %, rounded to 2 decimal places) is calculated as the fraction $d_{\%}(m) = 100 \cdot \frac{d(m)}{d(k)}$ (e.g. 25.85 %). This is the percentage that the duration of beat m has of the duration of the bar k it belongs to.

Subdivision Level / Sixteenth Notes

Each of the four beats of a bar spans four columns, each representing a sixteenth note position. Each sixteenth note belongs to exactly one beat, each beat to exactly one bar. For each note of which I measured the onset time, the following data can be found in the cells below the note number n (for the n -th note measured in that recording, e.g. $n = 15$):

- In the row labelled “ $t(n)$ ”, I inserted the **onset time code** (in s, counted from the beginning of the recording) of the onset marker of the note (e.g. 2.616 s; measured as described in Section 5.4).
- In the row labelled “ $d(n)$ ”, the **absolute duration** of the note (in ms; rounded to ms) is calculated as the difference $d(n) = t(n + 1) - t(n)$ (e.g. 169 ms). This is the IOI between the onsets of the note and the subsequent one.
- In the row labelled “ $d_{\%,1}(n)$ ”, the **relative duration** of the note (in %, rounded to 2 decimal places) is calculated as the fraction $d_{\%,1}(n) = 100 \cdot \frac{d(n)}{d(m)}$ (e.g. 26.33 %). This is the percentage that the duration of note n has of the duration of the beat m it belongs to.
- In the row labelled “ $d_{\%,2}(n)$ ”, the **relative duration** of the note (in %, rounded to 2 decimal places) is calculated as the fraction $d_{\%,2}(n) = 400 \cdot \frac{d(n)}{d(k)}$ (e.g. 27.22 %). This is the percentage that the duration of note n has of $1/4$ of the duration of the bar k it belongs to.

In those cases where I could not measure the onset of a sixteenth note, or if there was none played in a certain position, the corresponding cells were left blank. In the second rightmost column of the table, the respective values for the first note of the subsequent bar are displayed, in the rightmost column the bar number is repeated. For better orientation, I colored the relative note durations in four different shades of grey, corresponding to the four different sixteenth note places of a beat. These numbers were the most important ones for the subsequent statistic analysis. They are displayed in graphical form in the diagrams below the table, for the example of the relative durations $d_{\%,1}$, calculated using the current beat as a reference.³

³The respective figures for relative durations $d_{\%,2}$ are also included in the files on the accompanying CD. I did not include them in this place, because the numbers $d_{\%,1}$ and $d_{\%,2}$ turned out to be relatively close to each other anyway, as can be inferred from the table.

6.1.4 Statistics for the four Beats of the Bar separately

In Figure 6.4, the statistic data I calculated about the absolute note durations and about the relative note durations $d_{\%,1}$ and $d_{\%,2}$ are displayed. They are summarizing across the various bars of the recording. Note that these data are only meaningful if assuming in some way that certain patterns are repeated bar after bar, which is to a certain degree validated resp. falsified by low resp. high values of the standard deviation.

Statistics about Relative Note Durations: Averages

The designations for the syntactic sixteenth notes of the bar as introduced in Section 4.4.3 are found in the first row below the heading (e.g. **e** of Beat 3). In the column corresponding to a certain sixteenth note, the following statistic data about the numbers $d_{\%,1}$ can be found:

- In the row labelled “Mean Cumulative Dur.”, I calculated the arithmetic mean (using Equation (5.1) on p. 133) of the sums of the relative note durations in the current beat up to the onset of the subsequent sixteenth note, but only the bars where that sixteenth note had been measured were taken into account.⁴ Consequently, for the sixteen notes of the bar, the underlying sample may vary (see Section 5.4.5). The numbers are of the same dimension as the the sample, hence in % of the duration of a beat, and are displayed rounded to 2 decimal places (e.g. 45.04 %).
- In the row labelled “Std Dev” the corresponding standard deviation is calculated according to Equation (5.1) on p. 133. The numbers are in %-points, and displayed rounded to 2 decimal places (e.g. 2.57 %).⁵

⁴These sums are the time spans from the beginning of the beat to the onset of the subsequent note, given as % of the beat duration. For the first sixteenth note in each beat, this number equals its average duration (representing the moment when the second sixteenth note of the beat was played), and for the last sixteenth note in each beat, the number is 100 % (representing the fact, that the following sixteenth note, the first of the subsequent beat, concludes this beat.) I used this technical auxiliary step just to compensate for the missing sixteenth notes of which I could not measure the onset time. If calculating the average note durations directly for each sixteenth note position separately, one loses more information: if an onset is missing, the precedent note is hence longer (in fact an eighth note), and cannot be compared to the other notes of that position. Thus, the missing sixteenth note *and* the precedent, longer, note could not be used in the calculations, which is avoided by using the mean cumulative durations and calculating the mean durations afterwards as differences of the cumulative durations.

⁵This means, for the moment—questionably—assuming a normal distribution of the underlying values (see the remarks in Section 5.5.5 on p. 135), that for example ~68 % of

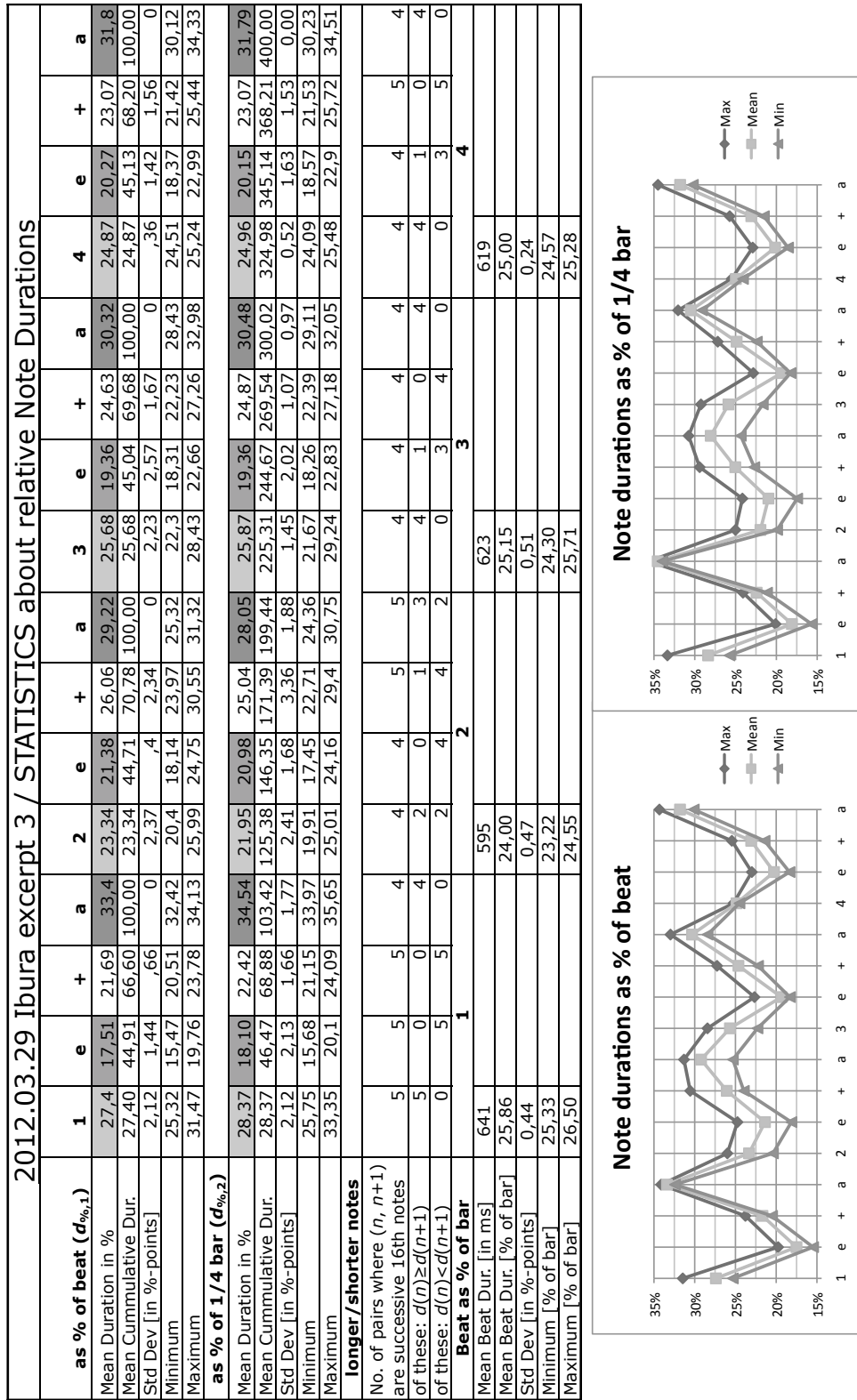


Figure 6.4: 2012.03.29 Ibura excerpt 3—Statistics

- In the row labelled “Mean Duration in %”, the arithmetic mean of the relative note durations of the notes played in that sixteenth note position is calculated as the difference between the Mean Cumulative Note Duration of the following sixteenth note position and this sixteenth note position. These numbers, colored in the same shades of grey again, are the represented graphically in the diagrams below the table.
- In the rows labelled “Minimum” and “Maximum”, the smallest and largest occurring values respectively of the relative note durations of the notes played in that sixteenth note position are presented. They are also depicted in the diagrams, alongside the mean relative duration.

For the numbers $d_{\%,2}$, calculated by comparison of the note durations to the duration of $1/4$ of the duration of the bar, almost exactly the same procedure is carried out. The only exception is the way the mean cumulative duration is calculated: Here, the sums are taken over all sixteenth notes of the bar up to the sixteenth note in question, not only for each beat separately.⁶

Absolute Note Durations: Longer/Shorter Comparisons

The next section of the table in Figure 6.4, headed “longer/shorter notes”, contains the numbers on the comparisons of successive note durations.

Although the rest of the analyses is mainly based upon the *relative* note durations, in order to compensate tempo shifts, I used the *absolute* note durations d for these comparisons. I believe tempo effects can be taken to be marginal for two successive sixteenth notes. Also, I felt that a direct comparison of the absolute durations, based only on local information, might represent better a direct perceptual categorization process into longer or shorter notes.⁷

the sums of the relative note durations of the two subsequent notes played on **3** and **3_e** of a certain bar (or, in some cases, the relative duration of the eight note played on position **3**), fall into the interval $[42.47 \% (= 45.04 \% - 2.57 \%), (45.04 \% + 2.57 \% =) 47.61 \%)$. In other words, $\sim 68 \%$ of the notes played in position **3₊** were played somewhere between 42.47 % and 47.61 % into the beat (thus markedly before the middle of the beat). As the mean cumulative note duration for the last sixteenth note of each bar is always 100 %, the corresponding standard deviation is always 0 and without significance.

⁶As a consequence, the mean cumulative sums do not add up exactly to 100 % in each beat, but only to exactly 400 % at the end of the bar. This represents precisely the difference in the two methods of calculating the average note durations: once as a certain fraction of the current beat and once as a certain fraction of ($1/4$ of) the bar.

⁷Note that a difference between comparison of absolute vs. relative note durations for successive notes can only result for notes belonging to different beats (in the case

- In the row labelled “Number of pairs where $(n, n + 1)$ are successive sixteenth notes”, the size of the underlying sample for the comparisons at a certain sixteenth note position is displayed.⁸
- In the rows labelled “ $d(n) \geq d(n + 1)$ ” resp. “ $d(n) < d(n + 1)$ ” the number of such comparable pairs of notes for which the absolute duration of the first note is longer resp. shorter than the absolute duration of the second note is displayed.

Beat Statistics

In the last section of the table in Figure 6.4, labelled “Beat as percentage of bar”, some statistic data concerning the durations of the four beats of the bar are shown. These data give an indication of in how far the data about a specific sixteenth note position of a specific beat (e.g. **1_a**) might be comparable with the data about the corresponding sixteenth note positions of the other three beats (e.g. **2_a**, **3_a** and **4_a**). In the top row, the number of the beat is displayed (e.g. 3).

- In the two rows labelled “Mean Beat Duration”, the average (using Equation (5.1) on p. 133) over all bars of the absolute durations (using the numbers $d(m)$) resp. relative durations (using the numbers $d_{\%}(m)$) of each beat is displayed (in ms, rounded to ms (e.g. 623 ms); resp. in % of the bar duration (e.g. 25.15 %)).
- In the row labelled “Standard Deviation” the standard deviation corresponding to the arithmetic mean of the relative beat durations is calculated, using Equation (5.1) on p. 133. The numbers are in %-points, and displayed rounded to 2 decimal places (e.g. 0.51 %).

of durations relative to the current beat duration, using $d_{\%,1}$) resp. bars (in the case of durations relative to the current bar duration, using $d_{\%,2}$); namely when the duration of the two notes is fairly close to each other and the two beats (resp. bars) they belong to have different durations. In other words, with the terminology introduced in the next section, it is possible that for example $d_{\%,1}(\mathbf{1}_a) > d_{\%,1}(\mathbf{2}_{beat})$, although actually, in terms of absolute durations, $d(\mathbf{1}_a) < d(\mathbf{2}_{beat})$. Similarly, for $d_{\%,2}$ this could happen at the border of neighboring bars.

⁸In order to be able to compare durations, both the durations of that note (e.g. n) and the subsequent sixteenth note must be available (in this case, n and $n + 1$ are immediate successive sixteenth notes, there is no ‘missing’ note in between) and comparable, i.e. have the same syntactic value. For this it was necessary that the onsets of that sixteenth note and the next *two* notes were available (otherwise the note $n + 1$ was an eighth note or a longer one and hence not comparable to n).

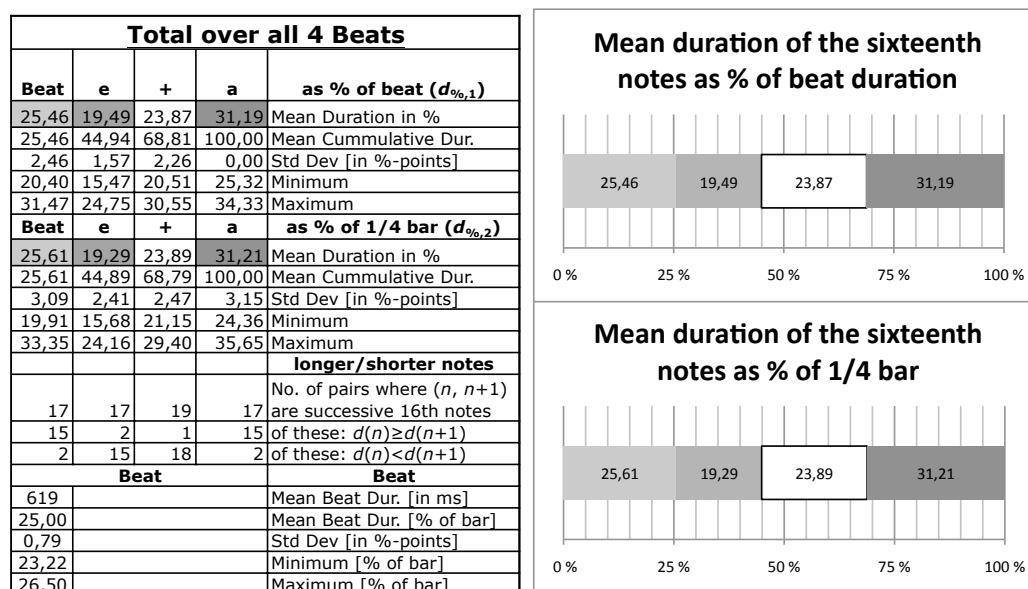


Figure 6.5: 2012.03.29 Ibura excerpt 3—Total Statistics over 4 Beats

- In the rows labelled “Minimum” and “Maximum”, the smallest resp. largest occurring value over all bars of the relative duration of each beat is displayed.

6.1.5 Statistics over all four Beats of the Bar

Finally, I also produced statistic data about the four sixteenth note positions *beat*, *e*, *+*, *a* of a beat summarized across all four beats of all bars. Note that these data are only meaningful if assuming in some way that certain patterns are repeated beat after beat, which is to a certain degree validated resp. falsified by low resp. high values of the standard deviation. In Figure 6.5, the table with these totalizing data from the example recording 2012.03.29 *Ibura excerpt 3* are shown.

The same steps are carried out as described in the previous section for the sixteen syntactic positions of the bar separately, only that as a basis for the calculation of arithmetic means, standard deviation, minimum and maximum values and the note length comparison, the set of *all* notes *beat*, *e*, *+*, *a* of *any* beat was used, without discriminating between beats **1**, **2**, **3**, or **4**.

Note that the standard deviation of the cumulative note durations of the fourth sixteenth note position is always 0 in the case of relative note durations $d_{\%,1}$ calculated as a percentage of the current beat, whereas this is not true

for the case of relative note durations $d_{\%,2}$ calculated as a percentage of $1/4$ of the current bar.

The mean beat duration relative to the duration of the bar, averaged over all 4 beats, is always exactly 25 % for purely mathematical reasons. This number has no significance.

The mean durations of the four note positions of each beat, which are the numbers that most authors of similar studies regard as the central results of their statistic evaluations, are represented in graphical form in the bar-type diagram in the left-hand side of Figure 6.5.

6.2 Overview of Introduced Functions

I want to recap the functions introduced and defined in this section. If for some recording excerpt N is the set of notes, M the set of beats, and K the set of bars of that recording, then the following functions will be used in the analysis:

- $t: N \rightarrow \mathbb{R}$, onset time of a note,
- $d: N, M, K \rightarrow \mathbb{R}$, absolute duration of a note, beat or bar,
- $d_{\%}: M \rightarrow [0, 1]$, duration of a beat relative to current bar,
- $d_{\%,1}: N \rightarrow [0, 1]$, duration of a note relative to current beat,
- $d_{\%,2}: N \rightarrow [0, 1]$, duration of a note relative to $1/4$ current bar.

When referring to specific notes of the recordings, I will specify this by writing, for example, “in bar 5, it is $d_{\%,1}(\mathbf{2}_+) < d_{\%,1}(\mathbf{2}_a)$ ” to express that the relative duration of the third sixteenth note (relative with respect to the duration of the current second beat) of the second beat of bar 5 is less than the relative duration of the fourth sixteenth note of the same beat.

I will also use expressions like “ $d_{\%,2}(\mathbf{3}_+)$ ”, “ $d_{\%,1}(\mathbf{e})$ ” or “ $d(\mathbf{1})$ ” for discussing average values of a certain syntactic position, or, in a more heuristic sense, when describing general results or tendencies coming up in the analysis of the durations of certain metric categories / positions that apply to *all* or *most* instances of notes or beats at that metric position.

6.3 Analysis

Let us now try to analyze and interpret some of the statistic data of the example recording *2012.03.29 Ibura excerpt 3*.

6.3.1 Beat, Bar, Tempo

Before coming to the metric level in which sub-syntactic timing phenomena are most easily identified and described in terms of recurring patterns, I want to take a closer look at how stable or varying durations are on the higher metric levels. In this way, an understanding of how significant the relative subdivision durations should be estimated, is developed.

Tempo

The tempo, calculated as described in Section 6.1.3, is relatively stable. As can be seen in Figure 6.1 on p. 140, in the excerpt of about 13 s, the tempo has an only narrow range of 95.04–98.33 bpm. As will be the case in all examined recordings, the tempo tends to go up through the course of the performance, but not in a monotone process, as can be validated by checking the absolute beat durations of bars 2 and 3, presented in Figure 6.3 on p. 142. The tempo increase was usually particularly pronounced at the beginnings of the recordings, especially in the first bars.

Neither in this, nor any of the other recordings, I was able to detect any tempo-related effects on the relative note durations. I will hence disregard tempo for this example and consider it quasi-constant.

Bar Level

In Table 6.1, I give the absolute durational values (in ms) of the five bars of the recording excerpt *2012.03.29 Ibura excerpt 3*.

Table 6.1: *2012.03.29 Ibura excerpt 3*

Bar #	1	2	3	4	5
Abs.Dur. (<i>d</i>)	2525	2477	2478	2441	2466
Diff. to previous		−48	+1	−37	+25

The differences of the duration between neighboring bars are of the same magnitude as the corresponding differences between beats, as outlined in the next section. The maximum durational difference from the table above, 48 ms, is $\sim 2\%$ of the shortest bar duration, 2441 ms. Judging only from the little data presented above, it seems impossible to draw any direct conclusions. I will hence defer a discussion to Section 7.2, where all available data will be taken into account.

Beat Level

The 20 measured absolute beat durations of the excerpt had a 83 ms wide range from 586–669 ms. Incidentally, the longest and shortest beats of the recording are beats **1** and **2** of the first bar respectively. Apart from those two beats, the range was only 589–649 ms, hence 60 ms wide. This is 9.7 % of 619 ms, the average beat duration of the recording. The relative beat durations $d_{\%}$ had a range of 23.22–26.50 % of the duration of the current bar, as can be inferred from Figure 6.5 on p. 149. The standard deviation of 0.79 %-points is much lower than those for the relative durations of the subdivisions. Going to Figure 6.4 on p. 146, one can observe that the standard deviations calculated for each beat separately are significantly smaller still.

The exemplary data for the 8 beats of bars 2 and 3 of the recording, displayed in Figure 6.3 on p. 142, illustrate the behavior of the beat durations (in ms):

Table 6.2: *2012.03.29 Ibura excerpt 3, Bars 2–3*

Beat	1	2	3	4	1	2	3	4
Abs.Dur. (d)	640	596	624	617	628	589	635	626
Diff. to previous		–44	+28	–7	+11	–39	+46	–9

These absolute durational values, of the differences between neighboring beats, were definitely greater than I had expected. At 96.87 bpm, the average tempo of these two bars, the duration of an isochronous beat (i.e. the average duration) is 619 ms, of which the maximum value from the table above, 46 ms, is 7,4 %. I had been assuming a relatively high constancy or quasi-isochronicity of the beat, but I am convinced that timing nuances of this magnitude do have a perceptually relevant effect.

Beat **1** was the longest in each of the five bars of the recording, beats **2** and **4** tended to be the shortest ones. This results in a moderate alternating **LSLS** pattern of the beat durations, which was broken up in only a few places of the recording in question. See the discussion in Section 7.3 for some considerations on the possible generalizability of this.

6.3.2 Subdivisions

Coming to the lowest syntactic metric level, much clearer sub-syntactic timing nuances are detectable. Before trying to describe them by concrete numbers, I would like to start the analysis with a discussion of the coarse qualitative categorization shorter vs. longer notes.

Longer/Shorter Notes

Due to the great consistency of the results, I will directly jump to the total numbers over all 4 beats; there was not much difference in the emerging patterns between the four beats of the bars.

The numbers in Figure 6.5 on p. 149 show no ambiguity; the first (*beat*) and fourth (*a*) sixteenth notes both were in 15 out of 17 cases longer than the subsequent note, whereas the second (*e*) resp. third (*+*) note were in 15 out of 17 resp. 18 out of 19 cases shorter than the subsequent note. One hence can infer the following two patterns, recurring very consistently from beat to beat:

$$d(\mathbf{a}) > d(\mathbf{beat}) > d(\mathbf{e}) \quad (6.1)$$

$$d(\mathbf{e}) < d(\mathbf{+}) < d(\mathbf{a}) \quad (6.2)$$

In other words, *e* is the shortest, *a* the longest subdivision, and *beat* and *+* are lying in between.

Going back to the data in Figure 6.4 on p. 146 and analyzing the four beats of the bar separately, slightly more ambiguity can only be noted on beat 2. In only two of four cases it was $d(\mathbf{2_{beat}}) > d(\mathbf{2_e})$, in the remaining two cases the opposite was true, and in only three of five cases it was $d(\mathbf{2_a}) > d(\mathbf{3_{beat}})$, whereas in the remaining two cases it was the contrary.⁹

Looking at the concrete numbers of the example bars 2 and 3 of the recording excerpt 2012.03.29 Ibura excerpt 3, given in Figure 6.3 on p. 142, the above inequalities can be verified in all 32 but the following 5 cases. Bar 2: $d(\mathbf{2_+}) > d(\mathbf{2_a})$, $d(\mathbf{2_a}) < d(\mathbf{3_{beat}})$, $d(\mathbf{3_e}) > d(\mathbf{3_+})$, $d(\mathbf{4_e}) > d(\mathbf{4_+})$; bar 3: $d(\mathbf{2_{beat}}) < d(\mathbf{2_e})$.

The MSML-Pattern

As I will discuss in Section 7.4.2, the data of the other recordings exhibit patterns similar to those pointed out in the last section.¹⁰ This hints at a repeated medium—short—medium—long subdivision of the beats. In the terminology of Rainer Polak,

$$\begin{array}{cccc} \mathbf{beat} & \mathbf{e} & \mathbf{+} & \mathbf{a} \\ \mathbf{M} & \mathbf{S} & \mathbf{M} & \mathbf{L} \end{array} \cdot \quad (6.3)$$

⁹These two instances with $d(\mathbf{2_a}) < d(\mathbf{3_{beat}})$ occurred in bars 1 and 2. The differences were marginal 5 ms resp. 6 ms. Incidentally, in both cases it was $d_{\%,1}(\mathbf{2_a}) > d_{\%,2}(\mathbf{3_{beat}})$ since beat 3 in both bars was longer than beat 2.

¹⁰Especially the two inequalities involving *a*, the first in (6.1) and the second in (6.2), will turn out strikingly consistent across the recordings (with markedly more ambiguity on beat 2 than the other three beats), while the two involving *e*, the second in (6.1) and the first in (6.2), are showing a moderately greater variety.

This happens to be the same basic pattern that Christiane Gerischer detected in *samba* music from Bahia [Gerischer, 2003, p. 180], [Gerischer, 2006, p. 106].

Remarkably, it does not coincide with the pattern that Gérald Guillot derived for two recording excerpts of the *maracatus-nação* *Leão Coroado*¹¹ and *Encanto da Alegria*¹². In both cases he concluded a **MSSL** pattern [Guillot, 2011a, p. 178–179].¹³

Quantitative Description

I now want to proceed by looking at the quantitative data concerning the subdivisions. One thing I want to emphasize right away, is that all the microrhythmic timing phenomena are developed much stronger, and show clearer and more coherent patterns than on the metric levels of beats or bars. By looking at the values of the arithmetic means and the standard deviations in Figure 6.4 on p. 146 for the beats and, in comparison, for the subdivisions, one immediately gets an idea of the situation. The sixteenth notes in *2012.03.29 Ibura excerpt 3* have an absolute durational range of 97–220 ms, hence the scope is 123 ms wide. The average duration of the sixteenth notes (which is $\frac{1}{4}$ of the average beat duration) is 155 ms. The span of possible durational values of the sixteenth notes is hence almost 80 % of its average duration. Already these few pieces of data make it obvious that the sub-syntactic timing at this metric level is perceptually relevant. It is definitely audible, as can be verified easily by listening to the recording.

Two Example Bars

Let us now first, as an concrete example, only study 32 sixteenth notes of bars 2 and 3 of the examined recording, displayed in Figure 6.3 on p. 142. The absolute durations d of these 32 notes had a wide range of 97–211 ms. For comparison, observe that isochronous sixteenth notes, at the average tempo ~ 96.87 bpm of the two bars, have a duration of ~ 155 ms. This is (almost) exactly the middle between the two occurring extremal values.

¹¹Port. “Crowned Lion”

¹²Port. “House of Joy”

¹³In my opinion, in the case of *Leão Coroado*, the numbers Guillot derived as averages for the relative subdivision durations,

$$\begin{array}{cccc} \mathbf{beat} & \mathbf{e} & \mathbf{+} & \mathbf{a} \\ 24.95 \% & 23.68 \% & 21.67 \% & 29.71 \% \end{array} ,$$

[Guillot, 2011a, p. 178], might possibly better be categorized as **MMSL**. See Section 8.1 for a comprehensive comparison of the results.

The most salient feature of the relative note durations (the numbers $d_{\%,1}$), ranging from 15.47–33.53 % (see **1_e** and **1_a** of bar 3), and the diagrams which depict them in graphical form, is the length of **a**, the last sixteenth note, in most beats. It shows durations around and above 30 % of the beat duration, which, judged only by this number, could be interpreted as being a little closer to an isochronous ternary phrasing than an isochronous quaternary phrasing. Nevertheless, by listening to the recording, I think there should be absolutely no doubt about the subdivisions being quaternary. The first sixteenth note, **beat**, in seven of the eight instances occupies around 25 % of the beat duration or a little more. This is also a tendency that can be generalized, as we will see later. Notes in the **e** position are the shortest. It is the only metric position customarily reaching values of 20 % and lower of the beat duration. Finally the third sixteenth note, **+**, has a typical relative duration $d_{\%,1}$ of slightly below 25 %, around 22–24 %. The starkest exception, on **2₊** of bar 2, with a value of $d_{\%,1}(\mathbf{2}_+) = 30.55$ %, hints at a more general feature: the metric position **2₊** tends to show longer relative durations $d_{\%,1}$ than **1₊**, **3₊**, and, with one noteworthy exception¹⁴, **4₊**. Summarizing,

$$\begin{array}{cccc} \mathbf{beat} & \mathbf{e} & \mathbf{+} & \mathbf{a} \\ \geq 25 \% & \leq 20 \% & 22\text{--}24 \% & \geq 30 \% \end{array} \cdot \quad (6.4)$$

Looking at the relative durations $d_{\%,2}$, calculated by comparison of the note with the bar duration, all these tendencies are apparent as well. The exact number ranges naturally differ a little from those obtained from the relative durations $d_{\%,1}$, but not to a degree that would question the overall interpretations that I undertook so far. The most consistent tendency that we will find looking through a larger amount of data in the remaining recordings, is that of beats **1** resp. **2** being relatively long resp. short, which corresponds to $d_{\%,2} \geq d_{\%,1}$ (for the notes of beat **1**) resp. $d_{\%,2} \leq d_{\%,1}$ (for the notes of beat **2**). As another consequence, the tendency of **2₊** to be the (relatively) longest note on the **+** position is still sensible, but a little less pronounced than in the case of the numbers $d_{\%,1}$. All of these statements can be verified in the short example we are looking at.

All in all, the numbers for the relative durations in these exemplary two bars support the **MSML** pattern (6.3), claimed above as a result of qualitative longer/shorter comparison of successive notes.

¹⁴See the discussion of the recordings *2012.03.24 Jacqueira excerpt 1—2*, stemming from a *batuqueira* from another *maracatu-nação*, in Sections 7.4.2 and 7.4.3.

Data on the Entire Recording

Let us now turn our attention to Figure 6.4 on p. 146 and look at the statistics concerning the whole recording excerpt, which consists of five bars. The graphs make apparent at one glance that the differences between the two evaluation methods, based on beat duration ($d_{\%,1}$) or bar duration ($d_{\%,2}$), yield slightly different numbers, but show the same basic tendencies. One interesting point is the varying size of the interval between the minimum and the maximum value of the relative durations. Over the course of beat **2**, this interval is relatively broad, peaking at position **2+**, where the interval size is 6.58 %-points (for $d_{\%,1}$) resp. 6.69 %-points (for $d_{\%,2}$).¹⁵ The peak values of the standard deviation are also found at this metric position. Compare this to the much narrower min–max span, as well as the small values of the standard deviation, found at metric position **4_{beat}**, **3_a**, or **1_a**. These observations mean that through the five repetitions of the pattern (you may want to take another look at the transcription given in Figure 6.2 on p. 141), the timing is more constant in certain metric positions than others. Interpreting this, one could say that the phrasing is freer in some parts of the pattern, and demands a more specifically defined timing in others.

Statistic Data Totalized across all four Beats

Finally, let us take a look at Figure 6.5 on p. 149, giving the total statistic values for the over four beats, not differentiating between them. What becomes apparent right away, is that the differences between $d_{\%,1}$ and $d_{\%,2}$ are just marginal in these averaged values for the relative durations of the sixteenth notes. This is always the case and an effect of the circumstance that the differences between $d_{\%,1}$ and $d_{\%,2}$ stem from the non-isochronicity of the beats; when taking averages over all four beats then, roughly speaking, it is exactly these differences that are ironed out. The resulting average relative subdivision durations, approximately

$$\begin{array}{cccc} \mathbf{beat} & \mathbf{e} & \mathbf{+} & \mathbf{a} \\ 25.5 \% & 19.5 \% & 24 \% & 31 \% \end{array}, \quad (6.5)$$

ideally reflect the **MSML**-pattern (6.3), and most accurately validate all the claims about the numerical ranges made in (6.4). More subtle conclusions, like the mentioned differences between the four beats, especially concerning beat **2**, can of course not be drawn from these numbers anymore.

¹⁵Over the course of the whole bar, greater differences between the minimum and the maximum value of the average relative durations are only found in the case of $d_{\%,2}$, namely 7.6 %-points at **1_{beat}** and 7.57 %-points at **3_{beat}**.

6.4 Summary

Before the set of all recordings in its entirety is examined in Chapter 7, an analysis based on a larger amount of data but hence necessarily involving less detailed treatment of singular subtleties and nuances, I examined, discussed and examined one specific recording at length. Looking at concrete examples and the numbers involved puts the final average values, readily presented at the end, into perspective. The averages contain only a very specific part of the timing information contained in the body of data. That part might or might not be the most relevant. Only future listening experiments could decide on such questions.

Overall Characteristics

The recording *2012.03.29 Ibura excerpt 3* has a total length of around 13 s. It is an excerpt of the interview [Leonardo, 2012] that I conducted with Hugo Leonardo, *mestre* of the *Nação do Maracatu Leão da Campina*, in which he demonstrated some *caixa* patterns to me. The recording consists of five repetitions (bars) of the *caixa* pattern that is used in that *batuque* to accompany the rhythm called *malê*. The meter is $4/4$ with a quaternary subdivision. I measured 78 note-onsets, extending over twenty beats. The pattern played consists of consecutive sixteenth notes with some accents that correspond largely to the *alfaia* part it goes with. Hugo held the *caixa* in an upright position on his left leg, playing with a *right-handed traditional grip* (see Section 3.6.4). Some general information on the recording is given in Figure 6.1 on p. 140, the transcription, including the sticking, in Figure 6.2 on p. 141.

Bar Level (Tempo)

The bar durations had a moderately wide range of 2441–2525 ms. The corresponding tempo, in the range of 95.04–98.33 bpm, sped up slightly through the recording, but not in a monotone way. I could not discern any particular pattern that would describe the alterations. Although it seemed unlikely that the varying bar lengths, of at most $\sim 2\%$ of the bar durations, have noticeable and relevant perceptual effects, and that hence the metric bar level can be regarded as quasi-isochronous, I think it is impossible to draw any conclusions from such a small amount of data. What appears likely is that the tendency of gaining tempo explains to some extent the varying beat lengths, although not all of these variations can be explained this way.

Beat Level

The beat duration ranged from 586–669 ms. The four beats of the bar tended to show a **LSLS** pattern, but the differences between long and short beats were much more moderate than in the case of the subdivisions. The durations relative to the bar ranged from 23.22–26.50 %. The average length of **1** and shortness of **4** could maybe be explained to some extent by the tendency of acceleration in the recording. As this would not explain the average durational positions of the other two beats (**2** tended to be shorter than **3**), it is at most an incomplete model. I conjecture that the durational variance on the beat level is great enough to definitely have non-negligible perceptual effects.

Subdivisions

The subdivisions showed a striking variance of durations and clearly identifiable recurring patterns. The durations ranged from 97–220 ms which illustrates that they are far from being played isochronously. Perceptual relevance is apparent and easily verified by listening to the recording. The basic pattern, which recurred relatively consistently from beat to beat, was **MSML**, with average relative durations of approx. 25.5—19.5—24—31 (in % of beat duration). The long duration of metric position **a** was also observed, and stressed as one of the most important sub-syntactic timing phenomena, by Christiane Gerischer for Bahian *samba* [Gerischer, 2003, p. 180], [Gerischer, 2006, p. 106]. The relative durational value, as well as the one for position *beat*, is consistent with her results and also with the ones derived by Gérald Guillot in his analyses of other *maracatu* recordings. The positions **e** and **+** seem to have a greater variety, as well within these *genres* as between them.

Looking in a more detailed way at the data, well pronounced differences between the four beats of the bar become evident; in some metric positions of the bar the variance of the subdivision durations was significantly greater than in others. This could be interpreted as the phrasing being free to a greater or lesser extent in different positions of the bar. Also, the average relative durations of certain subdivisions were markedly different in different beats, the most salient example being **2+**, which was on average around 1.5–4 %-points longer than **1+**, **3+**, and **4+**.

Concluding Remark

I must underline again that in being confronted with simple formulaic results like (6.5), I think it is important not to forget that in such broadly averaged

values, a lot of important information about the sub-syntactic timing of notes is *not* represented anymore. In this example, interesting differences between the four beats of the bar could be observed that I will further examine in the other resordings. I think the idea of quasi-isochronous subdivisions is already rare today, which is an achievement I would attribute to a large degree to the empiric and theoretic microrhythmic works of the past few decades. The results of this study led me to suspect that the conception of quasi-isochronicity at the beat level, which on the other hand is, I think, still prevailing in the discourse on dance-oriented music, might model *maracatu*, and probably other music as well, in a just as unsatisfying way.

Statements like (6.5) are clearly a lot easier to handle than the 78 note duration values of the example, but the potential drawback is that such statements may mislead to the idea of a *static* microrhythmic model (Section 4.4.4) that is maybe not a lot more accurate than a static *isochronous* model. I feel that in a large part of the microrhythmic literature this is not reflected appropriately. It is true that the actually played note durations fluctuate around the average values given in (6.5), but at this stage, it is not clear at all if not, for example, the precise way in which these fluctuations work is actually more important for the musical idiom *than around which average values* the durations fluctuate.

Chapter 7

Comparative Analysis of All Recordings

7.1 Overview of the Recordings

In Figure 7.1, an overview of the 14 recordings that I used for the analyses is given, all included on the accompanying CD-ROM. Besides the names of the recordings, the name of the player, and in most cases of the rhythm, is provided.

Also, the minimum and maximum tempo is given, in bpm and in terms of the bar duration, as well as the size of the range interval. From these data an idea of the tempo differences between the recordings is given, as well as how strongly the tempo varied within a given recording. Additionally, the global minima, maxima, and ranges are shown.

Finally, the total duration of the recording excerpts is displayed, as are the number of beats and bars of it, and the number of note onsets I measured and hence used as a basis for the analyses.

7.1.1 2012.03.29 Ibura, Interview

Eight of the recording excerpts stem from an interview, [[Leonardo, 2010](#)], that I conducted with Hugo Leonardo, *mestre do batuque* of the *Nação do Maracatu Leão da Campina*, the group that I played with during my field stay in Recife.

During the interview, which took place at his house (in the Ibura neighborhood of Recife), I asked him to play the *caixa* patterns used in *Leão da Campina*. Starting out, using a *caixa* that happened to be around there, he immediately stopped again, because he did not like the tuning of the *caixa*,

Recording	Names		Tempo		Bar		Counts			
	Who	Rhythm	Min	Max	Min	Max	Duration (s, ca.)	# Bars	# Beats	# Onsets
Excerpt										
1	Andresa	Luanda	112,63	117,84	2037	2131	13	6	24	85
2	Andresa	Martello	84,06	94,57	2538	2855	13	5	19	77
3	Charles	no name	99,83	104,34	2300	2404	20	8	32	111
4	Andresa	no name	98,76	107,92	2224	2430	13	6	22	89
2012.03.24	Nathalia	EB	91,37	101,49	2365	2627	57	19	76	268
Jacqueira	Nathalia	EB	90,30	102,08	2351	2658	38	15	60	209
1	Hugo	Alfaia (Vir.)	104,98	115,60	2076	2286	9	4	16	52
2	Hugo	Luanda	77,35	82,76	2900	3103	12	4	16	57
3	Hugo	Malé	95,04	98,33	2441	2525	13	5	20	78
4	Hugo	Martello	74,07	85,12	2820	3240	18	6	24	97
5	Hugo	Parada	92,87	96,60	2485	2584	13	5	20	79
6	Hugo	Luanda (Vir.)	102,68	109,42	2193	2337	25	11	44	160
7	Hugo	Luanda	102,73	105,09	2284	2336	7	3	12	39
8	Hugo	Arrastro	79,28	91,28	2629	3027	23	8	32	120
TOTAL			74,07	117,84	2037	3240	274	105	417	1521

Figure 7.1: Overview of all analyzed recording excerpts.



Figure 7.2: Hugo Leonardo, *mestre* of *Maracatu Nação Leão da Campina*.

which he considered too low. We therefore continued at the nearby *sede* of *Leão da Campina*, with another *caixa*. He still thought it was tuned rather low, but he said that in the context of a *batuque*, when played together with other *caixas*, including higher pitched ones, it would result in an balanced overall sound. That is to say, the tuning of the *caixa* is indeed important. Listening to the recordings, one should recall Hugo's statement referring to the tuning of the *caixa* he used.

This shall just illustrate the fact that the tuning of the *caixas* is important and, when listening to the recordings, put the tuning of the *caixa*, which some listeners might consider rather low, into context.

The way in which Hugo held the instrument and the sticks can be inferred from Figure 7.2.

Leão da Campina is a *maracatu* of the *nação angola*.¹ The main *musical* characteristic that Hugo named in this context was that the *baque angola*

¹All *maracatus-nação*, similar to *candomblé terreiros*, refer to certain 'African' *nações*, in some way connected to the idea of descent from, or cultural/spiritual identification with specific 'African peoples', see [Souza, 2006a]. Apart from *Leão da Campina*, most *maracatus-nação* of Recife understand themselves as *nação nagô*. For example, this is true for *Elefante*, *Leão Coroado*, *Porto Rico*, *Estrela Brilhante (do Recife)*, and *Encanto da Alegria*.

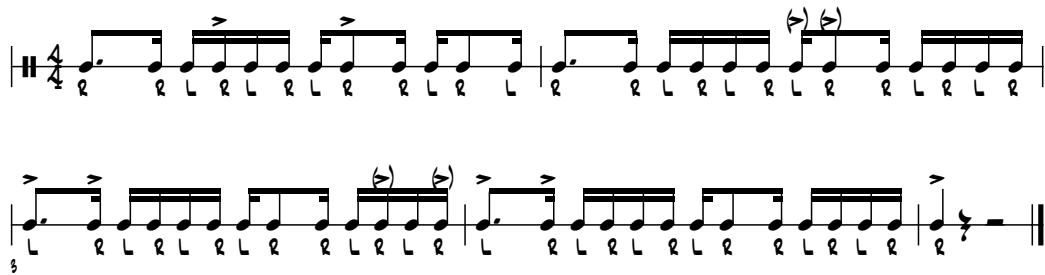


Figure 7.3: Transcription of the recording *2012.03.29 Ibura excerpt 1*, played by Hugo Leonardo. A *viração* pattern for *alfaia* that is used in *Leão da Campina* for the *baque malê*. They call this pattern *baque dos ventos*. Hugo demonstrated it for me playing with his hands on his thighs.

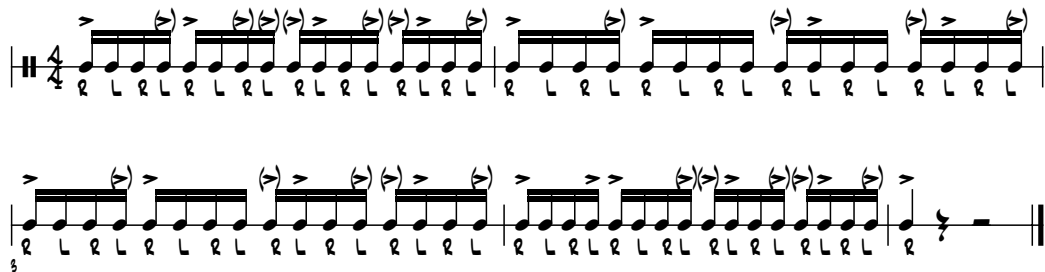


Figure 7.4: Transcription of the recording *2012.03.29 Ibura excerpt 2*, played by Hugo Leonardo. The *caixa* pattern used in *Leão da Campina* for the *baque luanda*.

can be described as “mais agitado”² in comparison to the *baque nagô*, and has an overall slightly faster tempo.

He demonstrated all the basic patterns of the *baques* in *Leão da Campina*’s repertoire, which are *luanda*, *malê*, *martello*, and *parada*. The transcriptions of these examples are given in Figures 7.4 on p. 164 and 7.8 on p. 166 (*luanda*); 6.2 on p. 141 (*malê*); 7.5 on p. 165 (*martello*); and 7.6 on p. 165 (*parada*). For the corresponding *marcação* parts of the *alfaias*, see Figure 3.11 on p. 65.

Moreover, he demonstrated *viração* playing, at the example of *luanda* (Figure 7.7 on p. 166), and the rhythm he would play for *arrastro*, although this *baque* is not played in *Leão da Campina* (Figure 7.9 on p. 167).

Finally, he gave an example for an *alfaia repique* pattern, called *baque dos ventos*³, transcribed in Figure 7.3 on p. 164. This is a rhythm used in

²Port. “more lively”

³Port. “Beat of the Winds”

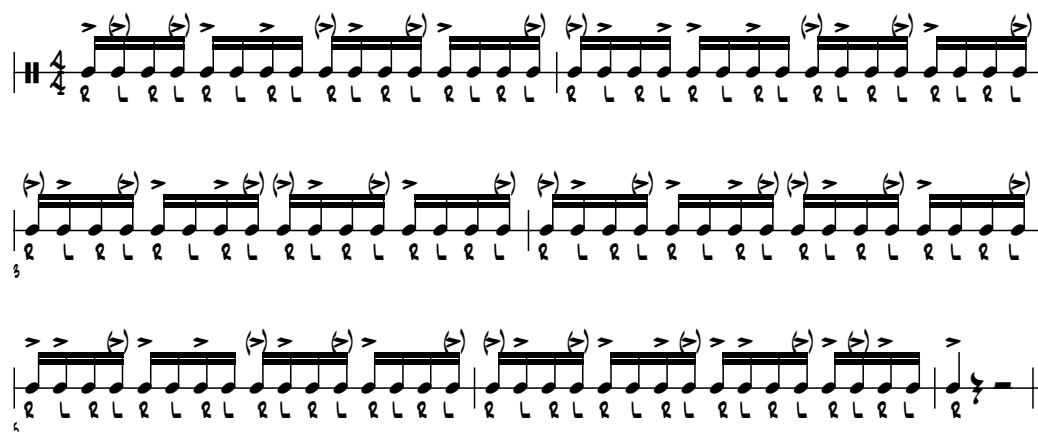


Figure 7.5: Transcription of the recording *2012.03.29 Ibura excerpt 4*, played by Hugo Leonardo. The *caixa* pattern used in *Leão da Campina* for the *baque martello*.

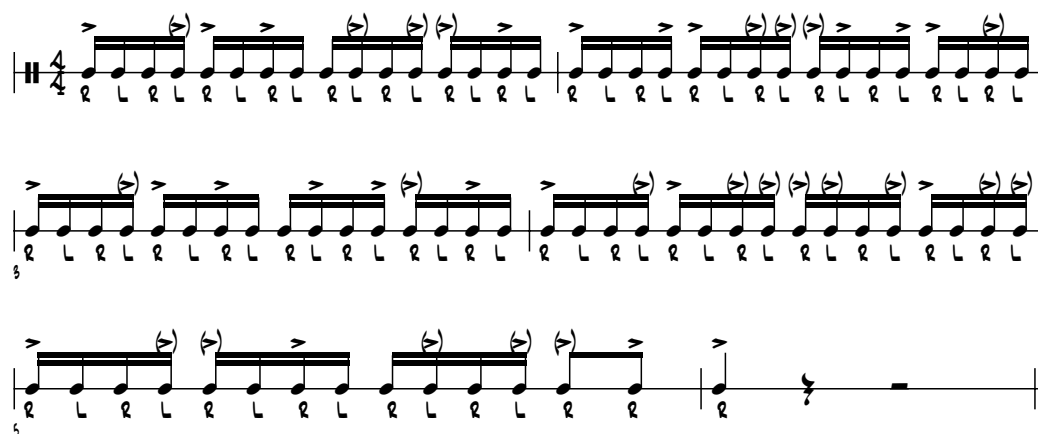


Figure 7.6: Transcription of the recording *2012.03.29 Ibura excerpt 5*, played by Hugo Leonardo. The *caixa* pattern used in *Leão da Campina* for the *baque de parada*.

The transcription consists of six staves of music in 4/4 time. Each staff contains rhythmic notation with accents and 'R' (right) and 'L' (left) labels. The first staff starts with a double bar line and a 4/4 time signature. The second and third staves are marked with a '5' at the beginning. The fourth staff is marked with a '7'. The fifth staff is marked with a '9'. The sixth staff is marked with an '11' and ends with a double bar line.

Figure 7.7: Transcription of the recording 2012.03.29 *Ibura excerpt 6*, played by Hugo Leonardo. An example of *caixa viração* playing as used in *Leão da Campina* for the *baque luanda*.

The transcription consists of two staves of music in 4/4 time. Each staff contains rhythmic notation with accents and 'R' (right) and 'L' (left) labels. The first staff starts with a double bar line and a 4/4 time signature. The second staff is marked with a '5' at the beginning and ends with a double bar line.

Figure 7.8: Transcription of the recording 2012.03.29 *Ibura excerpt 7*, played by Hugo Leonardo. The *caixa* pattern used in *Leão da Campina* for the *baque luanda*.

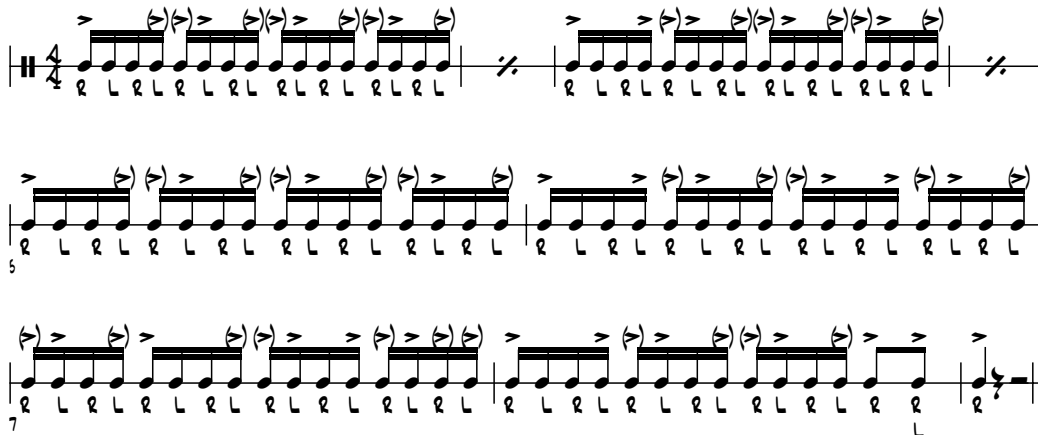


Figure 7.9: Transcription of the recording *2012.03.29 Ibura excerpt 8*, played by Hugo Leonardo. The *caixa* pattern he suggested for the *baque arrastro*, which is not part of *Leão da Campina*'s repertoire.

Leão da Campina as a *viração* for *malê*. He did not use an *alfaia*, but simply demonstrated it by playing with his hands on his thighs. Nevertheless, in the light of my conjecture that specific playing techniques do not have noteworthy influence on the sub-syntactic timing (see my remarks on this in Sections 3.6.5 and 4.5.1), I still used this example to be able to make at least a preliminary comparison between different instruments.

7.1.2 2012.02.16 Ibura, *ensãio de caixas*

The *contra-mestre* and *mestre dos caixas* of *Leão da Campina*, Charles Dayvison, held an *ensãio de caixas* with a few *caixeir@s* of the *nação*, one day before *Leão da Campina*'s *passarela* of the 2012 carnival, in order to remove any possibly remaining doubts or insecurities. As my instrument also was the *caixa*, I was invited to participate as well and had the chance to audio and video tape the *ensãio* [Dayvison, 2012].

From this occasion, I selected four excerpts in each of which only one *caixa* plays alone. One of them, *2012.02.16 Ibura excerpt 3*, transcribed in Figure 7.13 on p. 170, is played by Charles Dayvison. The three other ones, *2012.02.16 Ibura excerpt 1–2* and *4*, transcribed in Figures 7.11, 7.12, and 7.14 on pp. 169–170, are by Andresa Bento, a *caixeira* who participated in the rehearsal. These examples open up the possibility of comparing the *caixa* playing of various *batuqueir@s* of one and the same *batuque*.

The patterns played were *luanda*, including some variations that would classify as *viração* (*2012.02.16 Ibura excerpt 1*); *martello* (*2012.02.16 Ibura*



Figure 7.10: Three *caixeir@s* of *Leão da Campina*. The one to the right, Andresa Bento, plays right-hand lead. Note that she switches the grip of her right stick from matched grip (top picture) to ‘reversed traditional’ grip (bottom picture). Andresa plays on the recordings *2012.02.16 Ibura excerpt 1, 2, and 4*. Charles Dayvison, the *batuqueiro* in the middle of these pictures, is heard on *2012.02.16 Ibura excerpt 3*.

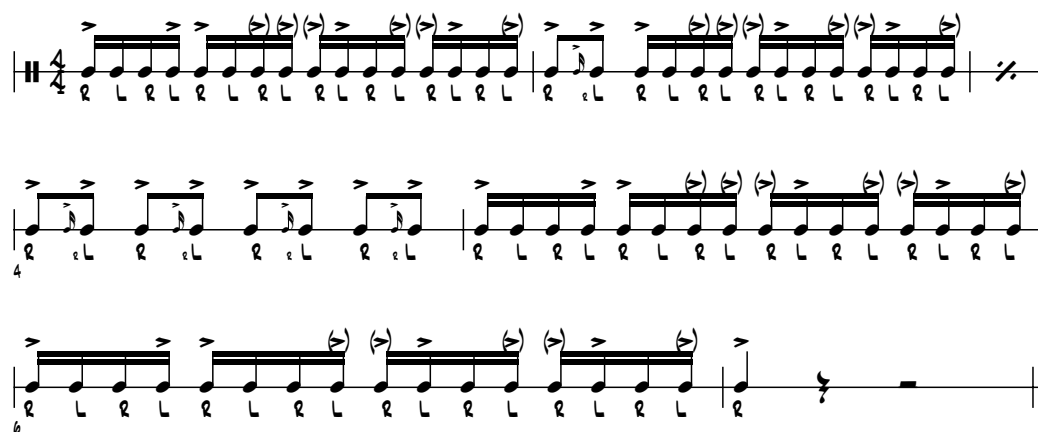


Figure 7.11: Transcription of the recording *2012.02.16 Ibura excerpt 1*, played by Andresa Bento. The *caixa* pattern used in *Leão da Campina* for the *baque luanda*, including some *viração*, or variations, on beats 1 of bars 2 and 3, and throughout bar 4.

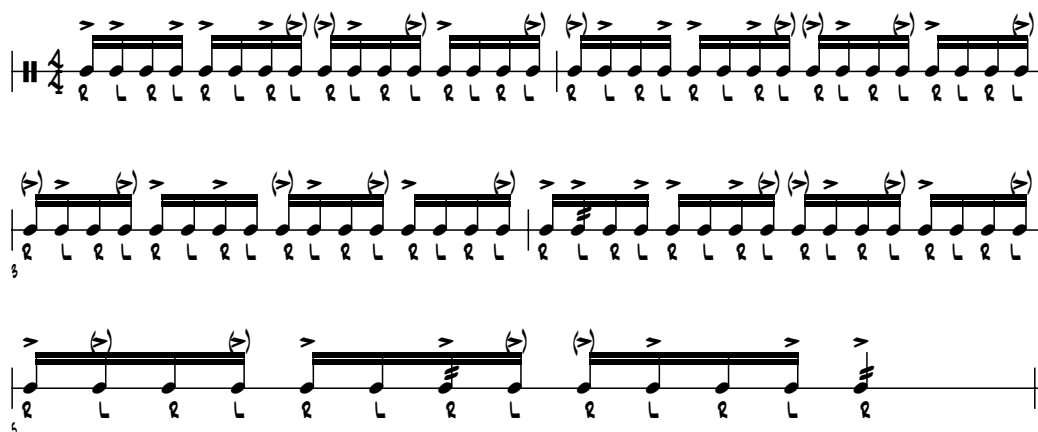


Figure 7.12: Transcription of the recording *2012.02.16 Ibura excerpt 2*, played by Andresa Bento. The *caixa* pattern used in *Leão da Campina* for the *baque martello*.



Figure 7.13: Transcription of the recording *2012.02.16 Ibura excerpt 3*, played by Charles Dayvison. The *caixa* pattern that *Leão da Campina* used in a *baque* or arrangement that had been prepared specifically for the *passarella* of the 2012 carnival, celebrating the group's 15th anniversary.

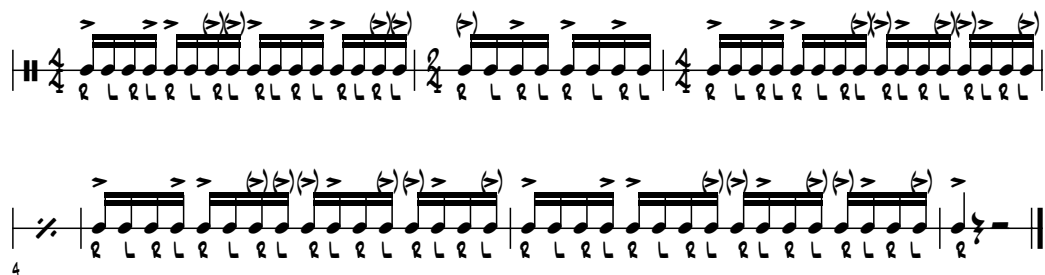


Figure 7.14: Transcription of the recording *2012.02.16 Ibura excerpt 4*, played by Andresa Bento. The *caixa* pattern that *Leão da Campina* used in a *baque* or arrangement that had been prepared specifically for the *passarella* of the 2012 carnival, celebrating the group's 15th anniversary.



Figure 7.15: Nathalia Paixão, *caixeira* of *Estrela Brilhante*

excerpt 2); and the *caixa* part for a specific *baque*/arrangement that *Leão da Campina* had prepared for the *passarela*, to celebrate the group’s 15th anniversary⁴ (2012.02.16 *Ibura excerpt 3–4*).

7.1.3 2012.03.24 Jacqueira, Interview

In order to be able to facilitate at least rudimentary considerations about differences between the sub-syntactic timing in different *maracatus-nação*, I used two excerpts from an interview I conducted with Nathalia Paixão [Paixão, 2012]. *Batuqueira* of the renown *Nação do Maracatu Estrela Brilhante*, she used to be *mestra dos abês* of that group, until she decided to change to *caixa* and is now a regular *caixeira*. The interview took place in a public park in the Jacqueira neighborhood of Recife, and Nathalia demonstrated how the *caixa* was played in her group.

She expressed that on the *caixa*, as opposed to her mastery control of the *abê*, she was still not utterly satisfied with her playing, especially her left hand. She spoke of her *toque* as “muito seco ainda”⁵, and as missing

⁴*Leão da Campina* was founded on July 16, 1997.

⁵Port. “still very dry”

The figure displays four staves of musical notation in 4/4 time, representing two different recordings of 'Jacqueira'. Each staff consists of two measures separated by a double bar line. The notation includes rhythmic patterns with notes and rests, and specific rhythmic notations below the staff: 'R L RR L RL RR L R RL RL' for the 'caixa' pattern and 'R L RL R L RL RL RL RL RL' for the 'convenção' pattern. The top recording (2012.03.24 Jacqueira excerpt 1) features a 'caixa' pattern in the first measure and a 'convenção' pattern in the second, with a 'x6' multiplier. The bottom recording (2012.03.24 Jacqueira excerpt 2) features a 'caixa' pattern in the first measure and a 'convenção' pattern in the second, with a 'x3' multiplier. Both recordings include dynamic markings such as accents (>) and slurs (<).

Figure 7.16: Transcriptions of the recordings *2012.03.24 Jacqueira excerpt 1* (top) resp. *2012.03.24 Jacqueira excerpt 2* (bottom), played by Nathalia Paixão. The basic *caixa* pattern used in *Estrela Brilhante*, alternated with a characteristic *convenção* in bars 4, 8, 12, and 19, resp. 3, 7, 11, and 15.

“cadência”⁶, or “molejo”⁷. To my ears, however, her playing sounded as strong, confident, and ‘swinging’ as the playing of any other of the *caixeir@s* of *Estrela Brilhante* that I heard.

The pattern she played was the one that I heard almost exclusively from *caixeir@s* of *Estrela Brilhante*, possibly with minor variations.⁸ The transcription from the two excerpts *2012.03.24 Jacqueira excerpt 1–2* are found in Figure 7.16 on p. 172. She also repeatedly played a characteristic phrase, or *convenção*⁹, that is used frequently in *Estrela Brilhante*, and which would be mirrored and phrased similarly in the *alfaias*. It is found in bars 4, 8, 12, and 19 of *2012.03.24 Jacqueira excerpt 1*, and bars 3, 7, 11, 15 of *2012.03.24 Jacqueira excerpt 2*.

7.2 Bar Level / Tempo

I want to remind that I modeled the tempo in a specific bar via the duration of that bar (i.e. proportional to the inverse of the absolute bar duration). This amounts to regarding the tempo as being constant over the course of one bar and then suddenly changing at the beginning of the next bar. In my opinion, the tempo would more accurately and ecologically valid be modeled as a smooth (indefinitely differentiable, in particular continuous) function of time, not as a discontinuous step function. But as my main focus lay on the sub-syntactic level, and as I did not find any hints at tempo-dependency of sub-syntactic timing phenomena in the analyzed recordings, I did not examine these relations more closely. Hence the simple model did suffice. Also, a greater amount of data and longer recordings would be needed for such a study. I chose the excerpts in a way I felt suitable for the aim of analyzing the subdivisions; due to their much smaller duration, clearly less material, in terms of absolute duration, is needed for this.

I would like to add, however, that the variations of the bar durations were greater than I expected and, surprisingly for me, despite a continuous tendency towards speeding up that I perceived, not monotonous (i.e. only decreasing *or* increasing). I think that a more detailed analysis on a larger

⁶This Portuguese word, besides signifying “cadence”, can refer to the specific kind of rhythmic motion/temporal properties of a piece of music.

⁷This Portuguese word, of similar meaning to “requebrar-se” or “gingar”, refers to a light, swaying movement, and could maybe be translated by “motion” or “swing”.

⁸Although I never had a chance to observe this, Nathalia told me that in fact other *caixa* patterns are also used in *Estrela Brilhante* for specific *baques*.

⁹Port. “convention”; a pre-determined variation. In this case it is one that would also be reflected in corresponding variations of the other instruments of the *batuque*.

scale, and especially in the context of real performances in the whole ensemble, might give interesting insights.

It appears possible that some of the relatively great variety of the bar durations is due to the short overall lengths of the excerpts; maybe the tempo would stabilize after some time. The fact that the tempo increase tended to be particularly pronounced in the first bars of a recording supports this thesis. Also, in the real performance context of *maracatu batuques*, arrangements in which the tempo increases significantly during the introduction are widespread and rather the rule than the exception. But that the tempo locally also decreased in many cases was quite contrary to my expectations. I want to present at least some data I observed.

Durational Range of the Bar Level

The total range of durations for a $\frac{4}{4}$ bar over all examples was 2037–3240 ms, corresponding to a tempo range of 74.1–117.8 bpm.¹⁰ The tempo ranges of the various recordings are listed in Figure 7.1 on p. 162. These range intervals, measuring how strongly the tempo changes within a given recording, had sizes between 2.4–12 bpm (tempo) resp. 53–421 ms (bar duration). That the recordings varied greatly in length explains these different interval sizes to a certain degree.

Tempo Increase

The overall tendency in all recordings was an increase in tempo, but this did not happen monotonously: Comparing neighboring bars in all recordings, in 67 out of 91 cases (73.6 %) the tempo increased, in the remaining 24 (26.4 %) it decreased. Disregarding one particular recording for a moment,¹¹ the maximal tempo increase from one bar to the next was +4.2 bpm (corresponding to a –161 ms change of bar duration), the maximal tempo decrease –3.1 bpm (+77 ms). I also calculated the *average* change from bar to bar¹², which ranged between 0.9–3.54 bpm (21–79 ms), but with very high standard

¹⁰In this range different recordings at different tempos are juxtaposed, that cannot be compared directly. The only intention of presenting these numbers is to give an overall idea of the magnitude for the durations involved.

¹¹In *2012.03.29 Ibura excerpt 4* the tempo increase was particularly strong, peaking at +5.6 bpm (resp. –229 ms for bar duration) from one bar to the next, the average rate of change being +3.5 bpm (–105 ms) per bar.

¹²I used the absolute values, in order to prevent the decreases and increases to level each other out.

deviations up to 2 bpm (60 ms).¹³ The total average over all recordings was 1.7 bpm (44 ms); standard deviations: 1.4 bpm (42 ms).

Disregarding the first bars of 6 of the 14 recordings, where the tempo increase was especially strong, i.e. more than +3 bpm (or more than -100 ms), the numbers resulted a bit nicer: Now the average values were only 0.6–2.68 bpm (12–74 ms), and the standard deviations a little more moderate, but still reaching peak values of 1.4 bpm (36.41 ms). The total average over all recordings now was 1.4 bpm (36 ms); standard deviations 1.1 bpm (29 ms).

Perceptual Relevancy

What is the perceptual effect of durational differences of this magnitude? According to a 1995 experimental study by Friberg and Sundberg, the smallest humanly detectable timing difference in a series of quasi-isochronous sound events with IOIs of 240–1000 ms lies at around 2.5 % (taken from [Pfleiderer, 2006, p. 55]). Although the durations of a bar in our case are higher, this might provide a basis for conjectures.

Duration differences of successive bars up to 60 ms¹⁴ were rather frequent in the analyzed recordings (in 64 out of 91 cases, i.e. 70.3 %). Higher values occurred occasionally (in the remaining 27 cases, i.e. 29.7 %). I also calculated the difference of the duration of a given bar relative to the duration of the previous bar, since different absolute durations are perceived differently at different tempi. In 69 out of the 91 comparisons (75.8 %), the difference in length was ≤ 2.5 %, in only 22 cases (24.2 %) greater than 2.5 %.

Moreover, in our situation the IOIs between the first notes of successive bars are 2.5 times as great as in the Friberg/Sundberg study (2037–3240 ms). I would speculate that timing differences become more difficult to detect if the intervals are longer. In contrast to the clinical laboratory situation of the experiments, a lot of musical timing information, rapidly changing durations of the sixteenth notes, is constantly present in between. I strongly suspect that this also makes it more difficult to detect timing differences.

¹³Observe that these standard deviations are not able to offer information about the direction of the change (i.e. whether the tempo increased or decreased); the corresponding values of the standard deviations not using absolute values in the calculations were obviously even higher.

¹⁴At 100 bpm, which was among the faster tempos of the examined recordings, the duration of an isochronous bar is 2400 ms, of which 60 ms is 2.5 %.

Interrelation with Syntactic Patterns

In only one case, I was able to explain some of the temporal variations by the musical phrases that were played. In the recordings *2012.03.24 Jacqueira excerpt 1–2*, the basic pattern is interrupted with bars in which a certain variation, or *convenção*, is played (bars number 4, 8, 12, 19 resp. 3, 7, 11, 15). This *convenção* in all cases conditioned an increase in tempo, followed by a decrease when going back to the basic pattern in the subsequent bar. The magnitude of this, however, was still not very coherent. The durational differences tended to be longer than in other bars of the two recordings, but there were also exceptions to this.

On the other hand, I never noticed in any performance of a *maracatu batuque* that different tempi would condition different patterns. Within a given *batuque*, the same patterns seem to be used at all played tempi. In particular, this was true for the recordings I examined.

Conclusions

It seems not very probable that over the duration of a whole bar the durational fluctuations I measured have great perceptual relevance. Moreover, apart from the overall tendency of a slight decrease in bar duration (which I modeled as an stepwise increase in tempo) in most of the recordings, and the especially strong tendency of speeding up at the beginning of the recordings, which was in some cases easily detectable by ear, I was not able to discern neither any recurring structure or patterns in the varying bar durations, even less so than in the case of the metric level of beats, nor noteworthy differences between the recordings. This seeming randomness adds to the suspicion that, apart from the overall sense of a tempo increase, often particularly pronounced at the beginnings of the recordings, and the systematic variations detected in the recordings *2012.03.24 Jacqueira excerpt 1–2* that corresponded to macrorhythmic phrasing, the sub-syntactic durational differences on the bar level might be of minor importance.

7.3 Beat Level

I examined the absolute durations of the beats and the durations relative to the bar to which they belonged. In particular, I wanted to check the validity of the **LSLS** hypothesis developed during the example recording examined in Section 6.3.1.

For all the analyses conducted below, I could not find any noteworthy consistent differences of any of the results when looking more specifically

only at specific recordings, or all recordings played by a specific person, as compared to considering all recordings simultaneously.

Durational Range of the Beat Level

The total durational beat duration over all recordings was 490–870 ms; the longest beat in any recording was almost twice as long as the shortest. Compare this to the range of bar durations of 2037–3240 ms: according to these bar lengths, isochronous beats would have a much smaller durational range of only 509–810 ms.

The total range of the relative beat durations $d\%$, as a percentage of the bar to which they belong, was 22.9–27.8 %, hence 4.9 %-points wide.¹⁵ These numbers illustrate that the real variety of beat durations is significantly greater than a quasi-isochronous beat model would imply. Let us hence try to explore the structure of the variations and find possibly existing patterns.

Durational Change from Beat to Beat

The total range of the durational change from a beat to the next was –123 to +87 ms. To get a better feeling for the magnitude of the absolute durational change from beat to beat, I counted in how many cases the (absolute value of the) difference to the previous beat was at most (resp. greater than) a certain fixed value. The results are displayed in Table 7.1

Table 7.1: Total count over the 14 recording excerpts of all the instances in which the durational change from the preceding beat was at most (resp. greater than) 6, 15, or 40 ms. The results are displayed in percentages

Beat	1	2	3	4
$\leq 6 \text{ ms}$	22.47	18.45	21.36	28.16
$> 6 \text{ ms}$	77.53	81.55	78.64	71.84
$\leq 15 \text{ ms}$	51.69	35.92	51.46	54.37
$> 15 \text{ ms}$	48.31	64.08	48.54	45.63
$\leq 40 \text{ ms}$	92.13	79.61	88.35	94.17
$> 40 \text{ ms}$	7.87	20.39	11.65	5.83

It can be seen that two successive beats in relatively few cases differ *at most* 6 ms in length, and likewise relatively seldom *more* than 40 ms. The strongest durational differences can be observed when going from beat **1** to **2**, where

¹⁵Excluding the recording with an exceptionally wide range, *2012.02.16 Ibura excerpt 2*, the range over the other 13 recordings was significantly smaller, only 23.2–27.1 %, hence 3.9 %-points wide.

both very small changes are a little rarer and very strong changes noticeable more frequent than for the other three beats.

The *averages* of the absolute values¹⁶ of the beat-to-beat change ranged from 8–55 ms, over all four beats of all recordings, with fairly high standard deviations of 4–33 ms. I also calculated the arithmetic mean of these averages over the 14 recordings to give an idea of the magnitude of the average change from beat to beat. To a certain degree it can be inferred from the data in Table 7.2 that the durational change with respect to the preceding beat is greater for some beats than for others.¹⁷ There, again, tends to be a relatively great change going from **1** to **2**, and also a comparatively small change going from **3** to **4**. Observe, however, that the high values of the standard deviation indicate substantial differences between the recordings.

Table 7.2: Arithmetic means μ and standard deviations σ (in ms) over the 14 recording excerpts of the average absolute durational change from the preceding beat, calculated for all four beats separately.

Beat	1	2	3	4
μ	19	31	21	16
σ	8	16	11	7

Relative Durational Change from Beat to Beat

Motivated by the Friberg/Sundberg study cited above about perceptibility of durational variations, and in correspondence with similar considerations already made for the bar level in the previous section, I looked at the changes from beat to beat in terms of a percentage of the former beat, and checked whether they were greater or smaller than 2.5 %.

The maximum value for these changes over all recordings was 15.5 %, the means (calculated separately for each recording and all four beats of the bar) ranged from 1.19–9.79 %.

The trend already observed in Table 7.2 in the previous section, that the durational change going from **1** to **2** tended to be especially pronounced, can also be inferred from Table 7.3 below; in the other three cases, the two categories ‘at most’ and ‘greater than’ 2.5 % are more balanced.

¹⁶Absolute values were used to prevent leveling out between positive (getting longer) and negative (getting shorter) values. These average values were calculated over all beats of a certain metric position of a recording, e.g. the average durational change going from beat **1** to **2** in a given recording.

¹⁷Remember that the direction of this change cannot be inferred anymore from this data, due to the use of absolute values.

Table 7.3: Total count over the 14 recording excerpts of all instances where the durational change from the preceding beat was at most (resp. greater than) 2.5 % of the duration of the preceding beat.

Beat	1	2	3	4
$\leq 2.5\%$	48	36	53	57
$> 2.5\%$	41	67	50	46

In total, in 48.7 % of all cases this change was $\leq 2.5\%$ of the former beat duration, but in 51.3 % greater than 2.5 %. Compare this to the corresponding numbers presented above for the bar level: there, in only 24.2 % of the cases the durational change was greater than 2.5 % of the duration of the former bar. Combined with the fact that now durations of the magnitude only $\sim 1/4$ as great as in the case of the bar level are involved,¹⁸ the results of Friberg/Sundberg let it appear probable that the durational variety on the beat level may have much greater perceptual relevance than in the case of the bar level.

Longer/Shorter Beats

I also compared the absolute durations of successive beats directly and counted in how many cases each of the four beats of the bar were longer or shorter than its preceding beat. Surprisingly, as can be inferred from Table 7.4, for beats **1**, **2** and—to a lesser extent—**4**, there was a relatively clear tendency towards one of the two relations: 73 % of beats **1** were longer than the preceding **4**,¹⁹ whereas 77.7 % of beats **2** were shorter than the preceding **1** and 60.2 % of beats **4** were shorter than the preceding **3**. Between beats **3** and **2**, however, the comparisons were completely balanced: in almost exactly half the cases either beat was longer.

Table 7.4: Total number of beats over all recording excerpts that were longer/shorter than the immediately preceding beat.

Beat	1	2	3	4
Comparisons	89	103	103	103
Longer	65 (73.0 %)	23 (22.3 %)	51 (49.5 %)	41 (39.8 %)

¹⁸Remember the durational range of the beats was 490–870 ms, that of bar durations 2037–3240 ms. The durations used in Friberg/Sundberg’s study were 240–1000 ms. The beat durations are lying within this range, while the bar durations are not.

¹⁹Comparing the relative durations $d_{\%}$ of the beats instead of the absolute ones, this affects the longer/shorter analysis only at the border of neighboring bar, i.e. for the comparisons between beat **1** and the preceding **4**. The tendency for beat **1** was even much stronger then: in 88.8 % of the cases was $d_{\%}(\mathbf{1}) \geq d_{\%}(\mathbf{4})$ (for the preceding beat **4**).

Shorter | 24 (27.0 %) | 80 (77.7 %) | 52 (50.5 %) | 62 (60.2 %)

Summarizing, the following tendencies for neighboring beats emerge. Except for (7.2), they are supporting the theory of a possible recurring **LSLS** pattern. Alternatively, the overall tendency of acceleration in the recordings, as discussed in Section 7.2, could explain (7.1) and (7.3) but not (7.4).

$$d(\mathbf{1}) > d(\mathbf{2}) \quad (7.1)$$

$$d(\mathbf{2}) \sim d(\mathbf{3}) \quad (7.2)$$

$$d(\mathbf{3}) > d(\mathbf{4}) \quad (7.3)$$

$$d(\mathbf{4}) < d(\mathbf{1}) \quad (7.4)$$

Average Relative Beat Durations

The spread of the relative beat durations $d_{\%}$ was moderate: all standard deviations (calculated for each recording and the four beats of the bar separately) were at most 0.89 %-points. It hence made sense to compute the arithmetic means and compare the resulting average values.

In 12 out of the 14 recording excerpts,²⁰ the maximum average relative beat duration was that of beat **1**. In general, the average relative durations of beats **1** and **3** tended to be longer than those of beats **2** and **4**. This was the case for 7 out of the 14 excerpts;²¹ in the remaining 7 only one of **2** or **4** was among the shorter beats. This can be summarized as follows: dividing the four average relative beat durations of each recording into the two longer and the two shorter ones, **1** and **3** together occupied 75 % of the spots in the ‘longer’ category and 25 % of the spots in the ‘shorter’ category (for **2** and **4** together: vice versa). A tendency towards the following pattern can hence be derived:

$$d_{\%}(\mathbf{1}) > d_{\%}(\mathbf{3}) > d_{\%}(\mathbf{2}), d_{\%}(\mathbf{4}) \quad (7.5)$$

Again, these findings could partly be a result of the fact that the tempo tended to speed up in all the recordings. If the tempo increase was, say, linear—as noted above, the situation was not that simple, as the tempo increase was not even monotone—this would leave the average relative beat durations getting successively shorter: $d_{\%}(\mathbf{1}) > d_{\%}(\mathbf{2}) > d_{\%}(\mathbf{3}) > d_{\%}(\mathbf{4})$.²² The relative length of **1** and shortness of **4** could hence be explained in that way, but not the tendency of $d_{\%}(\mathbf{2}) < d_{\%}(\mathbf{3})$.

²⁰All excerpts except *2013.02.16 Ibura excerpt 1* and *2013.03.29 Ibura excerpt 1*.

²¹Namely *2013.02.16 Ibura excerpts 2, 3*, *2013.03.24 Jacqueira excerpt 1*, *2013.03.29 Ibura excerpts 3, 4, 5, 7*.

²²This order was actually the case in only two of the 14 recordings.

I then averaged again across all recordings, calculating the arithmetic means of the average relative beat durations of the 14 recordings. The results, displayed in Table 7.5 further support (7.5), although the numerical differences are of small magnitude: the difference between the minimum and maximum value in Table 7.5 is only 1 %-point. At a beat duration of, say, 600 ms, this corresponds to only 6 ms. But, of course, means naturally tend to level differences out. It seems possible, that such subtle differences of the mean values do have perceptual relevance, especially when considered in conjunction with the less ambiguous data from Table 7.4.

Table 7.5: Arithmetic means μ and standard deviations σ in %-points of the average relative beat durations $d\%$.

Beat	1	2	3	4
μ	25.64	24.65	25.00	24.70
σ	0.45	0.45	0.39	0.25

Conclusions

All in all, the beat durations were less constant than I had prospected. Judged by ear, the beat always felt very steady, altering only to a occasional gradual tempo increase. I found this discrepancy between my aural impression and the statistic data interesting, even more so as *maracatu* is regarded as a music that is usually danced to. In this function, like most music accompanying dance, it is broadly regarded to have a steady, quasi-isochronous, beat.

Maybe this conception must be rethought. In reality, differences of ≥ 6 ms in the absolute durations between neighboring beats were rather the rule than the exception. In roughly half of all cases the difference was ≤ 15 ms. I chose this number, since 15 ms are 2.5 % of 600 ms, which was a medium value for the beat duration in the examined recording excerpts. In the light of the general discussion on the perceptually relevant magnitude of timing phenomena (Section 4.5), and in particular the Friberg/Sundberg study which qualifies timing differences of more than 2.5 % as perceivable, it would appear as an inappropriate simplification to subsume this data under a quasi-isochronous beat. I do not think that these timing differences are negligible.

Moreover, there were definite signs of recurring patterns, that were, although not as consistent as on the subdivisions level, still clearly quantifiable. In my opinion, this supports the thesis that the timing variety on the beat level is perceptually relevant.

The findings presented in this section hint at a recurring **LSLS** pattern of the beat durations from bar to bar, but with only moderately articulate durational differences and a medium high constancy. Consequently, it could be speculated about parallels and differences to bar-wise recurring beat patterns in other groove-related music.²³ In my opinion, the **LSLS** pattern could possibly be related to the overall tendency of tempo increase somehow, but can definitely not solely explained in this way, since beat **1** was in $\frac{3}{4}$ of the cases longer than the preceding **4**, and beat **3** in at least half the cases longer than the preceding **2**.

Two other finding which consistently resulted from various statistic tests was that beat **1** tended to be the longest, and the durational change going from beat **1** to **2** was especially great..

I was not able to detect any correlations between these potential patterns and the musical phrases played, the person who played, or the *nação* the person belonged to.

7.4 Subdivision Level

My main interest lay on the metric level of the subdivisions. Here, the fluctuations are of a still higher magnitude and displayed much more coherent and easier to detect patterns than in the case of the beat or bar level.

7.4.1 Durational Range

To start out, I looked at the range of the absolute durations we are dealing with on the subdivision level. The total range over all recordings and metric positions was 65–272 ms. This is a span of 1 : 4.2. For the beat level, this range was 490–870 ms (1 : 1.8), for the bar level it was 2037–3240 ms (1 : 1.6). These simple numbers already clearly show that the durational variety on the subdivision level was, as expected, much greater than on the beat or bar level.

The durational ranges (in ms) for the 16 metric positions separately, as well as the combined ranges for the four subdivision positions over all four beats of the bar, are displayed in Table 7.6.

²³For example the aforementioned **SLSL** pattern which Richard Rose concluded for the *swing* groove in *jazz*. In this case, beats **2** and **4** being the longer ones. Cited in [Pfleiderer, 2006, p. 268] and [Klavacs, 2011, p. 10].

Table 7.6: Total range over all recording excerpts of the absolute durations in ms of the sixteenth notes. First separately for all 16 metric positions of the bar, then totalized over all four beats for *beat*, *e*, *+* and *a* separately.

Beat	Position	<i>beat</i>	<i>e</i>	<i>+</i>	<i>a</i>
1	Range	98–237	68–213	103–199	134–272
2	Range	98–254	65–201	95–218	145–242
3	Range	113–205	92–200	94–196	147–252
4	Range	115–207	83–182	97–202	133–253
Total	Range	98–254	65–213	94–218	133–272

What can be concluded from these data? The shortest sixteenth notes are found on the *e* position, especially on **1_e** and **2_e**, the longest ones on the *a* position. For the latter, it is also evident that the shortest notes found in that position are markedly longer than the shortest notes in the other positions. The differences between the four beats seem moderate, rather the durational distributions for the four subdivisions of a beat seem to more or less recur from beat to beat.

One detail I noted was that the small minimum values for **1_{beat}** and **2_{beat}** both stem from the recordings *2012.03.24 Jacqueira excerpt 1* and *2*, which will in a slightly different context be discussed in more detail in the next section. Excluding these two recordings, the minimum values (**1_{beat}**: 115 ms, **2_{beat}**: 108 ms) were of the same magnitude as for **3_{beat}** and **4_{beat}**.

7.4.2 Longer/Shorter Notes

Once again I took the approach of directly comparing the absolute note durations of successive notes.²⁴ Several interesting points can be made about the resulting data, presented in Table 7.7.

Clear Overall Tendencies

For 15 out of the 16 metric subdivision positions, there was a very clear tendency whether the note was played shorter or longer than the subsequent note. The ratios of these two categories were close to 1 : 3 or even more unambiguous. There still were different degrees of coherence: the metric positions with a ratio of more than 1 : 9 were **1₊**, **1_a**, **3₊**, **3_a**, and **4_a**.

²⁴Remember, only pairs of sixteenth notes have been used in this. If occasionally an eighth note was played or the onset of the successive note undetectable, then these longer durations have been discarded from the analysis. This is the main reason why the sample size for the various metric positions differs so strongly.

Table 7.7: Total count over all recording excerpts of the number of sixteenth notes that were longer resp. shorter than the next sixteenth note. First separately for all 16 metric positions of the bar, then summed over all four beats for *beat*, *e*, *+* and *a* separately.

Beat	Position	<i>beat</i>	<i>e</i>	<i>+</i>	<i>a</i>
1	Sample	64	64	95	78
	Longer	51 (79.7 %)	19 (29.7 %)	2 (2.11 %)	72 (92.31 %)
	Shorter	13 (20.3 %)	45 (70.3 %)	93 (97.89 %)	6 (7.69 %)
2	Sample	79	79	101	103
	Longer	64 (81.0 %)	11 (13.9 %)	21 (20.8 %)	91 (88.35 %)
	Shorter	15 (19.0 %)	68 (86.1 %)	80 (79.21 %)	12 (11.65 %)
3	Sample	72	72	72	72
	Longer	53 (73.6 %)	35 (48.6 %)	0 (0 %)	72 (100 %)
	Shorter	19 (26.4 %)	37 (51.4 %)	72 (100 %)	0 (0 %)
4	Sample	60	60	85	56
	Longer	47 (78.3 %)	15 (25.0 %)	12 (14.1 %)	53 (94.6 %)
	Shorter	13 (21.7 %)	45 (75.0 %)	73 (85.9 %)	3 (5.4 %)
Total	Sample	275	275	353	309
	Longer	215 (78.2 %)	80 (29.1 %)	35 (9.9 %)	288 (93.2 %)
	Shorter	60 (21.8 %)	195 (70.9 %)	318 (90.1 %)	21 (6.8 %)

Different Idiosyncrasies?

Concerning the striking exception of position **3_e**, with almost exactly the same number of notes being played longer and shorter than the subsequent **3₊**, I looked through the various recordings to find an explanation. It turned out that this was mainly due to the data from the two recordings *2012.03.24 Jacqueira excerpt 1* and *2012.03.24 Jacqueira excerpt 2*, which are played by a *caixeira* from another *maracatu-nação* than all other recordings. This was the first clear evidence I found during the analyses hinting at different idiosyncrasies in the sub-syntactic timing between different players. On those two recordings, there were huge differences in the timing between the four beats of the bar. Especially the timing of *e* and *+* of beat **3** differed a lot from their timings in the other three beats. For the other metric positions there were no big changes when leaving out the data from those two recordings, but for **3_{beat}** and **3_e**, the numbers now looked as follows.

Table 7.8: Total count, over those recording excerpts played by members of the group *Leão da Campina*, of sixteenth notes that were longer resp. shorter than the next sixteenth note. Positions *beat* and *e*, first of beat **3**, then summed over all 4 beats.

Beat	Position	<i>beat</i>	<i>e</i>
3	Sample	43	43
	Longer	39 (90.7 %)	14 (32.6 %)
	Shorter	4 (9.3 %)	29 (67.4 %)
Total	Sample	208	208
	Longer	175 (84.1 %)	57 (27.4 %)
	Shorter	33 (15.9 %)	151 (72.6 %)

In Table 7.8, the numbers show a clearer tendency than in Table 7.7, concerning 3_{beat} and *beat* summed over all four beats, as well as for 3_e (now 1 : 2 instead of 1 : 1 which it was before) and *e* summed over all four beats. It is apparent that the question whether position *e* or + is played longer than in the other three cases still cannot be answered unambiguously. Going back to Table 7.7, a second interesting point in this respect is that *e* of beat **2**, as opposed to *e* of the other three beats, *did* have a particularly unambiguous tendency of being played shorter than 2_+ .²⁵ After the conclusion from Section 7.3, that the durational change going from beat **1** to beat **2** tended to be greater than in the other three cases, this is another timing subtlety concerning differences between beat **2** and the other three beats. As before, I was not able to detect specific relations between this and the macro-rhythmic structure, in particular the different accent patterns played in the various recordings (except for the mentioned one). To me, there were no apparent differences, regarding the phenomena described here, between the different recordings.

Conclusions

For (almost) every pair of successive sixteenth notes a clear tendency could be deduced, indicating which of them is played longer and which shorter. This pattern, recurring from beat to beat, was:

$$d(\mathbf{a}) > d(\mathbf{beat}) > d(\mathbf{e}) \quad (7.6)$$

$$d(\mathbf{e}) < d(\mathbf{+}) < d(\mathbf{a}) \quad (7.7)$$

²⁵In the two recordings *2012.03.24 Jacqueira excerpt 1–2*, this tendency was even stronger, there in 89.5 % of the cases it was $d(\mathbf{2}_e) < d(\mathbf{2}_+)$.

In other words, **e** is the shortest, **a** the longest subdivision, and **beat** and **+** are lying in between. This is exactly the observation already made in Section 6.3.2 for one specific recording. The resulting pattern, expressed in durational categories, is **MSML**.

A striking exception to this pattern was found in *2012.03.24 Jacqueira excerpt 1–2*, played by Nathalia, from another *maracatu-nação* than in all other recordings: she tended to play the notes on position **3_e** longer than those on position **3₊** (the same was not true for the other three beats).

The degree to which the pattern of (7.6) and (7.7) was consistent and unambiguous, however, varied significantly: $d(\mathbf{2}_e) < d(\mathbf{2}_+)$ was a much clearer tendency in all recordings than $d(\mathbf{e}) < d(\mathbf{+})$ in the other three beats. Especially salient in their coherency were:

$$\begin{aligned} d(\mathbf{1}_+) &< d(\mathbf{1}_a), d(\mathbf{1}_a) > d(\mathbf{2}_{beat}) \\ d(\mathbf{3}_+) &< d(\mathbf{3}_a), d(\mathbf{3}_a) > d(\mathbf{4}_{beat}) \\ & d(\mathbf{4}_a) > d(\mathbf{1}_{beat}) \end{aligned}$$

Incidentally, all of these results correspond very well with something Christiane Gerischer deduced for the timing of the four subdivision positions in Bahian *samba*, she reports: “Unterschiede habe ich vor allem in der Ausprägung der zweiten und dritten Intervalle gefunden.”²⁶ [Gerischer, 2003, p. 180].

Furthermore, it seems worth noting that subtle differences in the timing between beat **2** and the other three beats could be inferred. This reminded of the finding from Section 7.3 that between **1** and **2**, greater durational differences were found than between other successive metric beat positions.

7.4.3 Quantification of the Relative Note Durations

Let us now turn our attention to the quantitative description of the relative subdivision durations. I will first discuss the relative durations $d_{\%,1}$, calculated with respect to the duration of the beat of which the respective subdivision is part. Afterwards, I will take a look at the durations $d_{\%,2}$, calculated in relation to the bar duration, and point out differences and similarities between the two calculation methods.

Range and Distribution of the Relative Note Durations

In Figures 7.17–7.20, the minimum, average and maximum relative note durations $d_{\%,1}$ are depicted in graphic form for all recording excerpts. Although

²⁶Ger. “Differences I have found mainly in the characteristics of the second and third interval.”

the relative sixteenth note durations had, measured over all recordings and metric positions, a huge total range of 11.1–43.3 % of the duration of the beat during which they were played, it can be inferred from those graphs that the arithmetic means (average values) seem to accurately represent the tendencies of each recording. The usually moderately wide total ranges of the relative note durations are distributed relatively evenly around the mean values in most recordings.

Also, the standard deviations of the (cumulative) note durations of all 16 metric positions were fairly moderate for all recordings: They were ≤ 4 %-points in all but three cases. Usually, they were in the range of 1–3 %-points.

What becomes apparent immediately from the graphs, is that in most recordings there is a pattern, with clear local minima and maxima, that recurs in each of the four beats. The most consistent exception to this is beat **2**, where in several cases the pattern is varied or distorted (see for example the graphs to *2012.02.16 Ibura excerpt 2*, or *2012.03.29 Ibura excerpt 2–5*).

Ranges of the *Average Relative Note Durations*

In Table 7.21, the arithmetic means for each recording and each subdivision position are listed.²⁷ What can be extrapolated from all those numbers? First of all, by far the strongest tendency was the following: The highest average values, for (almost) *all* beats in *all* recordings (the only exception being beat **2** of *2012.02.16 Ibura excerpt 2*), can be found for **a** the fourth sixteenth note of each beat. These are also the only notes with average durations of 30 % of the beat or more, in a few extreme cases above $\frac{1}{3}$ of the beat. The shortest average duration found for **a** (apart from the aforementioned exception) is 27.8 %.

At the other end of the scale, average values of 20 % and lower (down to ~ 17.5 %) are only found in the **e** positions (two exceptions here being **3+** and **4+** of *2012.03.29 Ibura excerpt 2*). However, there are also average values as high as 24 % of slightly above for **e**.

The range of the averages for the *beat* position is ~ 22 – 28 % (at both ends of the scale I have excluded the one most extreme exception, these were **1_{beat}** of *2012.03.24 Jacqueira excerpt 1* and **2_{beat}** of *2012.03.29 Ibura excerpt 1*). For the **+** position, it was ~ 20 – 27 %. Summarizing, we found the following ranges. Remember that the total ranges over all instances, not over the mean values only, show an even much greater variety and are obviously substantially wider.

²⁷The blanks in the recording *2012.03.29 Ibura excerpt 1* can be explained by the fact that some subdivision positions were never played in that excerpt.

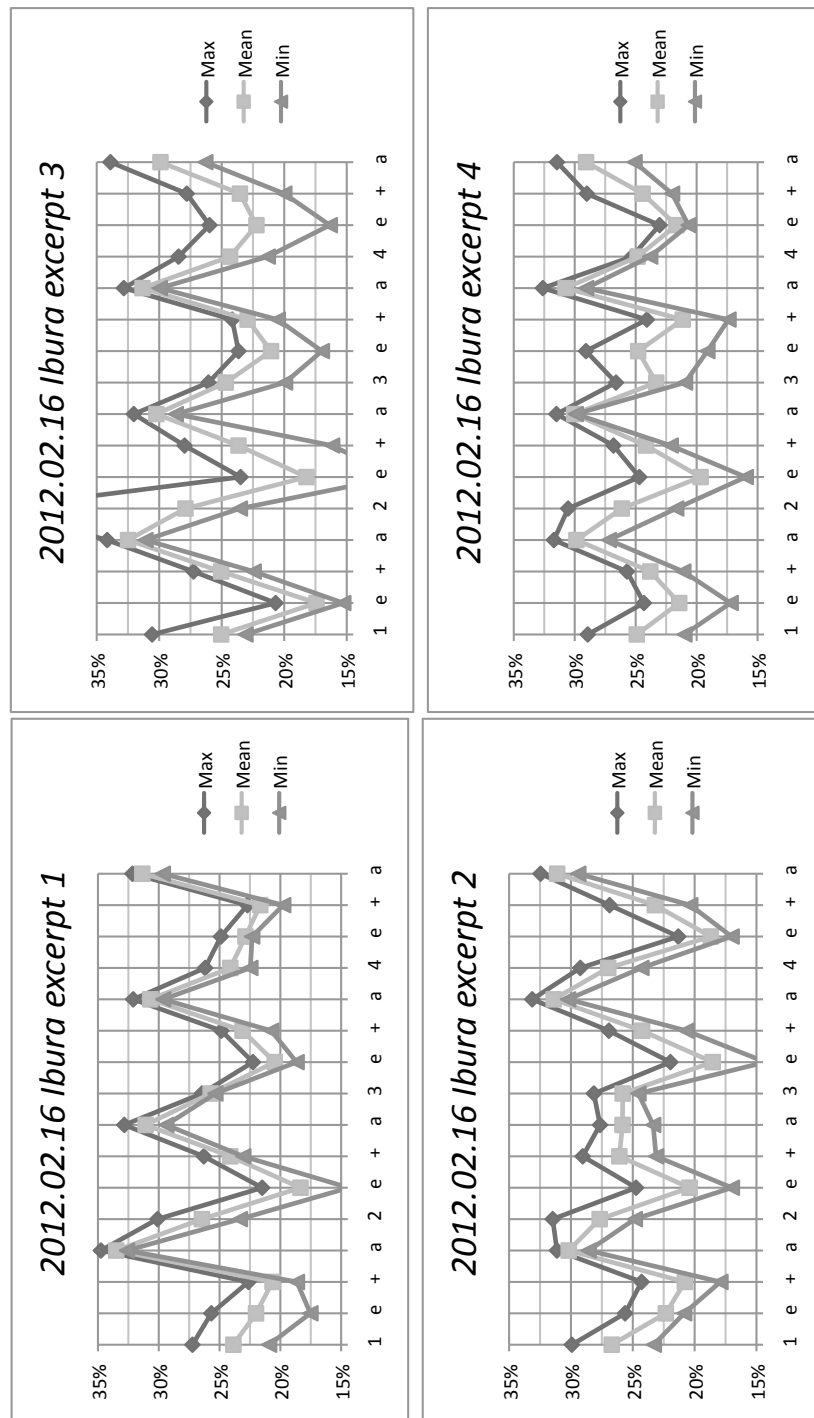


Figure 7.17: *2012.02.16 Ibura excerpt 1–4*—Minimum, Average, and Maximum Values of the Average Relative Note Durations $d_{%,1}$ (relative to beat duration).

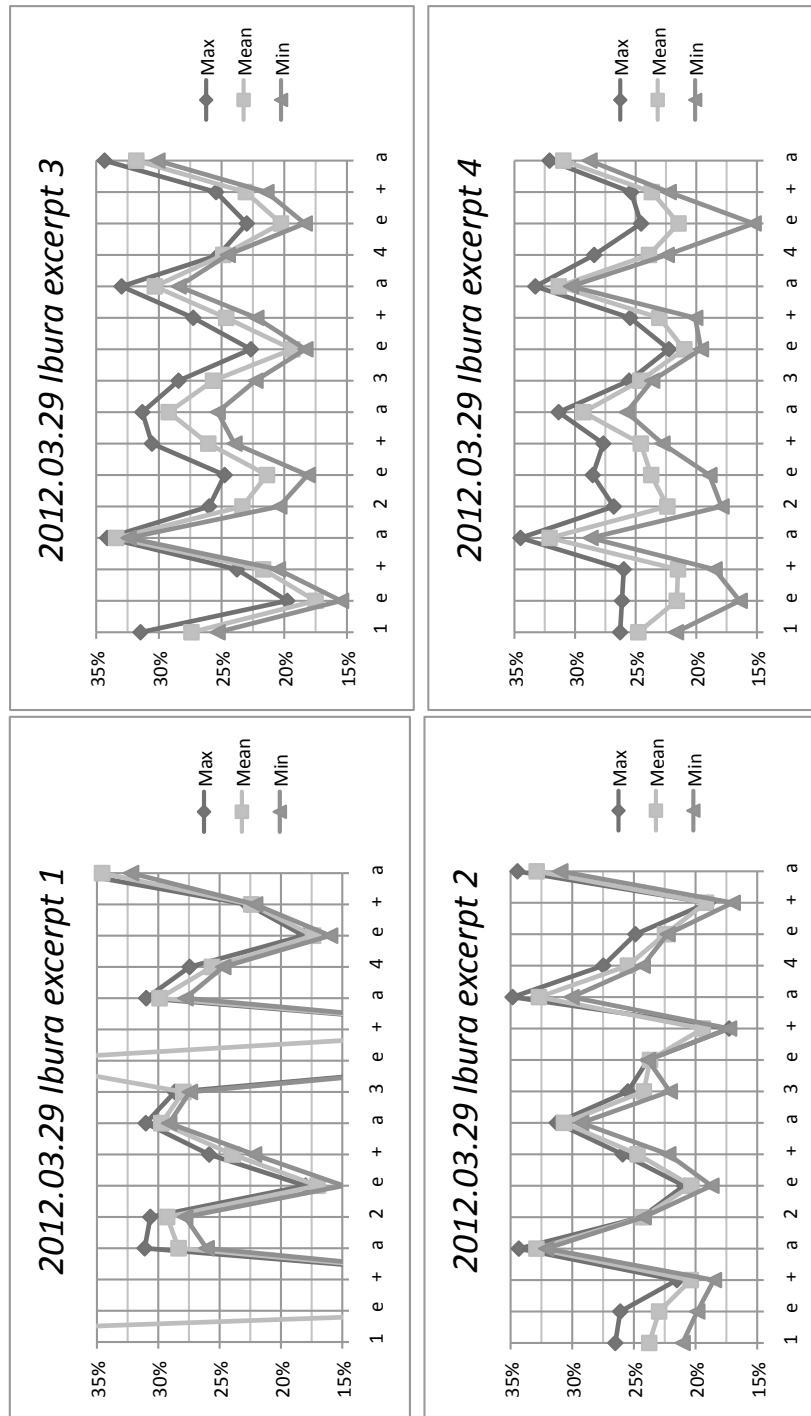


Figure 7.18: *2012.03.29 Ibura excerpt 1–4*—Minimum, Average, and Maximum Values of the Average Relative Note Durations $d_{%,1}$ (relative to beat duration).

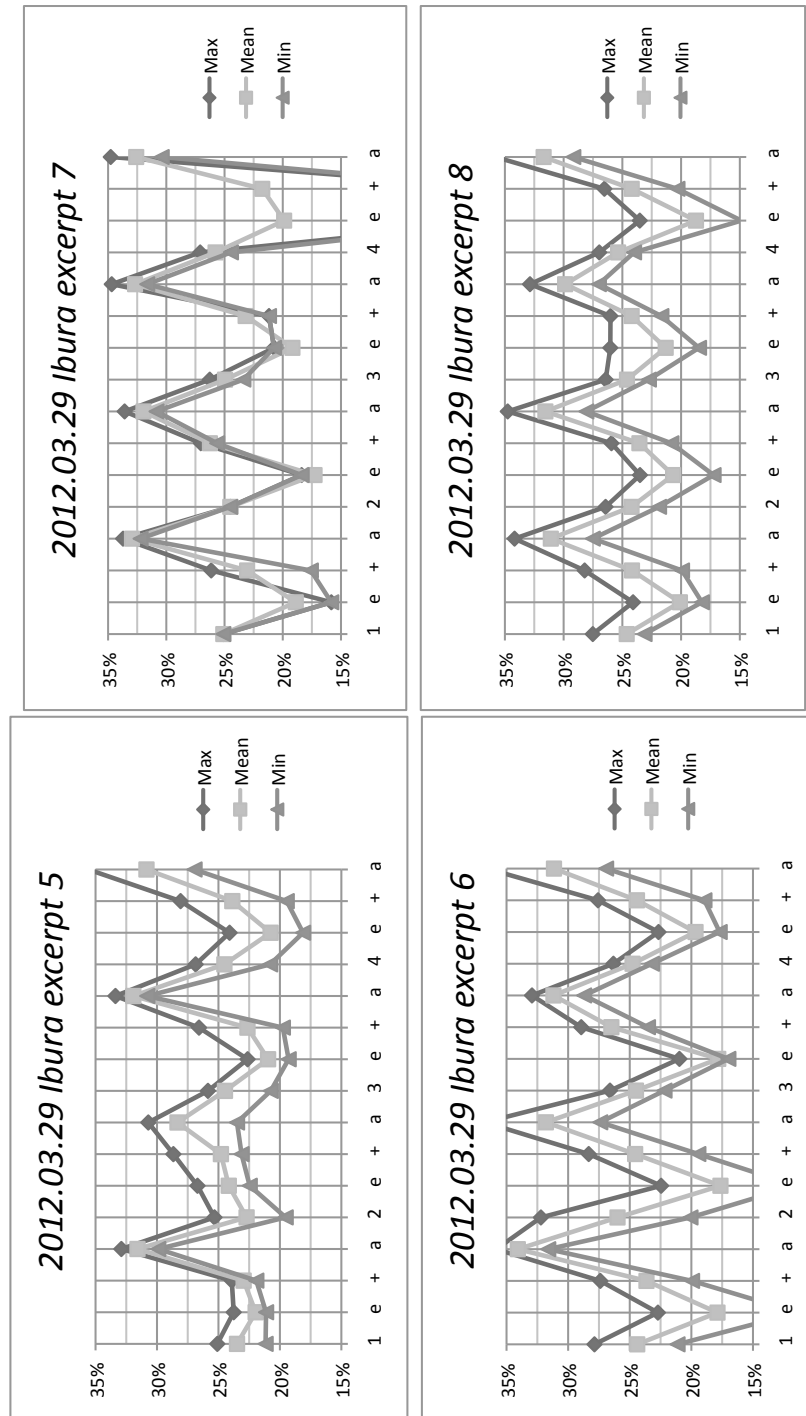


Figure 7.19: *2012.03.29 Ibura excerpt 5–8*—Minimum, Average, and Maximum Values of the Average Relative Note Durations $d_{%,1}$ (relative to beat duration).

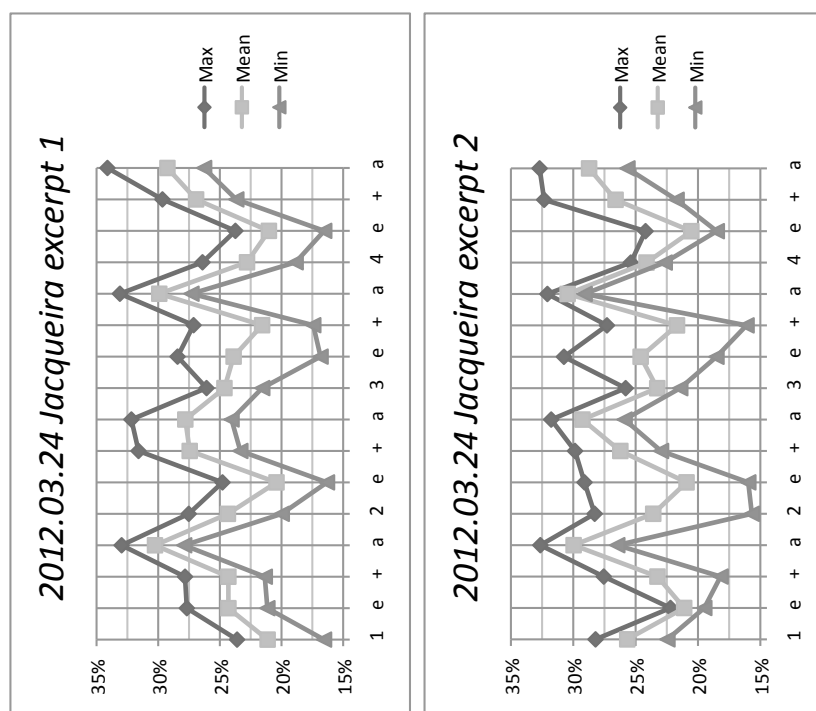


Figure 7.20: *2012.03.24 Jacqueira excerpt 1–2*—Minimum, Average, and Maximum Values of the Average Relative Note Durations $d_{\%,1}$ (relative to beat duration).

Recording	Mean as % of current Beat															
	1	e	+	a	2	e	+	a	3	e	+	a	4	e	+	a
2012.02.16 Iburá excerpt 1	23,86	22,	20,64	33,5	26,45	18,35	24,12	31,08	25,73	20,46	23,11	30,7	24,12	22,87	21,66	31,35
2012.02.16 Iburá excerpt 2	26,7	22,33	20,79	30,18	27,67	20,41	26,08	25,83	25,82	18,54	24,25	31,4	26,98	18,69	23,21	31,12
2012.02.16 Iburá excerpt 3	25,05	17,42	25,04	32,49	27,9	18,22	23,65	30,22	24,68	21,06	22,93	31,34	24,33	22,22	23,55	29,9
2012.02.16 Iburá excerpt 4	24,91	21,43	23,8	29,86	26,14	19,67	24,15	30,04	23,32	24,79	21,14	30,75	24,84	21,66	24,43	29,07
2012.03.24 Jacqueira excerpt 1	21,13	24,31	24,31	30,26	24,35	20,41	27,44	27,8	24,63	23,88	21,57	29,91	22,8	21,02	26,93	29,25
2012.03.24 Jacqueira excerpt 2	25,67	21,11	23,25	29,97	23,59	20,92	26,23	29,27	23,27	24,6	21,68	30,45	24,13	20,54	26,61	28,73
2012.03.29 Iburá excerpt 1	71,65			28,35	29,28	17,02	23,95	29,75	27,96	42,14		29,9	25,62	17,38	22,41	34,58
2012.03.29 Iburá excerpt 2	23,76	22,95	20,38	32,91	24,29	20,33	24,71	30,67	24,19	23,69	19,41	32,7	25,49	22,48	19,15	32,89
2012.03.29 Iburá excerpt 3	27,4	17,51	21,69	33,4	23,34	21,38	26,06	29,22	25,68	19,36	24,63	30,32	24,87	20,27	23,07	31,8
2012.03.29 Iburá excerpt 4	24,78	21,61	21,51	32,1	22,38	23,72	24,58	29,32	24,62	20,99	23,05	31,34	23,9	21,46	23,66	30,97
2012.03.29 Iburá excerpt 5	23,49	21,97	22,95	31,59	22,71	24,16	24,8	28,33	24,47	20,96	22,64	31,93	24,52	20,75	23,87	30,86
2012.03.29 Iburá excerpt 6	24,39	17,88	23,64	34,08	25,99	17,64	24,56	31,8	24,5	17,82	26,49	31,19	24,77	19,66	24,42	31,15
2012.03.29 Iburá excerpt 7	25,11	18,88	23,06	32,95	24,51	17,27	26,25	31,97	24,96	19,17	23,19	32,68	25,77	19,88	21,76	32,59
2012.03.29 Iburá excerpt 8	24,63	20,1	24,18	31,09	24,22	20,68	23,55	31,55	24,61	21,31	24,21	29,87	25,36	18,73	24,2	31,7
Min	21,13	17,42	20,38	28,35	22,38	17,02	23,55	25,83	23,27	17,82	19,41	29,87	22,8	17,38	19,15	28,73
Max	27,4	24,31	25,04	34,08	29,28	24,16	27,44	31,97	27,96	24,79	26,49	32,7	26,98	22,48	26,93	34,58
Interval Size	6,28	6,89	4,66	5,74	6,90	7,14	3,90	6,14	4,70	6,98	7,08	2,83	4,19	5,10	7,78	5,85

Figure 7.21: Average relative subdivision durations $d_{\%,1}$, as percentages of the respective beat they belong to, of all analyzed recording excerpts.

Table 7.9: Approximate ranges for the *average* relative note durations $d_{\%,1}$, given as percentage of the beat duration.

$d_{\%,1}$	beat	e	+	a
Range	22–28 %	18–24 %	20–27 %	28–33 %

Order of the Average Relative Note Durations

Let us see in detail which notes were on average played longer and shorter. I counted how often in Table 7.21, of altogether 54 beats in 14 recordings, various patterns occurred. As already stated, position **a** was in all but one case the longest. **e** was on average the shortest sixteenth note in 41 of these 54 beats (i.e. $\frac{3}{4}$). The following durational pattern for the average relative note durations within a given beat was by far the most frequent:

$$d_{\%,1}(\mathbf{e}) < d_{\%,1}(\mathbf{+}) < d_{\%,1}(\mathbf{beat}) < d_{\%,1}(\mathbf{a}) \quad (7.8)$$

This pattern can be observed in 32 out of 54 cases. Looking through the various examples in a little more detail yields an interesting point: There were unmistakable differences between the recordings played by members of the group *Leão da Campina* (all excerpts recorded in *Ibura*) on the one side, and 2012.03.24 *Jacqueira excerpt 1–2*, the two recordings played by Nathalia from *Estrela Brilhante* on the other. For the latter, (7.8) is not typical. Rather, the following pattern (7.9) is found on beats **2** and **4**, whereas a variety of different patterns is found on the other two beats. It can be seen that the positions of **beat** and **+** are interchanged in the chain of inequalities.

$$d_{\%,1}(\mathbf{e}) < d_{\%,1}(\mathbf{beat}) < d_{\%,1}(\mathbf{+}) < d_{\%,1}(\mathbf{a}) \quad (7.9)$$

In the recordings from *batuqueir@s* from *Leão da Campina*, we had (7.8) in 31 out of 46 cases (i.e. $\frac{2}{3}$). In the playing of Hugo Leonardo, captured on 2012.03.29 *Ibura excerpt 1–8*, a distinction between different beats of the bars can be found, too. On beat **2**, there were two patterns, (7.9) and (7.10), both distinct from (7.8) in the majority of cases (5 out of 8), whereas on the other three beats the generally more frequent pattern (7.8) is found in almost all examples (with only 1 or at most 2 exceptions for each beat). Also, he tended to play the notes on **2+** longer than the notes on **+** of the other three beats; the average values for six of the eight recordings demonstrate this. For recordings by the other members of *Leão da Campina*, similar data cannot be observed.

$$d_{\%,1}(\mathbf{beat}) < d_{\%,1}(\mathbf{e}) < d_{\%,1}(\mathbf{+}) < d_{\%,1}(\mathbf{a}) \quad (7.10)$$

Recording	Total			
	beat	e	+	a
2012.02.16 Ibura excerpt 1	25,17	20,79	22,59	31,45
2012.02.16 Ibura excerpt 2	26,78	20,06	23,6	29,55
2012.02.16 Ibura excerpt 3	25,49	19,78	23,68	31,05
2012.02.16 Ibura excerpt 4	24,87	21,77	23,44	29,93
2012.03.24 Jacqueira excerpt 1	23,91	21,6	25,18	29,31
2012.03.24 Jacqueira excerpt 2	23,78	22,11	24,51	29,61
2012.03.29 Ibura excerpt 1	27,62	17,27	24,47	30,64
2012.03.29 Ibura excerpt 2	24,51	21,78	21,42	32,29
2012.03.29 Ibura excerpt 3	25,46	19,49	23,87	31,19
2012.03.29 Ibura excerpt 4	23,92	21,94	23,2	30,93
2012.03.29 Ibura excerpt 5	23,76	22,	23,58	30,67
2012.03.29 Ibura excerpt 6	24,87	18,33	24,73	32,06
2012.03.29 Ibura excerpt 7	25,15	18,24	24,07	32,54
2012.03.29 Ibura excerpt 8	24,68	20,13	24,15	31,03
Min	23,76	17,27	21,42	29,31
Max	27,62	22,11	25,18	32,54
Interval Size	3,86	4,84	3,76	3,24

Figure 7.22: Average values of the relative note durations $d_{\%,1}$, taken over all beats of each recording.

In the recordings of *Leão da Campina*, in 38 out of 46 cases **e**, **+** were averagely the two shorter subdivisions and **beat**, **a** the two longer ones. But the distribution was very unequal: For beats **1**, **3**, **4** this held in almost all cases (beats **1**, **4**: all recordings, beat **3**: 9 out of 11), whereas for beat **2** this was true in only exactly half the recordings (6 out of 12). These exceptions, again, stem from the recordings of Hugo Leonardo, whereas for the other *batuqueir@s* from *Leão da Campina*, I could not detect such pronounced beat-wise differences in the timing structure.

Total Over Four Beats

Let us now take a look at the resulting relative subdivision durations if averaging across all beats of a recording. Again, clearly distinct tendencies can be gathered from the data of Figure 7.22 for the recordings *2012.03.24 Jacqueira excerpt 1–2*, by a Nathalia of *Estrela Brilhante*, and the other recordings, all by *batuqueir@s* *Leão da Campina*. The durational pattern of the former is as follows:

$$d_{\%,1}(\mathbf{e}) < d_{\%,1}(\mathbf{beat}) < d_{\%,1}(\mathbf{+}) < d_{\%,1}(\mathbf{a}) \quad (7.11)$$

In all other recordings, hence those by *batuqueir@s* of *Leão da Campina* (except *2012.03.29 Ibura excerpt 2*, where the positions of **+** and **e** in the

following chain of inequalities are interchanged), the emerging pattern is the following one:

$$d_{\%,1}(\mathbf{e}) < d_{\%,1}(+) < d_{\%,1}(\mathbf{beat}) < d_{\%,1}(\mathbf{a}) \quad (7.12)$$

When taking again the arithmetic means of the average values displayed in Figure 7.22 over all recordings, disregarding the substantial differences between them, the following are the durational values that result:

Table 7.10: Arithmetic means of the average relative note durations from Figure 7.22, taken over all recordings.

<i>beat</i>	<i>e</i>	+	<i>a</i>
25.0 %	20.4 %	23.8 %	30.9 %

Interpersonal Considerations

Motivated by the interpersonal variants that have become apparent so far, by the use of relative note durations, which facilitate a finer description of sub-syntactic timing patterns, I took a closer look at the average relative note durations taken over all recordings by a certain *batuqueir@*. I calculated the arithmetic means of the average values given in Figure 7.21 over all recordings by a certain *batuqueir@*. The results are given in Table 7.11.

Table 7.11: Average values of the relative note durations $d_{\%,1}$, taken separately for the *batuqueir@s*, taken over all instances of a certain metric sixteenth note position in the recordings of that *batuqueir@*.

Beat	Position	<i>beat</i>	<i>e</i>	+	<i>a</i>
1	Nathalia	23.4 %	22.7 %	23.8 %	30.1 %
	Hugo	24.8 %	20.1 %	22.5 %	32.1 %
	Andresa	25.2 %	21.9 %	21.7 %	31.2 %
	Charles	25.1 %	17.4 %	25.0 %	32.5 %
2	Nathalia	24.0 %	20.7 %	26.8 %	28.5 %
	Hugo	24.6 %	20.3 %	24.8 %	30.3 %
	Andresa	26.8 %	19.5 %	24.8 %	29.0 %
	Charles	27.9 %	18.2 %	23.7 %	30.2 %
3	Nathalia	24.0 %	24.2 %	21.6 %	30.2 %
	Hugo	25.1 %	20.5 %	23.4 %	31.2 %
	Andresa	25.0 %	21.3 %	22.8 %	31.0 %
	Charles	24.7 %	21.1 %	22.9 %	31.3 %

4	Nathalia	23.5 %	20.8 %	26.8 %	29.0 %
	Hugo	25.0 %	20.1 %	22.8 %	32.1 %
	Andresa	25.3 %	21.1 %	23.1 %	30.5 %
	Charles	24.3 %	22.2 %	23.6 %	29.9 %
Total	Nathalia	23.8 %	21.9 %	24.9 %	29.5 %
	Hugo	25.0 %	19.9 %	23.7 %	31.4 %
	Andresa	25.6 %	20.9 %	23.2 %	30.3 %
	Charles	25.5 %	19.8 %	23.7 %	31.1 %

The most salient data in this comparison are found on the metric positions **2+**, **3_e**, and **4+**, in all of which Nathalia plays the notes on average substantially longer than the three *batuqueir@s* from *Leão da Campina*. All four consistently play the notes on position **a** longer than the other notes, but Hugo and Charles tend to phrase them even longer than the other two *batuqueir@s*. Hugo also tends to be the one who phrases the notes on **e** shortest, with the exception of beat **2**.

Studying the total numbers of averages taken across all four beats, it is striking how close the values for Hugo and Charles are. Overall, the differences between *batuqueir@s* from *Leão da Campina* are noticeable smaller than the differences between them and Nathalia from *Estrela Brilhante*. This could be attributed to either the macrorhythmic differences between the played patterns, or to different timing strategies which are typically used within the respective *batuques*. In this regard, possibly an examination of for example *alfaia* or *gonguê* playing in subsequent studies could be illuminating, as there, patterns which are identical on the syntactic level are used in both groups.

***Alfaia*-Timing**

Concerning the recording *2012.03.29 Ibura excerpt 1*, in which Hugo Leonardo demonstrated an *alfaia* pattern, basically the same tendencies can be inferred from Figures 7.21 on p. 192 and 7.22 on p. 194 as for his other recordings. Most apparent are differences concerning the exact numerical average values for the metric positions **beat** and **e**: Compared to the other recordings, **beat** tends to be played longer, whereas **e** is especially short. Due to the small amount of data, it seems inappropriate to draw concrete conclusions. Nevertheless, the analysis of this recording supports the conjecture that the basic timing pattern, **MSML**, could be the same for the *alfaia* playing in *Leão da Campina*, possibly with slightly different durational average values.

Comparison of $d_{\%,1}$ vs. $d_{\%,2}$

Finally, what were the differences between the relative durations of the subdivisions, if calculated as a percentage of the beat duration (numbers $d_{\%,1}$) as opposed to $1/4$ of the bar duration (numbers $d_{\%,2}$)? It turned out that they always showed the same tendencies. All analyses in this section lead to the same general results when carried out with either set of relative durations.

The exact numbers naturally differ a little, but not to a degree that would question the overall interpretations that I undertook. The most consistent tendency that I found looking through the body of data is related to the tendency of beats **1** resp. **2** to be especially long resp. short: This has as a consequence $d_{\%,2} \geq d_{\%,1}$ (for the four notes of beat **1**) resp. $d_{\%,2} \leq d_{\%,1}$ (for the notes of beat **2**). Therefore, the tendency of **2+** to have a longer relative duration than **1+**, **3+** and **4+** in the playing of Hugo Leonardo is still sensible, but a little less pronounced than in the case of the numbers $d_{\%,1}$. All of these statements can, for example, be verified for the data that was presented in Table 6.3 on p. 142 and Table 6.4 on p. 146.

The differences between $d_{\%,1}$ and $d_{\%,2}$ were diminished even further when taking arithmetic means. In the resulting average numbers for the relative duration of a certain metric subdivision position, the nuances were only up to 1 %-point (at an average beat duration of 600 ms, this corresponds to 6 ms), in very few cases even slightly below 2 %-points.

When finally considering the arithmetic means taken over four beats, as presented for relative durations $d_{\%,1}$ in Figure 7.22, it became apparent right away that there the differences between $d_{\%,1}$ and $d_{\%,2}$ are practically negligible. In a few exceptional cases they were up to 0.4 %-points, but almost always only ≤ 0.15 %-points. Hence, they were below my error estimates for the whole analysis as discussed in Section 5.6. The marginality of the deviations here is an effect of the circumstance that the differences between $d_{\%,1}$ and $d_{\%,2}$ stem from the non-isochronicity of the beats; when taking averages over all four beats then, roughly speaking, exactly these differences are ironed out.

Nevertheless, $d_{\%,1}$ and $d_{\%,2}$ did show different quantitative nuances in several concrete instances that would need clarification. I am not able to answer which of the two offers more ecologically valid quantifications.

7.5 Summary of the Microrhythmic Analyses

In this analysis, I examined the sub-syntactic timing of some *caixa* recordings of *maracatu-nação*. While focussing on *batuqueir@s* of the *Nação do*

Maracatu Leão da Campina, I also took recordings from a *caixeira* of another *nação*, *Estrela Brilhante*, into account, and further tried a, certainly only rudimentary, comparison with a single recording of an *alfaia* pattern, which I also included.

The aim was to explore the microrhythmic structure, to find recurring patterns, and to point out variational variety, differences and similarities between different recordings and *batuqueir@s*, and salient exceptions to all structural claims. Due to the fact that many microrhythmic studies tend to regard the beat level as quasi-isochronous and to point out recurring patterns from beat to beat, one aspect that interested me in particular, was how accurately this conception represents the actual timing. Preliminary conjectures, serving as a basis for the analyses, had been developed in Chapter 6 along the example of one specific recording, *2012.03.29 Ibura excerpt 3*.

Due to the great amount of information that was presented in this chapter, possibly difficult to overview, in concluding this analysis, I will summarize the most important data, and conclusions I drew from it, in this section.

7.5.1 Overall Characteristics

Analyzed were 14 recording excerpts of a total length of ca. 3.5 m. The onsets of altogether 1521 notes were evaluated. An overview of the recordings is given in Figure 7.1 on p. 162.

Seven recordings, *2012.03.29 Ibura excerpt 2–8*, consisted of the *caixa* playing of *Leão da Campina*'s *mestre*, Hugo Leonardo. Included were all basic patterns used in that group, one that is not part of the repertoire but played in other *maracatus-nação*, and some variational *viração* patterns. In another recording, *2012.03.29 Ibura excerpt 1*, he demonstrated a specific *viração* pattern for *alfaia*, which is used in *Leão da Campina*. The recordings *2012.02.16 Ibura excerpt 1–4* consisted of similar patterns, all from *Leão da Campina*'s repertoire, played by two other *batuqueir@s* of the group, Andresa Bento and Charles Dayvison.

Nathalia Paixão, *caixeira* of *Estrela Brilhante*, is heard on *2012.03.24 Jacqueira excerpt 1–2*, playing a basic *caixa* pattern, alternated with a certain *convenção*, which both are typical for *Estrela Brilhante*.

Transcriptions for all recordings, as well as video frames depicting the playing *batuqueir@s*, were provided in Figures 7.2–7.16 on pp. 163–172, and Figure 6.2 on p. 141. I notated all examples in a $\frac{4}{4}$ meter with quaternary subdivision (sixteenth notes).

7.5.2 Bar Level/Tempo

The bar durations over all examined recordings had a range of 2037–3240 ms (this is a relation between minimum and maximum of 1 : 1.6), the tempo range was 74.1–117.8 bpm.

I modeled the tempo proportional to the bar durations, hence as constant over the course of one bar. Although I think that this is a severe simplification that does not model human perception well, the influences on the analyses seem to have been minimal.

The overall tendency was an increase in tempo, which is, in general, something very typical for *maracatu*, but the development from bar to bar was not monotonous: in around $\frac{1}{4}$ of the cases the tempo actually decreased from a given bar to the next. The durational change from bar to bar ranged between -161 ms and $+77$ ms, with a total average over all recordings of 1.7 bpm (44 ms), or, when discarded a few exceptional peak values at the beginning of recordings, where the tempo increase tended to be especially strong, 1.4 bpm (42 ms). The standard deviations were relatively high: 1.4 bpm (42 ms) resp., in the latter case, 1.1 bpm (29 ms). The only recurring patterns that I found, were:

- An overall increase in tempo, detectable by ear in several cases;
- A tendency towards an especially strong tempo increase at the beginnings of the recordings, in particular during the first bars, which was also in some cases detectable by ear;
- And an increase in tempo in those bars of the recordings *2012.03.24 Jacqueira excerpt 1–2* in which a certain *convenção* is played as a variation to the basic pattern, followed by a decrease in the subsequent bars.

Apart from these, I could not detect neither systematic differences between various players or recordings, nor an underlying structure or pattern according to which the durational increases and decreases fluctuated from bar to bar. Based on an experiment by Friberg and Sundberg from 1995, in which they reported 2.5 % as the minimum durational difference in a series of sounds that is humanly detectable, I came to the conclusion, that, apart from the three points mentioned above, the sub-syntactic timing differences on the bar level are of minor importance.

7.5.3 Beat Level

The (absolute) beat durations over all recordings had a range of 490–870 ms (1 : 1.8); as a percentage of the bar length, the (relative) durations were in the range of 22.9–27.8 % (isochronous beats have a relative duration of 25 % of the bar duration).

The absolute durational changes from a given beat to the next seemed significant. Despite the fact that the durations involved were now only $\sim 1/4$ as compared to the bar level, the total range of these changes was between -123 ms and $+87$ ms, hence of practically the same magnitude as on the bar level. They were to the greatest part in the range of 6–40 ms. The *average* absolute change, calculated for each metric beat position and each recording separately, ranged from 8–55 ms, with relatively high standard deviations of 4–33 ms. The strongest durational change was observed going from beat **1** to **2**, the smallest change going from **3** to **4**.

Motivated by the mentioned study by Friberg and Sundberg, I also looked at the relative durational change of each beat, calculated as a percentage of the duration of the previous beat. Compared to the bar level, these relative changes were ≥ 2.5 % in, on average, twice as many cases, which again strongly supported a much greater perceptual relevancy of the sub-syntactic timing on this metric level. Going from beat **1** to **2**, in even 67 % of the cases the change was ≥ 2.5 %, corresponding to the already stated observation that at this point of the bar the durational differences were particularly pronounced.

I now wanted to check whether the **LSLS** hypothesis for the beat durations would turn out to be accurate, developed along the example analysis of Chapter 6. Comparing the absolute durations of successive beats directly, counting how often either one was shorter or longer, the following tendencies emerged:

$$d(\mathbf{1}) > d(\mathbf{2}); \quad d(\mathbf{2}) \sim d(\mathbf{3}); \quad d(\mathbf{3}) > d(\mathbf{4}); \quad d(\mathbf{4}) < d(\mathbf{1}).$$

The average beat durations, calculated as percentages of the bar, although differing relatively slightly, still showed patterns that were coherent across the greatest part of the recordings. I could infer the following durational tendencies:

$$d_{\%}(\mathbf{1}) > d_{\%}(\mathbf{3}) > d_{\%}(\mathbf{2}), d_{\%}(\mathbf{4}).$$

The calculation of the arithmetic means μ over all recordings of the average relative beat durations, displayed below together with the respective standard deviations σ , pointed at relatively subtle differences, which nevertheless supported the **LSLS** hypothesis:

Beat	1	2	3	4
μ	25.64	24.65	25.00	24.70
σ	0.45	0.45	0.39	0.25

There were two main points I wanted to make. Firstly, the beat durations had a tendency towards a **LSLS** pattern, repeated from bar to bar. Several ways of evaluating the timing all pointed in this direction. However, I want to emphasize again, that this pattern is subject to a non-negligible variational richness, possibly of greater importance than the pattern itself. By indicating in all cases *to what extent* certain recurrences were observed, I hope to have given an idea of *how* flexible or *how* static the sub-syntactic timing on the beat level is.

Secondly, based on the experimental evidence by Friberg and Sundberg, informed by the durational variations in the context of the various numerical ranges concerning perceptual relevancy of timing phenomena provided in Section 4.5, and supported by the fact that relatively clear and recurring systematic timing patterns emerged, I strongly suggest that the sub-syntactic timing on the beat level is perceptually relevant, and that consequently the conception of a quasi-isochronous beat level is not appropriate for the analyzed recordings.

7.5.4 Subdivisions

The absolute durational range of the subdivisions over all beats of all recordings was 65–272 ms (1 : 4.2), hence hugely greater than the respective numbers for the beat and bar level. Already from this little data, the perceptual relevance of the sub-syntactic timing seems obvious. Considering the durational ranges in more detail for all sixteenth notes of the bar separately, indicated clearly that notes in the metric **e** position were the shortest, those in the **a** position the longest ones.

Longer/Shorter Notes

I proceeded with comparing the absolute durations of successive sixteenth notes. In one case, the comparisons between **3_e** and **3₊**, there were striking differences between the recordings of the *batuqueir@s* of *Leão da Campina* on the one hand and Nathalia from *Estrela Brilhante* on the other hand. The latter tended to time these subdivisions as follows:

$$d(\mathbf{3}_e) > d(\mathbf{3}_+)$$

In all other recordings the tendency clearly was towards the inverse inequality. Concerning the remaining fifteen metric positions, tendencies similar for all recordings emerged. These tendencies recurred from beat to beat and can be summarized as follows:

$$\begin{aligned} d(\mathbf{a}) &> d(\mathbf{beat}) > d(\mathbf{e}) \\ d(\mathbf{e}) &< d(\mathbf{+}) < d(\mathbf{a}) \end{aligned}$$

The resulting pattern, expressed in durational categories, is **MSML**. However, the degree to which the above inequalities were consistent across the beats and bars of the various recordings, differed significantly. For example, $d(\mathbf{2_e}) < d(\mathbf{2_+})$ was a much clearer tendency than $d(\mathbf{e}) < d(\mathbf{+})$ for the other three beats. Being another particularity of beat **2**, this reminded of the finding from the beat level analyses that the durational differences between beats **1** and **2** were greater than for the other three pairs of successive beats. Especially salient in their coherency were the following patterns:

$$\begin{aligned} d(\mathbf{1_+}) &< d(\mathbf{1_a}), d(\mathbf{1_a}) > d(\mathbf{2_{beat}}) \\ d(\mathbf{3_+}) &< d(\mathbf{3_a}), d(\mathbf{3_a}) > d(\mathbf{4_{beat}}) \\ d(\mathbf{4_a}) &> d(\mathbf{1_{beat}}) \end{aligned}$$

Durational Quantification

Following, using relative note durations, calculated as a percentage of the beat duration, I tried to establish concrete numbers to quantify the durational differences between the various metric subdivision positions. The standard deviations and minimum–maximum ranges of these relative note durations seemed small enough for being able to reasonably work with the *averages* of the relative durations. The most salient features were:

- the systematic recurrence of a timing pattern from beat to beat,
- if this pattern was altered, this most often occurred on beat **2**;
- the length of notes in one of the four **a** positions, often $\geq 30\%$;
- the shortness of notes in one of the four **e** positions, often $\leq 20\%$.

The durations of positions **beat** and **+** were in between, with **beat** slightly longer than **+**. Ranges for the average relative note durations were as follows (excluding a few peak values):

$d_{\%,1}$	beat	e	+	a
Range	22–28 %	18–24 %	20–27 %	28–33 %

Counting the frequency with which certain durational patterns within a beat occurred, the following pattern turned out as the most common:

$$d_{\%,1}(\mathbf{e}) < d_{\%,1}(\mathbf{+}) < d_{\%,1}(\mathbf{beat}) < d_{\%,1}(\mathbf{a})$$

However, going into more detail, it became apparent that this pattern was predominantly typical for the recordings by *batuqueir@s* of *Leão da Campina*. This was further supported by total averages taken over all four beats. But even here, an exception was found in the playing of Hugo Leonardo, who used the above timing pattern mostly on beats **1**, **3**, and **4**, while distributing the notes of beat **2** in a variety of other ways. Moreover, he systematically played **2+** longer than the notes on the other three **+** positions.

Both of these observations did not apply to the other *batuqueir@s* of *Leão da Campina*, where no noteworthy systematic differences between the timing of the four beats were apparent.

In contrast, Nathalia, of *Estrela Brilhante*, mostly used one pattern on beats **2** and **4**, while using various other timing patterns on the other two beats. This mirrored the macrorhythmic structure of her playing, with a pattern that was $\frac{2}{4}$ long and then repeated with slight variations (see Section 3.6.5). Her pattern for beats **2** and **4** was as follows:

$$d_{\%,1}(\mathbf{e}) < d_{\%,1}(\mathbf{beat}) < d_{\%,1}(\mathbf{+}) < d_{\%,1}(\mathbf{a})$$

Again, the total averages taken over all four beats supported this pattern. These numbers also clearly demonstrated greater timing similarities in the playing of the three *batuqueir@s* of *Leão da Campina* than between their playing and the playing of Nathalia of *Estrela Brilhante*. Taking average values correspondingly, once over the recordings of Nathalia and once over the recordings from *batuqueir@s* from *Leão da Campina*, these are the resulting numbers:

Table 7.14: Arithmetic means of the average relative note durations from Figure 7.22, taken over all recordings by Nathalia of *Estrela Brilhante*, respectively *batuqueir@s* of *Leão da Campina*.

	beat	e	+	a
Nathalia	23.8 %	21.9 %	24.9 %	29.5 %
<i>Leão da Campina</i>	25.2 %	20.1 %	23.6 %	31.1 %

Despite the quantitative differences, and the interchanged positions of **beat** and **+** in the durational order, when expressed in durational categories, using the system of Rainer Polak, I would in both cases describe the resulting

pattern as **MSML**.

Finally, the two calculation methods I used for the relative note durations, as a percentage of the beat ($d_{\%,1}$) of $1/4$ of the bar duration ($d_{\%,2}$), although naturally differing to a certain degree as far as exact quantifications are concerned, always pointed towards the same tendencies. Concerning the exact numerical values, I am not able to say which are more ecologically valid. When calculating average values across all four beats of the bar, however, the differences between the two calculation methods are negligible and mostly lie beneath the error estimates that I gave concerning the precision of the methods I used. Summarizing, the most important points of this analysis seem to have been the following ones.

- A strong tendency towards an **MLMS** pattern of the sixteenth notes was observed, which is repeated from beat to beat.
- Great differences were found concerning the coherence of durational patterns in relation to the various metric positions; in some positions a much greater variety was found than in others.
- Most consistent was that on the metric **a** position the longest notes were found, and on the **e** position the shortest ones, with greater variety concerning the other two positions.
- Substantial timing differences between different *batuqueir@s* were obvious.
- The timing differences between the *batuqueir@s* of *Leão da Campina* were smaller than as compared to Nathalia of *Estrela Brilhante*. This could be related to either the different macrorhythmics of the played patterns or different general timing strategies in the two groups.
- In the playing of Hugo Leonardo, several particularities about the timing within beat **2** were observed, whereas the other *batuqueir@s* of *Leão da Campina* did not tend to systematically vary the timing between the four beats.
- The playing of Nathalia showed a timing structure that recurred after two beats, mirroring the macrorhythmic periodicity of the patterns she played.

Chapter 8

Outlook and Conclusions

When I explained to Nathalia Paixão what kind of studies I wanted to conduct, and asked her about *svingue*, she said that she thought it was very difficult to explain it, as the ‘difference’ is achieved through very small things, “nada”¹, as she put it [Paixão, 2012]. I think that she is absolutely right in this respect. Although I have outlined some of the regularities and tendencies that can be observed in the *caixa* playing of the four *batuqueir@s* of whom I analyzed recordings, I am not sure if I have *explained* anything with this. I am not convinced that the regularities I pointed out belong to the characteristic or essential features of the timing structures of the examined examples. I do not think that programming a beat, based on exact repetitions of the average values I calculated, would yield results that sound like the original music.

However, we are only starting to understand the richness of timing phenomena on the sub-syntactic level, and likewise I have only touched the wide field of study that the microrhythmics of a complex music as that of the *maracatus-nação* of Recife constitute. In the process, I came in contact with many topics whose investigation might be rewarded by illuminating insights into the processes that determine the rhythmic interplay that is at work in large percussion ensembles as a *maracatu batuque*. These topics include interplay within the ensemble, resembling or disparate timing structures between *batuqueir@s*, *batuques*, *baques*, instrumental sections, groups of different size and formation, and tempi.

So what *did* I find? First of all, it should be noted that it was more than obvious that the timing patterns of the recordings I analyzed were not arbitrary but rather followed certain structures and regularities. Although generally, there was a strong tendency towards a sixteenth note scheme that

¹Port. “nothing”

was repeated beat after beat, in some cases there were substantial timing differences between the four beats that should not be ignored.

One of the strongest and most unambiguous tendencies was that **a**, the fourth sixteenth note of the beat, was the longest, with durations more or less constantly close to 30 % of the beat duration, occasionally reaching maximum values of over 33 %.²

The remaining sixteenth notes showed a greater variety of timing patterns, between different recording excerpts, but also from one beat to the next *within* one recording. Interestingly, all of these findings corresponds strongly to what Christiane Gerischer reported for *samba* in Bahia:

Im Besonderen das lange Intervall vor dem Beat prägt auch andere Sambaphrasierungen. Unterschiede habe ich vor allem in der Ausprägung der zweiten und dritten Intervalle gefunden.³
[Gerischer, 2003, p. 180]

In my analyses, the second sixteenth note of each beat, tended to be the shortest one, often reaching durational values of 20 % and below, which once again is something that Gerischer also observed in recordings of Bahian *samba*.

8.1 Comparison with Gérald Guillot's Results

In 2011, French musicologist Gérald Guillot conducted a microrhythmic analysis of excerpts from two *maracatu toadas*, one by the group *Leão Coroado*, the other by *Encanto da Alegria* [Guillot, 2011a]. In Table 8.1, I repeat his results.

Table 8.1: Guillot's 2011 results⁴. The table gives the name of the performing group, the song title, the duration of the excerpt used for the analysis, the number of measured notes (sample size), the average tempo of the excerpt, the average relative durations of the subdivisions (in % of the beat duration), the corresponding standard deviations (in %-points) and a durational category according to the terminology of Rainer Polak.

²This never even remotely seemed to call the quaternarity of the beat subdivision into question, although a durational value of 33.3 % of the beat corresponds to an isochronous ternary subdivision.

³Ger. "In particular the long interval before the beat is also found in other Samba phrasings. Differences I have found mainly in the characteristics of the second and third interval."

<i>Nação</i>	Leão Coroado				Encanto da Alegria			
<i>Toada</i>	<i>Princesa Dona Isabé</i> ⁵				<i>Resplandô Coroou</i> ⁶			
Duration	15.316 s				9.738 s			
# of Notes	96				64			
Av. Tempo	95.26 bpm				100.11 bpm			
	<i>beat</i>	<i>e</i>	<i>+</i>	<i>a</i>	<i>beat</i>	<i>e</i>	<i>+</i>	<i>a</i>
Av.Rel.Dur.	24.95	23.68	21.67	29.71	25.78	21.08	20.09	33.05
Std.Dev.	1.87	3.16	2.13	1.77	1.38	2.02	2.03	1.29
Category	M	S	S	L	M	S	S	L

The numbers from Tables 7.14 on p. 203 as well as the last part of 7.11 on p. 195 are of a format which can be compared to the results of Guillot, representing overall averaged values for the relative durations of the subdivisions, taken over all four beats of the bar. For easier comparison, I also repeat them here, for each of the four *batuqueir@s* and the average values across all recordings by *batuqueir@s* of *Leão da Campina*.

	<i>beat</i>	<i>e</i>	<i>+</i>	<i>a</i>
Nathalia	23.8 %	21.9 %	24.9 %	29.5 %
Hugo	25.0 %	19.9 %	23.7 %	31.4 %
Andresa	25.6 %	20.9 %	23.2 %	30.3 %
Charles	25.5 %	19.8 %	23.7 %	31.1 %
<i>Leão da Campina</i>	25.2 %	20.1 %	23.6 %	31.1 %

Now, what are the similarities and discrepancies? The resulting average values for *beat* are hence relatively close to 25 % in all cases. Also, *a* always shows the greatest values. In the results of Guillot's for both groups, the durations of *e* were on average longer than for *+*, whereas in the cases I examined, it was the other way round. Especially the values I derived for *+* seem significantly higher than in both results by Guillot. Moreover, whereas his results seem to be best described by the categorical subdivision pattern **MSSL**, or maybe, as I would suggest for the case of *Leão Coroado*, **MMSL**, all of mine are pointing towards the pattern of **MSML**.

At this point, I want to emphasize once again that I think the two tables above present simplistic and formulaic results, giving account of the variational richness of the sub-syntactic timing at most very partially. In my

⁴All data is from [Guillot, 2011a, p. 178]. For the sake of better comparison with the results of the present thesis, I calculated the values of the standard values presented in this table from the values of the relative standard deviation found in Guillot's text.

⁵From: [Maracatu Leão Coroado, 2005, track 1, 4:21.909– 4:37.225]

⁶From: [Maracatu Nação Encanto da Alegria, 2006, track 4, 2:18.688–2:28.426]

opinion, it is highly uncertain if, for example, the exact magnitude of those average values is actually more perceptually relevant or characteristic for the music than the succession in which the actual note durations are played longer or shorter than the average values. Moreover, the substantial and systematic timing differences that I found in some cases between the four beats of the bar are not represented in these tables. It is important to bear in mind that the static timing, suggested by average values as presented above, differs in all cases significantly from the actual note placement.

8.1.1 Distinct Phrasings Between *Batuques*?

In the light of the fact that Guillot derived substantially different values for *Leão Coroado* and *Encanto da Alegria*, which corresponds very well to my findings of greater coherence in the phrasing between the *batuqueir@s* of *Leão da Campina* than between them and Nathalia of *Estrela Brilhante*, it seems probable that a specific sub-syntactic timing strategy is one of the features of the music of *maracatu* that characterizes and distinguishes one *batuque* from another.

I believe master percussionist Tarcísio Resende would definitely support this conjecture; the following quote by him, from 2005, is taken from the *Batuque Book* (English translation by Peter Malcolm Keays):

Besides the differences in instrumental formation, the *baque* also changes from one *nação* to another. Each one has its “talk”, its own “swing”. These little differences change according to the beat’s accentuated parts. In various moments, the execution is quite free. [Santos and Resende, 2009, p. 33–34]

There is another, much earlier quote, that I think at least partly also expresses a similar view. It is less explicit than Resende’s statement, and definitely could be rated as referring to other things than sub-syntactic timing as well, like, for example, the sound of the instruments. Nevertheless, I think that microtiming could be one of the phenomena that are described in the following passage, taken from Guerra-Peixe’s 1955 *Maracatus do Recife*:

O estilo individual de um músico ou o de um grupo instrumental executar o seu toque, chama-se “tom”. Daí os populares dizerem-nos certa vez: “O **tom** do toque do Estrela Brilhante é diferente do **tom** do toque do Elefante”.⁷ [Guerra-Peixe, 1980, p. 65]

⁷Port. “The individual style of a musician or an instrumental group performing their *toque*, is called ‘tone’. It is in this sense that the people once told us: ‘The **tone** of *Estrela Brilhante*’s *toque* is different from the **tone** of *Elefante*’s *toque*.’”

The characteristic individuality and identity of the *maracatus-nação* of Recife and their *batuques* is a thing of great importance to many *maracatuzeir@s*, and was often pointed out to me. In Chapter 3, I have briefly mentioned issues like group size, instrumentation, formation, tuning, positioning of the instrument, grip, sticking, musical syntax, variety of accentuation, and embellishments like *flams* and *press strokes*. They all are constitutional for the identity of a *maracatu batuque*, as are overall appearance, choreography, the individuality of all *batuqueir@s* that take part, and many more aspects. I think that the sub-syntactic timing is yet another thing to be included in this list.

8.1.2 Resembling Phrasing Within The *Batuque*?

It should be noted that in Guillot’s study, it is not detailed which points in time exactly were used for the statistics, in particular, if a specific instrument was used as a reference. The numbers seem to rather represent an overall tendency within the ensembles. This might be based on a general tendency towards resembling phrasing throughout the whole ensemble, that Guillot conjectures:

[...] chacun des enregistrements présente une extrême cohérence générale (une forme de “convergence” [...] qui semble caractériser le *batuque*).⁸ [Guillot, 2011a, pp. 177–178]

However, in an earlier study on a smaller scale, from 2005, Guillot did explicitly measure timing differences between *caixa* and two different *alfaias*, pointing out five spots in each of which notes placed on the same syntactic position were timed differently in different instruments. He quantified these differences at 23 ms, 25 ms, 44 ms, 15 ms [Guillot, 2005, p. 9 (Section “Analyse agogique”)], reaching a peak value of 58 ms in one instance [Guillot, 2005, p. 12 (Section “Analyse du suingue brasileiro”)]. About this last passage he remarked:

La forme d’onde [...] montre clairement la désynchronisation entre 3 des instruments les plus importantes en terme de volume sonore: la *caixa* [...] et les deux *alfaias* [...].⁹ [Guillot, 2005, p. 12]

⁸Fr. “[...] all the recordings show an extreme general coherence (a form of ‘convergence’ [...] that seems to characterize the *batuque*).”

⁹Fr. “The waveform [...] clearly shows the desynchronization between 3 of the most important instruments in terms of volume: the *caixa* [...] and the two *alfaias* [...]”

Microrhythmic timing differences of the reported magnitude are definitely great enough to have perceptual effects, see Section 4.5. I think that more detailed studies are required in order to understand and accurately model the interplay of the instruments within the *batuque*. In microrhythmic studies concerning the *jazz* rhythm section, a number of empiric studies has been dedicated specifically to the examination of the relation between the sub-syntactic timing of just the two instruments of bass and ride cymbal, rewarded by a deeper understanding of a multifaceted process of great intricacy, see for example [Prögler, 1995], [Butterfield, 2006], [Butterfield, 2010a], [Klavacs, 2011]. Given the fact that such a great number of instruments are involved in a *maracatu batuque*, I think it is most difficult to make conjectures about how, for example, the sub-syntactic interaction between various *caixas* playing syntactically identical patterns, between *alfaias* playing *marcação* as opposed to playing *viração* patterns, or between different groups of instruments, could be structured, and in how far the underlying processes in different *batuqueir@s* correspond or differ. I think it is well possible that the differences in the microtiming between different instruments are a decisive and characteristic feature of the temporal structure of the music of the *maracatus-nação*.

Nevertheless, judging from my own listening experiences, an overall tendency towards resembling phrasing within the ensemble seems likely. This is supported by the fact that although I did find significance differences in the exact numerical data for the recording *2012.03.29 Ibura excerpt 1*, in which Hugo Leonardo demonstrated an *alfaia* pattern with his hands on the thighs, the general tendencies were exactly the same as in the other recordings, in particular the pronounced shortness of *e* and length of *a*.

To conclude this topic, about which so far only preliminary speculations are possibly, I want to illustrate that it might not be advisable to unrestrictedly assume identical phrasing throughout the whole ensemble by two quotes from Christiane Gerischer, in which she reports her findings concerning Bahian *samba*:

In addition, the accents in the various patterns of the polyrhythmic interplay call for different microrhythmic phrasings, which consequently lead not only to a “clash of rhythms” but also to a clash of accents. [...] In polyrhythmic samples I also discovered significant differences in the timing between solo drummers, on the one hand, and accompanying percussionists, on the other. While the solo drummer’s accents created odd divisions of the beat, the accompanying parts remained remarkably regular.

[...] In [a specific] excerpt from a *samba de caboclo* perfor-

mance, every pattern seems to have its own microrhythmic timing. [Gerischer, 2006, p. 111]

8.2 Macro- and Microhrythmic Interrelation

As I have pointed out along the microrhythmic analyses, I only observed relatively little correspondences between the macrorhythmic phrasing and microrhythmic timing. Apart from one case, where Nathalia Paixão consistently tended to slightly increase the tempo when playing specific recurring phrases, and going back to the original tempo afterwards, I was not able to detect systematic interrelations.

One point I find very interesting, is the fact that the microrhythmic structure of the *maracatu* recording excerpts I analyzed bore great similarities with those that Christiane Gerischer derived for Bahian *samba*, but that the macrorhythmic structure of those two styles shows huge differences. One of the most striking examples concerns the average durations of **e** and **a**, the second and last sixteenth note of the beat. In both cases, Bahian *samba* and the *caixa* examples from Pernambucan *maracatu* that I examined, these metric subdivision positions showed strong tendencies towards **S** and **L** on the sub-syntactic level, with the length of **a** being even more consistent within and across performances than the shortness of **e**. Contrary to that, obvious *genre*-specific differences on the syntactic level can be observed for these two metric positions.

Means of Accentuation

It is an empirically well studied phenomenon that lengthening of notes, besides increases volume and several other possibilities, is a means of accentuation. Longer notes tend to be perceived as accented and, conversely, shorter notes, all other things being equal, tend to be observed as non-accented. Moreover, longer intervals tend to cause perceptual grouping, the border of neighboring groups being the longest intervals, see for example [Pfleiderer, 2006, p. 65]. Further, in a group of three or more sounds, the first and the last tend to be perceived as accented [Hähnel, 2008, p. 26].

Microrhythmic Accentuation in *maracatu* and *samba*

Let us apply these results to the cases of Bahian *samba* and the recordings I examined: Since the longest notes were very consistently found on **a**, the fourth sixteenth note, the perceived grouping would be beat-wise (a perceived group containing the four subdivisions of a beat), leaving *beat* and **a** as being

perceived as accentuated. For **a**, due to its longer duration, this is even more the case. All these statements, which concern only the microrhythmic timing, not the volume of the notes, correspond very well with my own perception. Christiane Gerischer reports similar findings for Bahian *samba*:

[...] certain double-time offbeats—specifically, those preceding a beat—consistently fall ahead of a theoretical equidistant division of time, with the effect that they are stressed by being lengthened. [Gerischer, 2006, p. 107]

Dynamic Accentuation in *maracatu* and *samba*

In the case of *samba*, however, the **a** is typically *also* accented in terms of volume. On this, Gerischer reports the following:

The most important double-time offbeat, usually stressed by various instruments, is the accent a sixteenth before the following beat. In smaller ensembles the *marcação*-players often accent these double-time offbeats, either with their left hands (on the *surdo* for example) or with special accents (like [a] slap on the *pandeiro* [...]). [Gerischer, 2006, p. 104]

Similarly, the **beat** is usually heavily accented by *surdos*, shakers, and often other instruments as well.

In *maracatu*, the situation is utterly different. Quite to the contrary, the most prominently accented notes in terms of volume are constantly played on **e**, which in my opinion (and that of, for example, Guerra-Peixe) is one of the most easily recognizable and characteristic features of *maracatu* rhythms (see my remarks on the syncopated *alfaias* accents in Section 3.5). Thus, in the metric position of **e**, the loudly played notes of the *alfaias*, *caixas*, and sometimes *gonguê*, adding heavy accents to the rhythmic structure, seem to work in opposite direction as compared to the microrhythmic framework: whereas the shortness of **e** ‘decreases’ the ‘accentuation level’, the loudness of the notes does the contrary. The metric positions **beat** and **+** are accentuated in some instrumental parts and rhythms; most noteworthy, **1_{beat}** is accentuated in most cases. Notes on the **a** position, however, are hardly ever accented in the *alfaias* or the *gonguê*, and in some cases on the *caixa* (as far as volume is concerned).

Interrelation of Syntax and Sub-Syntax

Matthew Butterfield in [Butterfield, 2006] considered the effects of various rhythmic patterns with regard to metric expectations on the syntactic and

the sub-syntactic level, and whether the effects point in the same or opposite directions on these two levels. Although I have not developed a precise theoretic framework concerning meter and musical syntax, I will still briefly try to apply this approach:

The heavy, ‘contra-metric’, accents in *maracatu* work in a way ‘against’ the macrometric structure, because the ‘weakest’ metric positions, the double time off-beats on **e** and **a**, are emphasized so strongly. The microrhythmic timing of these accents could be seen as promoting the same ‘contra-metric’ effect by working ‘against’ the microrhythmic, or maybe better ‘micrometric’ structure: The shortest subdivision positions, least emphasized through duration, are the ones most emphasized through loudness.¹⁰

8.3 Teaching and Learning *suingue*

In the *Batuque Book*, Tarcísio Resende writes the following (English translation by Peter Malcolm Keays):

I believe that, through the *Batuque Book*, musicians from the whole world are going to hear and play *maracatu*. They won’t acquire its very distinct swing so easily, because this comes with time, and a lot of practice. The *batuqueiros* practice these rhythms from childhood. [Santos and Resende, 2009, p. 34]

The last sentence’s statement is easy to verify for visitors in Recife: Practically all *maracatus-nação* have members of all ages, dancing as well as playing in the *batuque*, including children so young that their *alfaias*, *abês* and *ganzás*, specifically manufactured for them in diminished dimensions, still look very big. At the presentations of the groups during and before carnival, it is likewise very common to see young children in the audience alongside their parents, even if the presentations take place late at night.

Hugo Leonardo, when asked how children are taught when they enter the group, confirmed that for the *batuqueir@s* it is typical to start learning the rhythms and playing at a young age. He answered that the young kids, when they hold an *alfaiá* in their hands for the first time, maybe at age four or five, already know how to play all the rhythms [Leonardo, 2010]. They are capable of this because they have seen and heard how to do it many times before. In other words, there is no active teaching, the tradition is passed on by imitating the older ones.

¹⁰In the present study only *caixa* recordings have been analyzed. The statements are based on the assumption that the microtiming of *alfaias* bear similar characteristics, and hence somewhat speculative. See the discussion on this in Section 8.1.2.

How to Learn *suíngue*?

The question is, whether and how it is possible to learn the sub-syntactic timing of *maracatu*, if not having grown up in the same context as the *maracatuzeir@s* themselves. In his extensive survey from 2011, *Des objets musicaux implicites à leur didactisation formelle exogène: transposition didactique interne du suíngue brasileiro en France* [Guillot, 2011a]¹¹, about the teaching of Brazilian percussion music in France, Gérald Guillot comes to the following conclusion:

Most of the teachers concerned by this study perceive the *suíngue brasileiro* but do not use this ability: a filtering process takes place indeed but in an unexpected way. [...] Several pieces of implicit fundamental knowledge, called “transcultural” are filtered out by Western cognitive perception. Such is the case of the object of our research, a pan-African microrhythmic organization that structures the Afro-Brazilian repertoire. We thus believe that, in the benevolent hope of opening up the student to the music of The Other, the teacher is first confronted with his own (ethno)centrations in the form of “inadequate” cognitive and cultural inferences on such truly exotic musical objects. These perceptions distort his own learning and induce persistent transformations of knowledge in the reception context. It means: at school and thus in society. [Guillot, 2011b, p. 5]

As I have detailed in Section 4.5.1, I am convinced that sub-syntactic timing is, like most things, learnable. Probably children learn it easier and faster, as is the case with most things, but in the light of the conclusions that Guillot drew from his comprehensive study, I suggest that the crucial points in this regards are awareness, or, in other words, consciously directed perception.

Directed Consciousness

I believe one of the differences between the learning processes of children and adults is, that for the latter, consciousness is involved to a higher degree. Also, if not being constantly confronted with certain strategies of sub-syntactic timing, it seems likewise improbable to absorb them without consciously directed awareness. Consequently, for people that do not live, or have grown up in a context closely related to *maracatu*, maybe only once

¹¹Fr. “From implicit musical objects to their exogenous formal didactising: internal didactic transposition of *suíngue brasileiro* in France”, Guillot’s translation.

that the sub-syntactic timing has become the object of one's conscious observations, the learning process can start. I do not think that *then*, there are any reasons why the process should not be successful.

In this sense, I hope to have contributed to some degree with this work to bringing microrhythmic timing of the music of *maracatu-nação* more into the awareness of the reader, for I think that a great part, maybe even the most crucial aspect, of the rhythmic fascination and infectious motional richness of this music are rooted in timing processes on the sub-syntactic level.

Part IV
Appendix

Chapter 9

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9.1 *Maracatu-Nação*

9.1.1 Scientific Literature

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Curriculum Vitae

Timon Thalwitzer



PERSONAL DATA

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ACADEMIC

01/2012–04/2012 **Musicological field trip** to the carnival in Recife, Brazil, collecting material and preparing for this diploma thesis
07/2011–08/2011 **Musicological field trip** to Crete, Greece
01/2010–02/2010 **Musicological field trip** to the carnival in Recife, Brazil, as part of the musicology-curriculum of the University of Vienna; supervised by Univ.-Prof.Mag.Dr. Regine Allgayer-Kaufmann, Ass.-Prof.Mag.Dr. August Schmidhofer und Dr. Christiane Gerischer
2005–2006 **Visiting Student** at the University College Cork, Ireland, Departments for Mathematics and for Music (ERASMUS-scholarship).
2003–2013 **Master of Musicology** at the University of Vienna. Research interests: Northeast Brazil, percussion, rhythmic.
2001–2008 **Master of Mathematics** at the University of Vienna. Research Interests: Algebra, Graph Theory

MUSICIAN

Drum Set

since 2008 **Drum Set** with Herbert Pirker
2006–2007 **Jazz Drum Set** at the Vienna Gustav-Mahler Konservatorium. jazz theory, drum set, and rhythm courses with Christian Mühlbacher, Andreas Menrath, and Reinhart Winkler.
since 1997 **Freelance drummer** in and around Vienna, working, among others, with Susan Rigvava-Dumas, When Yuppies Go To Hell, TransHorta, Figure In Frame, PlaytOh (Ireland), Clélia Colonna, SoundDiary, and the Big Bang Big Band.
since 1995 **Drum Set** with various teachers, including Walter Grassmann, Klemens Marktl, Mario Gonzi, Conor Guilfoyle, Moritz Pedarnig, and Shayan Fathi.

Percussion

- 2012 Arts Direction & Production of **RECLAIM!/MARACATU. Die Geschichte einer (Rück)-Eroberung**, the main theatrical performance of the *Linzer Pflasterspektakel 2012* (production scholarship)
- 2010, 2012 *Batuqueiro* of **Nação do Maracatu Leão da Campina**, lead by Hugo Leonardo (Recife, PE/Brazil)
- 2010–2012 *Diretor do Apito* of the percussion group **Maracatu Novo Toque**
- 2011 *Batuqueiro* of the percussion group **Quebra Baque Vienna**, lead by Tarcísio Resende
- 2009–2011 *Batuqueiro* of the *samba-reggae* group **TimbaViena**
- 2008–2010 **Samba-Percussion** with Scott Laury at the University of Vienna
- since 1999 **Percussion Workshops**, studying Brazilian, Afro-Cuban, and other music with Maurício Tzumba Edison Tadeu, Herwig Stieger, Richard Filz, Benno Sterzer, and Gerhard Kero

Classical

- since 2007 **Classical Percussion** at the municipal music school of Vienna with Heinz Hartlieb; engagements as orchestral percussionist with, among others, the Wiener Jugendsinfonieorchester im Wiener Radiokulturhaus and with the orchestra of the Johann Sebastian Bach Musikschule at the Musikverein, Vienna.

PAPERS (accessible through <http://www.TimonThalwitzer.at.tf>)

Master's Theses

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Abstract

The *maracatus-nação* of Recife, capital of the Northeast Brazilian state of Pernambuco, have experienced a period of rapidly increasing popularity during the past two decades, in Recife, but also throughout the world. Considerably contributed to this development have the large percussion ensembles that are part of these groups and which play highly infectious music. But what exactly constitutes the heavy *swingue*, or ‘groove’, of this music?

Caixas, a sort of snare drums, are often taken to belong to the instruments that contribute most strongly the specific *swingue* of the *maracatus-nação*. In this thesis, I analyze several *caixa* recordings of *maracatu* musicians from Recife microrhythmically, and point out tendencies concerning the sub-syntactic timing structure. Special emphasis is laid on the flexibility of the timing, as I felt that a large part of the microrhythmic literature, in a somewhat static approach, focusses too strongly on patterned repetition, not accounting accurately for the processual aspects of rhythm. These issues are also discussed theoretically in the context of *categorical perception* and the misleading conception of timing ‘norms’.

To facilitate a more comprehensive understanding of the microrhythmic interpretations I undertook, a CD-ROM is included, containing the analyzed recording excerpts, as well as the annotated note on-set data and spreadsheets with the statistic calculations I performed.

As the available literature on the *maracatus-nação* in languages other than Portuguese is still very limited, I provide a general introduction to them, particularly focussing to their music. The findings are based on my observations from participatory field work and interviews I conducted in Recife, as well as a thorough literature research. Moreover, a comprehensive review of the non-lusophone literature is given, in order to open up possibilities for the interested reader to delve deeper into a topic that has been hugely neglected so far.

Zusammenfassung

Die *maracatus-nação* von Recife, Hauptstadt des Nordostbrasilianischen Bundesstaates Pernambuco, haben in den vergangenen zwei Jahrzehnten eine rasch anwachsende Popularität inner- und außerhalb Brasiliens durchlebt. Einer der Aspekte, die maßgeblich zu dieser Entwicklung beigetragen haben, liegt in der mitreißenden Musik der Percussion Ensembles begründet, die Teil der *maracatu* Gruppen sind. Aber was macht den *swingue*, oder 'Groove', dieser Musik aus?

Caixas, eine Art Snare Drums, werden gemeinhin als Instrumente angesehen, die ganz besonders zu dem spezifischen *swingue* der *maracatus-nação* beitragen. Die vorliegende Arbeit beinhaltet mikrorhythmische Analysen einer Reihe von *caixa* Aufnahmen von *maracatu* MusikerInnen aus Recife. Ich werde Tendenzen der sub-syntaktischen Timing Strukturen aufzeigen und dabei besonderes Gewicht auf die Flexibilität derselben legen. Ein großer Teil der mikrorhythmischen Literatur fokussiert meines Erachtens zu stark auf Wiederholung von Patterns und trägt damit der Prozesshaftigkeit von Rhythmus unzureichend Rechnung. Dies wird in einer theoretischen Diskussion des Begriffes *kategorische Wahrnehmung* und der irreführenden Idee von Timing 'Normen' kontextualisiert.

Um die Resultate der mikrorhythmischen Analysen nachvollziehbar zu machen, sind auf einer beiliegenden CD-ROM die ausgewählten Aufnahmeexzerpte enthalten, sowie die Note Onset Annotationen und alle Tabellenfiles der statistischen Auswertung.

Nachdem kaum Literatur zu *maracatu-nação* in anderen Sprachen als Portugiesisch verfügbar ist, gebe ich eine allgemeine Einführung unter besonderer Berücksichtigung der Musik, basierend auf meiner teilnehmenden Beobachtung und den Interviews, die ich in Recife durchgeführt habe, sowie auf einer intensiven Literaturrecherche. Zudem gebe ich einen umfassenden Überblick über die nicht-portugiesischsprachige Literatur, um dem/der interessierten LeserIn Möglichkeiten an die Hand zu legen, sich eingehender mit *maracatu-nação* zu beschäftigen, einem Thema, das bislang keine adäquate Beachtung in der Fachliteratur gefunden hat.