

Microtiming in the rhythmic structure of Candombe drumming patterns *

Luis Jure, Martín Rocamora
Universidad de la República, Uruguay

Abstract

The analysis of micro-rhythmic aspects of music has experienced an important development in recent years. Microtiming involves small-scale temporal deviations of events in the musical surface with respect to an underlying isochronous metrical grid. These deviations can take the form of tempo variations like *rubato*; in other cases they rather consist of the time-shifting of events with respect to the steady beats of a constant tempo (e.g. *notes inégales* in Baroque or “swing” eighth-notes in Jazz). It has been recently argued that in some cases microtiming could be better understood by considering non-isochronous beat subdivisions.

This paper presents the results of measuring and analysing the micro-rhythmical properties of the drumming patterns in Uruguayan Candombe. Candombe rhythm results from the interaction of the patterns of three drums of different size and pitch, and its metric structure—a cycle of four beats and sixteen pulses—shares many traits with other musics of the Afro-Atlantic world.

The analysis of several recordings by renowned players reveals the systematic and consistent use of micro-temporal deviations in the patterns of Candombe, demonstrating that microtiming is a structural component of its rhythm.

1 Introduction

1.1 Microtiming

The analysis of micro-rhythmic aspects of music has received an increasing amount of attention in recent years, and has developed a more solid theoretical framework [3, 4, 11]. Microtiming involves small-scale temporal deviations of events in the musical surface with respect to an underlying isochronous metrical grid. The systematic use of these deviations can be of structural importance in the rhythmic and stylistic configuration of some genres.

In some cases, these deviations take the form of tempo variations like *rubato*, *accelerando* or *ritardando*; this is common practice in traditional Western art music from

*Presented at the *Fourth International Conference on Analytical Approaches to World Music (AAWM 2016)*, June 8–11, 2016, New York, USA.

Baroque to Romanticism [11, 12]. In other contexts, however, microtiming is more appropriately represented by the time-shifting of events with respect to the steady beats of a constant tempo, e.g. *notes inégales* in Baroque, or “swing” eighth-notes in Jazz [2, 5, 7, 16]. This practice is an important characteristic of many genres of contemporary popular music and in some traditional musics of the Afro-Atlantic culture [6, 10, 13, 17]. It has also been argued that in some cases microtiming could be better understood when integrated into the metrical framework by considering non-isochronous beat subdivisions [18].

This paper presents the results of measuring and analysing the micro-rhythmical properties of the drumming patterns in Uruguayan Candombe.

1.2 Candombe drumming

With its deep African roots, Candombe drumming is one of the most characteristic features of Uruguayan popular culture [1, 9]. It is played on three drums of different size and pitch (*chico*, *repique* and *piano*), each with a distinctive pattern. An additional timeline pattern, called *clave* or *madera*, is shared by the three drums. The characteristic Candombe rhythm results from the interaction of these patterns, and its metric structure—a cycle of four beats and sixteen pulses—shares many traits with other musics of the Afro-Atlantic world [9, 20].

Figure 1 shows all the patterns in simplified form in common music notation, and the corresponding metrical structure. Unlike the other two drums, the *chico* drum is characterized by a single pattern that must be repeated during the whole performance, establishing the lowest level of the metrical structure. The *repique* drum, on the other hand, is the drum allowed the highest level of improvisation. Its primary pattern (*repique básico*) may be varied and ornamented in many ways, and alternated with other *repique* or *clave* patterns [9, 15]. It has been noted that in actual performance, the primary pattern presents a perceptible deviation with respect to the four pulses of the beat, towards a triplet feeling [14]. And although the *chico* drum is presented as the foundation upon which the whole metrical structure is built, it has been suggested recently that its pattern presents a contraction of the inter-onset intervals (IOIs) [10]. The aim of this research is to assess the exact nature of these deviations.

2 Analysis

2.1 Dataset

The dataset used consists of a series of 14 multitrack recordings involving five prestigious Uruguayan Candombe players of the Ansina style (*barrio* Palermo) [19]. Six takes were selected, featuring the three performers that played both *chico* and *repique*. The total time of the performances was over 16 minutes and the tempos varied between 105 and 140 bpm, with a strong prevalence of values around 130 bpm.



Figure 1: Candombe patterns in simplified form and the corresponding metrical structure.

2.2 Timing data extraction and analysis

Automatic detection of onsets was carried out on separate audio tracks using a signal processing method based on the spectral flux [8]. The resulting events were manually checked and adjusted when necessary. The location of beats was manually annotated for each performance, and the position of onsets was beat-normalized. Then, onsets were grouped to the closest pulse within the beat and a Gaussian distribution was fitted to each group. This provides a measure of the mean location of events within a group and their amount of dispersion.

2.3 Experiments and results

The six selected takes provided a total of approximately 5000 *chico* onsets for the analysis; in the *repique* tracks, only the segments with *repique básico* pattern were analysed, resulting in approximately 1500 onsets. The analyses show some clear tendencies appearing consistently in all cases, although the exact amounts of deviation are different for each take, even of the same player.

Figure 2 shows typical behaviours of *chico* and *repique* patterns. The last onset of the *repique* pattern is displaced as expected, and is very close to a ternary division of the beat. The second onset keeps its place around the second pulse, but has a higher variance. And despite the prevalent descriptions of the *chico* drum as strictly establishing the pulse of the lowest metrical level, its pattern presents a significant temporal contraction: the first onset (the hand stroke) coincides quite precisely with the second pulse, but the two remaining onsets appear clearly ahead of the divisions in four of the beat. Small quantitative differences aside, the same behaviour of both drums was observed in all the analysed recordings.

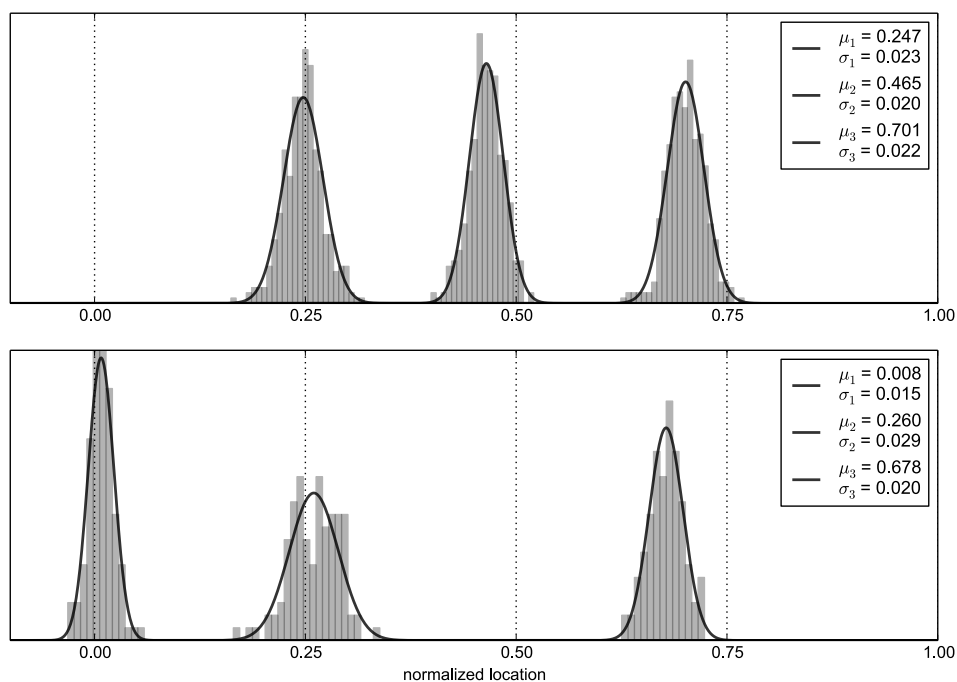


Figure 2: Analysis of *chico* and *repique* tracks of the same recording.

3 Conclusions and future work

The analysis of several recordings by renowned players revealed the systematic use of micro-rhythmical deviations in the patterns of the Candombe drums, demonstrating that microtiming is a structural component of its rhythm. The behaviour of the *repique* pattern was more precisely measured, and a behaviour of the *chico* pattern was confirmed that does not fit current descriptions. The consistent use of these deviations can be considered evidence of the existence of a sort of “swing” characteristic of Candombe, analogous to the idea of swing in Jazz and other Afro-American musics [2, 5, 10, 13, 17].

While the dataset used is representative and validates the results, further experiments should be carried out on a wider dataset including more performers representing the styles of different *barrios*. Also, other patterns should be analysed, like those of the *piano* drum, the *clave*, and alternative *repique* patterns.

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