Gesture in Samba: a cross-modal analysis of dance and music from the Afro-Brazilian culture

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In this thesis, we focus on the relationship between music and dance in the Afro-Brazilian culture. We concentrate on the Afro-Brazilian *samba*, which belongs to the musical/choreographical panorama of the African diasporas and shares with the other pan-African cultures the tendency to integrate dance, music and social participation in every instantiation of the culture.

We approach samba from the viewpoint of *embodied cognition*, which basically assumes that the mind cannot be dissociated from the body. The idea that the body is not a simple vessel of the mind but contributes, molds and enacts the formation of meaning has a number of impacts on the study of dance and music. It extends the concept "mind" to tacit forms of knowledge such as dancing or moving, it sheds light on how the human body has influenced the human development, culture and reasoning. Moreover it enables the Western epistemology to approach forms of knowledge that have the body as the central mediator.

In the introduction of this work, we demonstrate that few musicological approaches have been able to discuss the relationship between music and dance in Afro-Brazilian culture. Although a great part of the literature has stressed the importance of the "body" in the Afro-Brazilian musical culture, few studies concentrated on the analysis of the dancing body, its movements and its gestural forms. How did dances connect with music? How do movements inform about the relation between music and dance?

In the course of the research we have gradually approached these problems, starting from an extensive review of the literature, through the proposition of novel methods for dance and through the analysis of sets of recorded samba music and dances. The methods for the analysis of dance are concentrated in two methodological proposals: *the Basic Gesture* approach and the *Topological Gesture Analysis*.

The *Basic Gesture* approach introduces a computational heuristic that uses information from musical meter to uncover repetitive patterns of the dance gestures. Instead of looking at movement as a hermetic system or searching for single responses or parameters, we look for a summary of explanations in both music and dance domains. The method is based on Periodicity Transforms (Sethares and Staley 1999) that uncovers a set of solutions for the gesture periodicities based on the interaction of movement with music. It results in graphical representations that inform about the *shape* of the repetitive gesture. The *Basic Gesture* approach was developed from the analysis of trajectories of the

body collected from video analysis (Naveda and Leman 2009) and further development in a case study realized with a motion capture system (Leman and Naveda 2010). In the case study, we applied the method to different styles of popular dances (samba and Charleston) and different levels of expertise (teachers and students). The idea behind the *Basic Gesture* approach is that it conveys a spatiotemporal reference frame on which dancers can reference their choreography. It can be seen as a form of mental representation, or as an imprint in the motor domains that is activated and dynamically transformed in the process of the rendition of gesture. Basic gestures are assumed to be formed by the incorporation of action-perception couplings between sound and movement, or music and dance.

The *Topological Gesture Analysis* (TGA) complements the *Basic Gesture* approach by introducing a method that focuses on the space used by the gesture. The TGA sees movement as qualities distributed in space. It borrows from the study of *topology* an idea of a metric system that is abstracted from shapes, distances and coordinates. It focuses on qualitative relationships and reasoning between music and space. We use this alternative geometry to qualify the space with meter-related cues, which provides a map of the organization of the space of the dances in relation to music. It assumes novel forms of interpreting gestures as topological relations and contributes with an additional set of cross-modal algorithms.

In the musical domain, a profuse bibliography in musicology provides support to the basic assumptions about samba music (e.g., rhythmic priority of samba music, connections of samba with African roots and its metric characteristics). However, other "movement inducing" characteristics of samba music such as the timing or the induction of "groove" are less clearly present in the literature. We realized several studies that approach timing and microtiming in samba music. In the first study, we investigated the patterns of microtiming deviations collected from a data-set of 106 excerpts of commercial samba music. We analyzed how patterns of microtiming interact with the meter, spectrum and intensity in the auditory domain. In the second study, we applied the same methodology to spontaneous vocalizations of samba rhythms recorded from musicians and non-musicians, in Brazil. In both experiments, we verified the same consistent profile of timing "deviations" and other tendencies of metric induction. Although these experiments marginally contribute to the main notion of embodiment, they unravel a new layer of rhythmic/timing structures, which cannot be analyzed from symbolic analysis of music (e.g., scores). In the third study, we reapplied the methods for periodicity detection used in the *Basic Gesture* approach to auditory features extracted from the computational analysis of audio. These results reveal the ambiguous metric structure in samba music, and can be compared with the same type of analysis realized in the movement domain.

In the last experiment of the thesis, we made use of all of the developments realized in the previous chapters to investigate the characteristics samba dances in a data-set of dance recordings. We also investigated how musical meter, gender, tempo and choreographic background affect these gestures. The methodology is applied to a data-set of 30 dances recorded with professional samba dancers. In the first part we process all excerpts with the Basic Gesture and TGA approaches. This results in a collection detailed analyses

of dances, which exhibit a diverse panorama of styles. The basic gesture analyses were further correlated and discriminated using a number of methodologies that focused on the differences of gender, tempo and choreographic background.

Although the results offer examples of paradigmatic choreographies, the variability seen in our results reinforce the idea that samba dances are not represented by a single dance form nor by a single paradigmatic notion of choreography. The structure of samba dances seem to be primarily represented by a constant affirmation of "musical" meter contrasted with ambiguous metric relations in samba music. From this perspective, meter in samba appears to be much more a choreographic feature rather than a musical one.

The structure and enactment of meter in dance seems to be more detailed and contains much more parallel channels than its representation in music. The unambiguous properties of dance contrast with the ambiguity observed in the musical domain. The relationship between music and dance in samba seems to be regulated by a symbiotic relationship: while the two forms exhibit different metrical structures and different renditions at low-level information (signals) their interaction benefit from each other as a cultural system (high-level). The equilibrium between ambiguous and unambiguous content avoids both alienation (excess of ambiguous content) and monotony (excess of unambiguous content) in the context. Moreover, this complex mechanism of dependency seems to bind the choreographic structure of samba by making meaning in music dependent on dance context and participatory displays.

References

Leman, M., Naveda, L. (2010). "*Basic Gestures as Spatiotemporal Reference Frames for Repetitive Dance/Music Patterns in Samba and Charleston.*" Music Perception 28 (1): 71-91.

Naveda, L., Leman, M. (2009). "*A Cross-modal Heuristic for Periodic Pattern Analysis of Samba Music and Dance.*" Journal of New Music Research 38 (3): 255-283.

Sethares, W. A., Staley, T. W. (1999). "*Periodicity transforms.*" Signal Processing, IEEE Transactions on 47 (11): 2953-2964.