

Choreographisms

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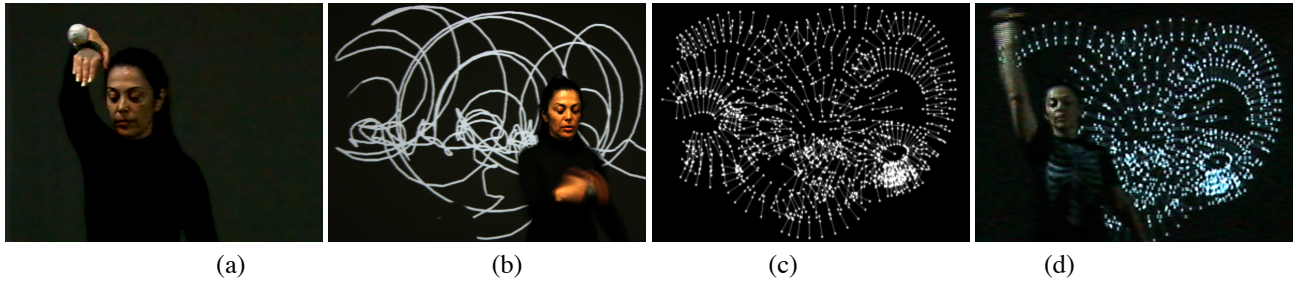


Figure 1: Stages of a choreographism: (a) Markers on dancer; (b) Capturing body trajectory; (c) Graphics interpretation of Motion Path; and (d) Visual elements integrated in dance performance .

1 The Setting ...

Choreographisms is a multidisciplinary project that aims to combine techniques from Computer Graphics, Vision and Animation with applications in Contemporary Dance, Stage Design and Art.

In recent years, the use of multimedia resources, such as live projection and dynamic lighting, has been increasingly exploited in music shows, dance presentations and art performances. However, up to now, these powerful visual sources have been applied mostly as an additional element to the set background, thus transforming it into a visually dynamic stage.

Our goal in this project is to push forward the state-of-the-art by calling into the scene real-time interaction and vision techniques. In this way, by integrating motion capture with procedural graphics and live displays, we expand the creative possibilities enabling graphical elements to be used, not as a mere passive set element, but primarily as an active one – a virtual agent capable of interacting with other actors in the scene under the guidance of the director-choreographer.

2 X-Motion: The System

The above context frames the proposed project. For that, we developed the X-Motion system which enables the design of a virtual dynamic stage that is directly linked to the dance. The system uses movements of dancers as an input for the generation of graphisms that are projected on the set in real-time. In this manner, the choreographer directs not only the dancers' movements, but also graphical elements that are projected into the set, which becomes dynamic and interactive. Thus, these graphisms act as virtual dancers, establishing an interaction and dialog with real dancers mediated by the choreographer. They can be modified by interactions with the dancers, instigating changes to the dancers' movements as well.

Authoring is based on graphical interpretation of movement, that establishes an association of motion-paths with visual forms. The system captures the motion of markers on the dancers' body to generate trajectories (see Figures 1-a and 1-b). It computes position, velocity, curvature, and tangents of these motion-paths that are represented as curves parametrized in time. In this way, trajectories of tracked points become the system's central mathematical abstraction. They embody the essence of spatial-temporal aspects of the movement. Expressive visuals result from applying syntactic and semantic graphical rules to motion paths translating them into active shapes (see Figures 1-c and 1-d). In sum, the system correlates – not necessarily in the literal sense – basic spatial structures to the elementary components of dance.

The system architecture is centered on a finite state machine where a state is defined by a set of formal attributes that determines the appearance (brush type, granularity, interpolation) and the behavior (persistence, synchronicity, projection) of the generated graphisms. Real-time interaction sets the machine in motion, scheduling procedural evolutions: i.e., changes through time, and possibilities of alterations in states with transitions between them.

When defining a state, the choreographer is in fact programming the way the dancer can interact with the graphisms. The dancer, on the other hand, also controls the system through state changes. Triggering of a new state may be linked to variables such as motion path parameters, clock time, procedural animation objects (motors, oscillators, etc.), or even randomness.

3 The Experiment: *Unsquare Dance*

An experiment to evaluate the system's potential was conducted with a renowned choreographer and dancer Analivia Cordeiro. She is a pioneer on dance-technology in Brazil and also a specialist on the Laban method. During the experiment, she made use of the system to develop an artistic work called *Unsquare Dance*. Some of the results of her performance can be seen in Figure 1, or on the website we created for the project [Cordeiro and Velho 2007].

References

CORDEIRO, A., AND VELHO, L. 2007. *Unsquare Dance*. <http://www.visgraf.impa.br/unsquare-dance>.

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