"Choreophony for Dynamic Scenographies"

(*Project for Sinlab by Pablo Ventura in collaboration with Chris Ziegler*)

This project entails the following research fields and aims: ***Choreophony***, ***Choreography of Space*** and use of the ***Choreographic Machine*** custom software to generate computer aided dance movements.
The ultimate aim of my research proposal entails the devising of a prototype consisting of hardware and software solutions that would allow for an innovative tool towards aiding the creation of innovative dance stagings; A choreophony embeded within a highly aesthetic dynamic scenography.

Choreophony by definition:
Polyphony through choreography. Sounds are triggered, influenced, modulated, distorted, slowed, speeded, made louder or silenced by dancers movements mapped to sound files. These can be affected by the dancers travelling in a space (Positional and Motion Recognition – *see graphic: A,B,C,D*) and also by movement around its own axis (Movement Recognition *x,y,z*).

Choreophony research goals:
- Polyphonic sound textures, through several dancers choreographies, with the use of visual and sensor based motion tracking technologies. Composing a polyphony of sound layers by means of mapping sounds to several dancers.

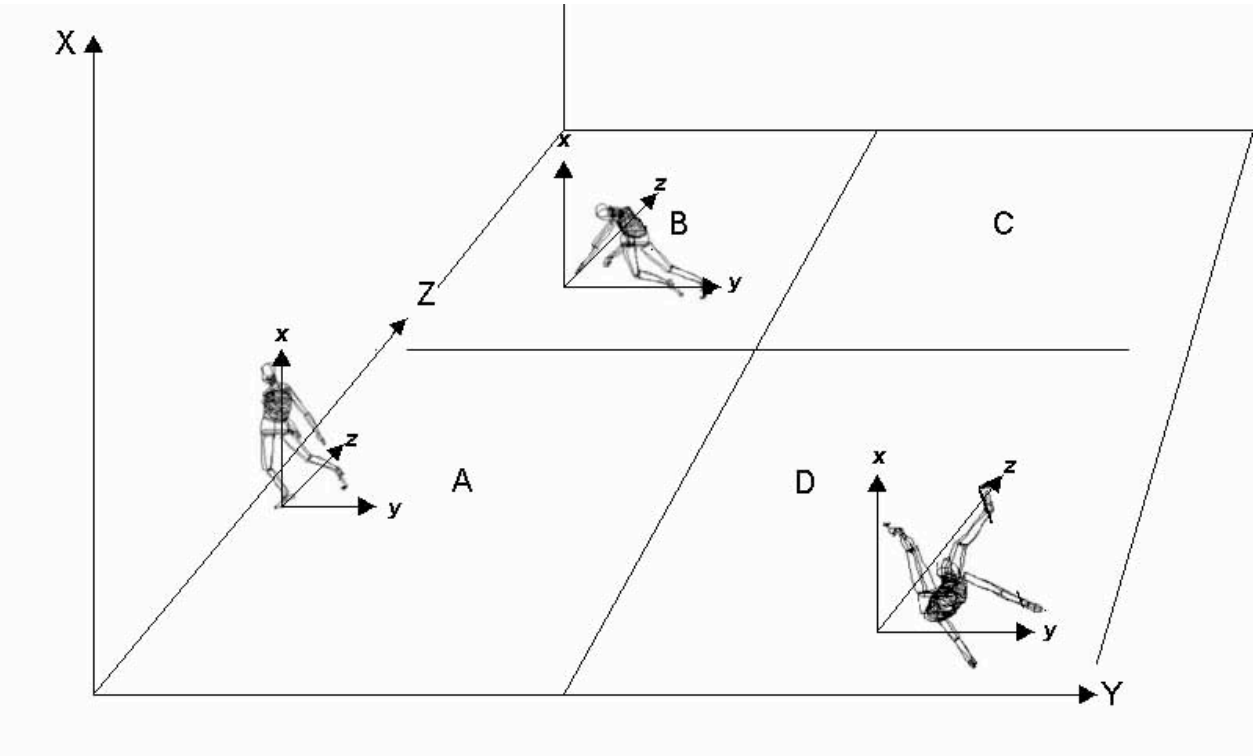
- Tracking the position of the dancers in space.
- Identifiying the movement phrases of the dancers over time and dynamics of individidual movement phrases.

- Generation of sound textures instead of playing a composition of musical notes.
- Soundtracks achieved by overlapping layers of sounds and by the use of interactive sounds controlled by motion and positon of dancers.

- finding out how a certain dance sequence's dynamics, an algorithm or mathematical formula applied to a dance sequence, would „sound" like (e.g.: to generate a sound track from a rhythmically counterpointed duet based on Pascal's Triangle such as: http://youtu.be/c3Sa6xiHP8U).

-If composers composed ballet music, **Choreophony** is a generated soundtrack by the choreography itself.

The choreography should remain a dance composition in itself independently of the sound it produces. The dancer gains the freedom to interpret set choreographies, affected by the sounds he or she generates (double feedback). The dancer isn't triggering „buttons" in space to generate a sound composition („illustrating music").
The concept for the devising of a prototype towards a **Choreophony** performance is based upon: using **Position, Motion** and **Movement Recognition** of Dancers in a Space.



Picture 1: positional A,B,C,D and movement x,y,z recognition within a stage.

Positional recognition: whenever a dancer enters a field A, B, C, or D he/she can trigger or affect a sound or video/light sample mapped to that **field**.

Examples generating video graphics with Eyecon Software by F. Weiss (2001):
http://www.youtube.com/watch?v=ovb8sM6otag&feature=related

Movement recognition: sensors pick up **movements** of individual dancers mapped to sound files. (e.g.: arm gestures, body tilting, panning, acceleration, changes of level, etc. mapped to generate melodic lines/single „voices“ or textures of sounds)
The position of bodies in space does not play a role since each dancer generates and play their own sounds anywhere on stage.

Examples generating sounds using *SoftVNS3 by C. Ziegler (2011):
http://www.youtube.com/watch?v=prfaE_glTCM&list=UUt3jickNK2ZKClKI2EoO03w&index=20&feature=plcp

Choreophony System Development Steps:

- Wireless *Positional Recognition*: Attempt at triangulation for position tracking (Selena Savic, Andrew Sempere) and sensor based body gesture tracking (Chris Ziegler) for "choreophonic" relations of dance and sound.

- Selena Savic , Andrew Sempere started to do research on wireless tools for tracking. We discussed question of resolution and how to prepare the stage for better tracking. AS: „*It's a very cool idea and it works in principle (the trilateration) it's just that the existing mobile devices don't have the appropriate sensors on board*" and yet, „ *A lightproof theatre tracking system is still a worthy goal*". Updates with the Ultra Wide Band lab of EPFL showed, that the resolution would be +/- 10m.

- Chris Ziegler, Pablo Ventura and dancers tried to identify complex movements using a Gesture Follower software (GF). With one ipod4 device per dancer, we received sensor data via OSC / WLAN of accelometer X,Y,Z movement and pitch, tilt and „yaw" (direction). The software had problems tracking, identifying long phrases of movement. New research goal: identify specific "dynamics" inside a complex movement phrase - like a dropping, rotating, a shaky or folding movement.

- Pablo Ventura decided to create a choreography, including drops, jumps, folds, or shaky movements inside longer phrases. When these moments were identified by the GF, the specifically mapped to **movements** sounds are played on top of the **field** (background) sounds. Motion and position of the dancers generate the background sounds in 4 fields.

- The result, identifying **dynamics of motion** during a longer movement sequence lead to unspecific results. We decided to lay out specific shorter sequences, which the system could realize „in realtime". The unpredictibality of the results were caused both by sequences which were too long, too short or too distorted, to identify them as complete sequences. The sequences too long, slowing down the „likelihood factor" to some seconds. With a long delay, the GF can't work as a „realtime" movement recognition system.

- At the end of the tryout session, we agreed to limit the use of an „*orchestration"* to 4 background/field „choral" sounds for the stage (position tracking fields A,B,C,D) and 4 "*melodies*" per dancer (body movements tracking *x,y,z*). We trained the system of GF to recognize 4 specific 2-4 second movements, which were part of a specific choreography.

- Final rehearal and presentation SINLAB 22. – 25.5.2012: The Choreophony system tracks 4 fields and 4 sounds triggered by one set of acceleration and gyroscope sensors on the chest of the dancers. Position and motion dynamics of dancers in space generate background (field) sound track, where the sensors of each dancer play a second layer on top of it according to predefined movements. (see documentation videos)

Choreographies of Space:

Picture 2: Dynamic scenography and lighitng design using LED technology.

The term *choreography* is not specific to the choreographing of bodies but it also entails the idea of choreographing space by means of moving objects, changing lights, video projections and moving sounds in space (multichannel/ DTS surround sound). The purpose is to generate dynamics in space.

Towards this end I designed an scenography and lighting design model in collaboration with the Color-Light Lab of the ZHdK (Marcus Pericin and Florian Bachmann).
The scenography entails a „monolith" light emiting structure on the stage and an overall lighting designed based on LED technology.
The purpose of researching the use of this particular and innovative light technology, instead of classical stage lighting lamps, is because it allows a wide palette of colour mixing for dynamic light changes on a stage. It is also particularly useful for the construction of light eimiting objects.

The monolith structure was conceived as a 5x 2.8mts (16:9 ratio) Rhomboid form covered by video screen material. It can hang on a theater rig and placed into different positions throughout a perfomance. The monolith contains within it LED lamps, the idea being, that it can emit a dynamically changig lighting design from within the structure juxtaposed against a background lighting design (see picture 2).
The choice of a Rhomboid form resulted from the wish to stage a hanging structure which through its form can bring dynamics, depth and distorsion into the physical space.

The Rhomboid form with a (16:9) ratio would also allow for possible video projections on the structure enabling a lighting design from within the structure alongside video projections unto it from without.

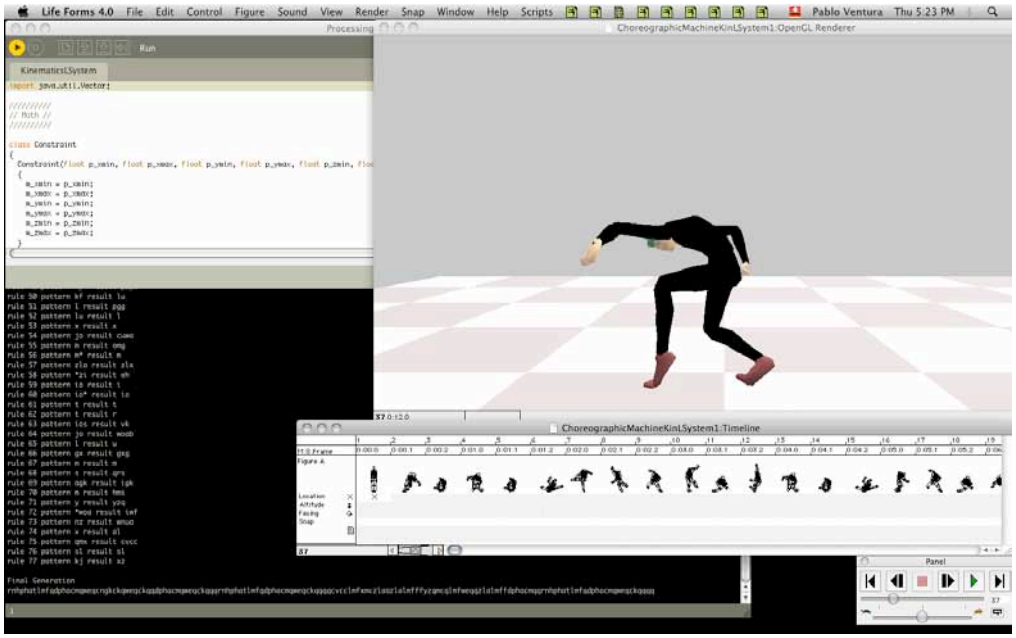
A debate that arose during the conception of the scenography, was why not make the lighting

design „interactive“ with dancers movements. My experience tells me that this live „interaction“ would not be registered by audiences unless made evident. The danger of this approach would be that of a chaotic lighting environment more suitable for a Club setting.
Alternative suggestons such as Interactive laser projections were discarded. Instead, I leave open the idea of possible live Interaction with video projections of graphics unto the structure itself in a dance production context.

Examples:
http://wiki.epfl.ch/private/filemanager/list.do?wikiId=2798&path=/ColorStudies_Ventura
(The changing lighting design is best appreciated as a Dia projection: download the files unto your Desktop/Screen Saver to play them).

Choreographic Machine

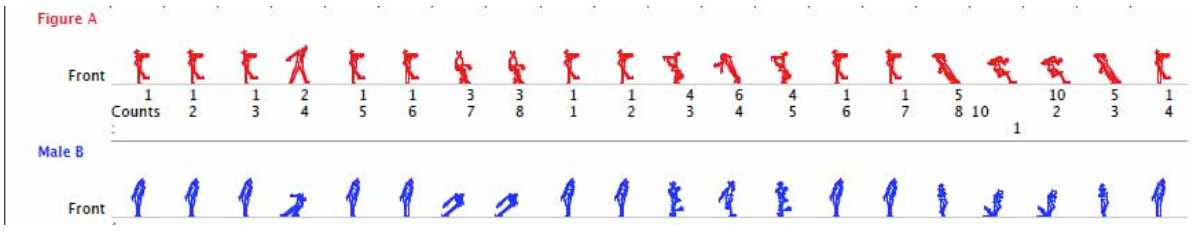
Picture 3: *Choreographic Machine interface*



Choreographic Machine

The “Choreographic Machine” is a custom made software which I use to devise my choreographies (picture 3). It consists of a programmed set of rules based on different algorithms and using Processing software, to deliver the outcome to Life Forms software to generate positions of the Life Forms software avatar. In order words, we enable the software Processing to throw the dice so to speak, for Life Forms to generate dance sequences. The sequences generated by Life Forms software are then passed on to the dancers.

For the testing of the choreophony prototype, I have devised dance sequences based on random kinematics (random poses of LF avatar), generated entirely by the *choreographic machine* custom software. A second series of sequences are generated through the segmentation of these into torso and leg movements of the live dance sequences, and interchanging these between both dancers. Finally a third series of sequences has been generated using printed scores of LF sequences based on the Fibonacci Series found in Pascal’s Triangle Numbers. *Picture 4: Life Forms score based on the Fibonacci Series of Pascal’s Triangle*



Summary

Software currently enables a dancer to precisely manipulate, affect and modulate live sounds and video sample,s by means of their body movements echoed in sounds and visuals.

This project entails researching and devising possible uses of new motion tracking tools to enable direct expression and extensions in the sound and visual domain of body movements. By means of interaction with audio-visual media through dance movements, we aim to achieve an overall integrally synchronised choreography of the various media involved and to achieve a complex choreography of media.