

CROSSING FOLIAGE:

An analytical and experimental approach of activation profile
for audio-graphic navigation in foliage clusters

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Crossing bushes :

Activation profile for audio-graphic navigation in foliage clusters

Abstract :

An analytical and experimental approach of activations profiles for audio-graphic navigation in foliage clusters.

The paper is part of the Topophonie research project, the aim to which is navigation within audio-graphic clusters. Clusters are wide ranges of objects of the same class. By Audio-graphic we mean synchronized audio and graphic object behaviour, both modalities been implemented in a single action.

Among the various examples of these kinds of objects, such as rain, flocks, grains etc, this paper focuses on foliage. We have selected two main audio and visual behaviour in order to find a good and costless way to simulate: the wind and a character crossing foliage.

This paper presents the work of designers and sound designers. It is an experimental approach, where we have tried to analyse the audio-graphic characteristics of foliage through video and simple simulation models. Within the project we are working on the concept of activation profile. An activation profile is a simple way to represent active and shaped event triggers. We needed to be sure that this concept was perceptible. Therefore, we have compared the user experience relative to two different symbolic activation profiles: a point for a character and a line for the wind.

Keywords : *activation profiles, audio-graphic clusters, navigation, sound navigation, wind, foliage, multimodal interactive representation*

Introduction:

The Topophonie project is financed by The ANR and Cap Digital. The partners are ENSCI Les Ateliers, Ircam, Limsi, Navidis Orbe UsierStudio.

Topophonies are virtual navigable sound spaces, composed of sounding or audio-graphic objects. Graphic and sounding shapes or objects are audio-graphic when visual and audio modalities are synchronized.

In virtual reality and videogames, we know how to make scenes composed of point-shaped elements: graphic and sound (i.e. a spot representing an object).

However, there is no tool enabling navigation to make scenes consisting of very great numbers of interactive visual and sound elements. Nor dispersed elements such as in a crowd, a flow of traffic, foliage or rain.

The research project Topophonie proposes lines of research and innovative developments for sound and visual navigation in spaces composed of multiple and disseminated sound and visual elements (audio-graphic clusters). By working in a scientific multidisciplinary group (digital audio, visualization, sound design) with enterprises specialized in the domain of interactive multimedia activities, the project Topophonie works on models, interfaces and audio-graphic renderings of audio-graphic clusters. The project team is composed of researchers specialised in granular sound renderings and in advanced interactive graphic renderings, as well as digital designers and enterprises specialised in the relevant fields of application.

The first task of the project was to analyse and formalize several representation models. Foliage is one of them.

VIDEO MODELS:

Video shots of various sorts(species) of foliages:

- 1 - Wind crossing foliage
- 2 - Camera (first person) crossing foliage
- 3 - Human body crossing foliage

These video captures show some audiographic characteristics.

At this stage of the project, we have only used the microphone of the camera.

Wind recording difficulty:

It is difficult to be in conditions where the wind blows strongly on the foliages and where the microphone is not affected. For the wind, we could have used a special microphone with a Rycote kind windshield but we did not have one at the time.

So unfortunately for certain overloaded passages of the capture, we had to replace small bits of the recorded sound by a fake sound extracted from other moments of the same recording.

Activation problem:

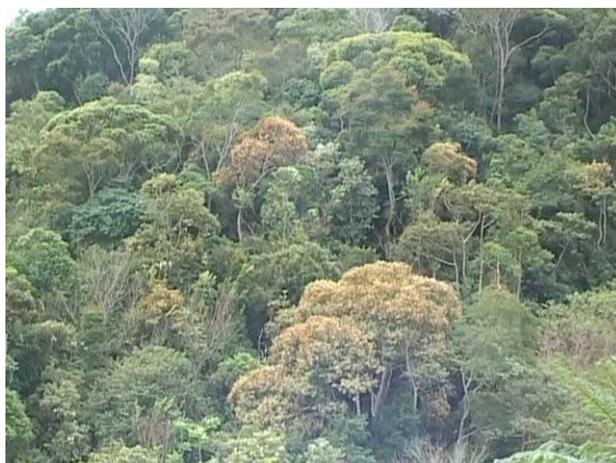
Idem for the passage of the object camera through the foliage, the microphone itself and the plastic case of the camera interferes when colliding with leaves and branches and creates some mechanical noise which appears out of context. A completely soundproof cage was rather complex to realize and we did not which to focus on this project.

Nevertheless the use of a body organ (hand, arm, body, foot) is natural and produces more convincing sound when crossing foliage.

For some other activation profiles such as small insects or big monsters we thought it would be easier to simulate them in studio afterwards.

Concerning the passage of the body, certain sound sequences seem "false" due to the fact that the sound produced by the body of the cameraman himself is added to the camera one. Crossing foliages carrying the camera also activates leaves out of the camera field. Therefore the audio-graphic may not be always coherent.

As a consequence, the coherence should be evaluated according to the kind of manipulated avatar, the precision of the physical interaction and the audiographic rendering.



Wind in foliage

<http://vimeo.com/14823976>



Camera in the foliage
<http://vimeo.com/14823982>



Body in the foliage
<http://vimeo.com/14823940>

MODEL 3D ANIMATIONS

Realized with Cinema 4D, compositing and sound comment-synchronization in AfterEffect. 3D simulation of the passage of a camera in diverse foliage, sound dubbing with sound samples of creased paper.

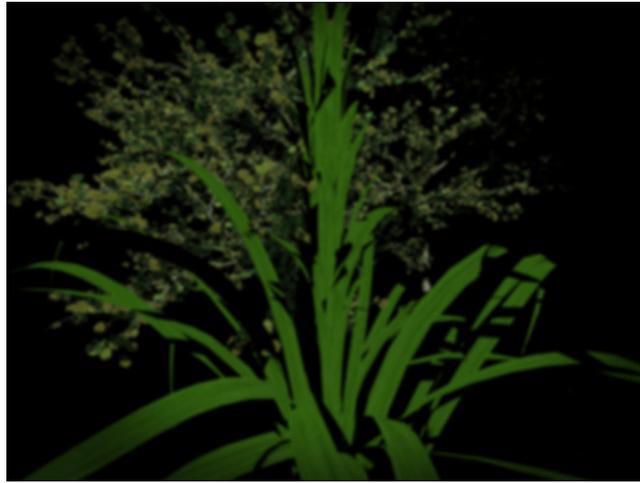
Remarks:

Literature about audiovisual synchronization and cross modality perception show that the audio + visual is complementary and synchronisation can vary a lot and still be significant. However to be autographically effective sound should; one way or another; stick to the visual events. In addition it works better when sound are related to visual events happening within the objective framework. An un-visualized event, outside the camera field, often causes interference with the understanding of active events.

Creased paper has a too dry or crispy sound texture for living plants.

In this example, the sound "crossing" is rather easy to feign.

The colliding object: the camera, the objective or the first person character being non-visible and non-definite, we can be quite tolerant on its material or its mental representation.



Model cinema 4D + post synchronized sound
<http://vimeo.com/14824136>

FOLIAGE SOUND RECORDING

In order to benefit from our own foliage sound library with a variety of different aspects and species we recorded several branches and leaves manipulation in studio.

We also recorded some foliage sounds outdoor, but it was too difficult to avoid traffic sounds and to resolve the wind and the activation problems.

We manipulated them more or less violently to produce various sound movements and feign typical effects of crossings: the passage of the wind in a foliage, the passage of a hand or an object on a leaf, or a group of leaves.

Video shots are important to correlate the manipulation of the foliage and the sound produced by the leaves.

Actions: with hand, with another branch or leaves: caressing, creasing, tearing away, shaking, crashing and hitting one or several leaves.

The remarkable sound differences we have noticed are related to the following criterion:

- The numbers of leaf
- Their texture and state of drought
- Their size and shape
- The proximity of the leaves
- Their spatial distribution
- The architecture and plasticity of the branch



Manipulation of various species of foliage samples
<http://vimeo.com/14824022>



Differents samples of foliage species
<http://vimeo.com/14862003>

Doing this work, we have noticed that when listening to the sounds without the image of the movement, they all seem to sound more or less the same and did not make much signification, it is especially difficult to imagine the real movement. This may sound obvious but, the visual view adds very important information for understanding what you hear such as spatial origin, causal action, physical reason for a specific sound particularity, activation mode, action.

In « L'audio-Vision : Son et image au cinéma » Michel Chion proposes to analyse the perception of an extract of Bergmann Persona in three times : sound alone, image alone and then sound + image. Applying this method to videos of simple sound actions such as manipulating foliage appeared to be a very interesting experience. But it became even more interesting for manipulating the simulation in realtime.

We thought that anyone should be able to tell how convincing and coherent is an audiographic simulation of foliage navigation.

We then proposed to a small panel of students to manipulate the interactive simulation with sound only, image only and both sound and image.

USER EXPERIMENT

The aim of the experience was to determine the importance of audio-graphic synchronization in the interactive manipulation and the relevance of the activation profile variation.

All the tests concern the same scene of foliage, consisting of the image of a tree on which leaves can be touched by the rollover of the mouse cursor and emit a light noise of leaf from our sound library. The test was realised with headphones.

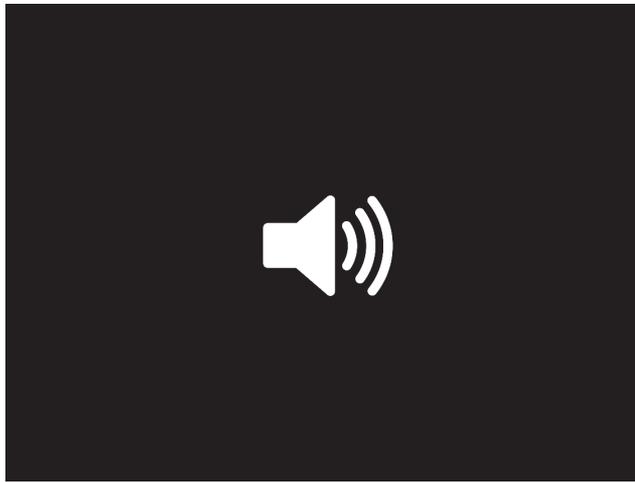
Two kinds of activation profiles where tested:

A: linear and B: punctual.

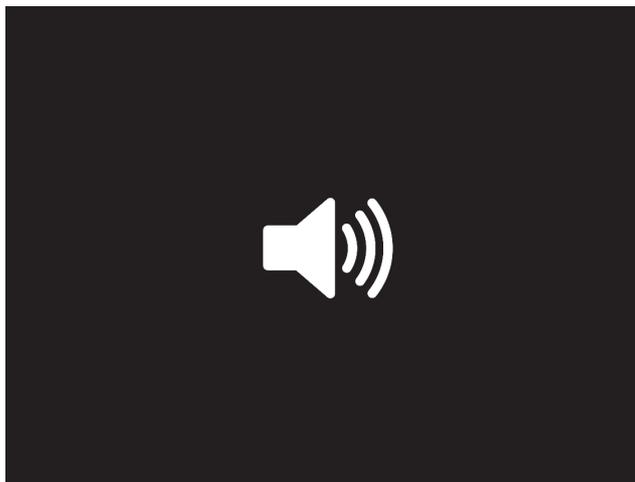
A (linear: a vertical line) is a minimum and non realistic representation of the passage of the wind through the tree, triggering a larger quantity of leaves.

B (punctual: a dot) symbolizes the hand of the player.

User experience questionnaire on audiographic activation profiles:
realized on 6 persons from 20 to 33 years old



Sound file A
<http://vimeo.com/14824062>



sound file B (navigation video recordings)
<http://vimeo.com/14824074>

First we proposed to navigate only with sound on a black screen.

Question 1: Compare manipulating A and B, what are the sound differences?

Target key: A: punctual and B: linear.

The sound difference is mostly the quantity of sound samples activated by the cursor, there were more leaves activated with the cursor movement in the file A than B.

Answers:

- Difference of sound volume
- A is stronger than B and there are more elements
- A seems doubled in regard to B
- B is slower
- B is more treble and the beginning is longer
- B sound elements are shorter and have less persistence than A

Results:

All testers did hear a sound difference between the profiles A and B. Non-specialized listeners often have difficulties to adopt a precise vocabulary without visual reference. A single person detected a larger quantity of sound elements in A

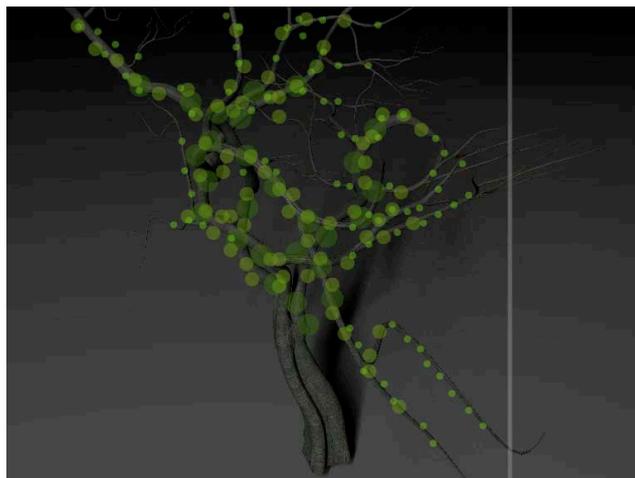
In the second experience we proposed to navigate with the image and no sound

Question 2: Compare graphics 1 and 2, what are the graphic differences?
(1: linear and 2: punctual)



graphic 1

<http://vimeo.com/14824087>



graphic 2

<http://vimeo.com/14824095>

Answers:

- Only the cursor is different
- The graphics of the cursor is different
- The green points are activated by the position of the cursor either by a bar or by a point
- Various representation of the cursor in the screen space
- When the cursor takes the shape of a line, the green disks become red in a more random way
- The graphic motives appear according to the movement of the cursor (line or circle)

Associative test:

Associate the sound files of question 1 with the graphic files of question 2:

In order to make the exercise not too obvious, we have crossed the two representations.

Answers:

A2/B1: 6 answers out of six (the good solution)

A1/B2: 1 answer (wrong)

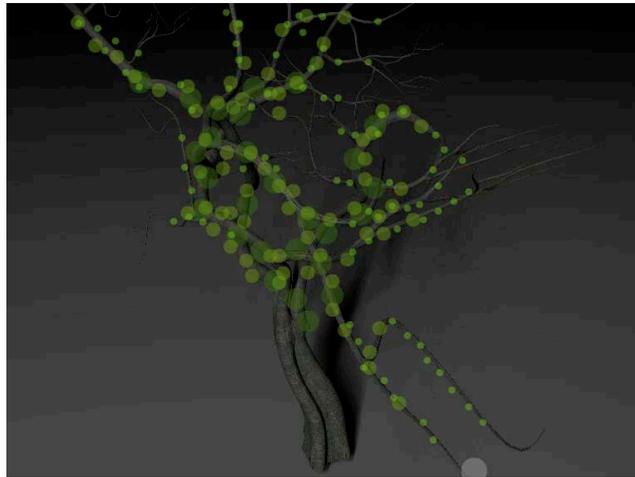
A2/B2: 1 answer (wrong)

Interpretation: finding the good answer seems to indicate that there is phenomenon logic to it.

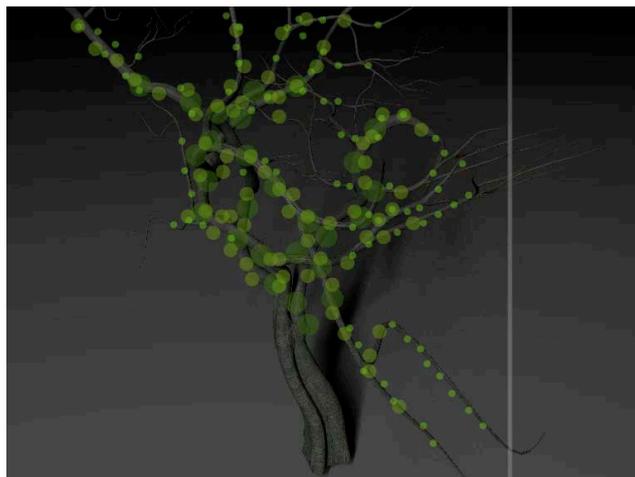
Then we presented the audiographic version with the image and the associated sound.

Question 3:

What brings the audiographic version?



punctual activation profile
<http://vimeo.com/14824104>



linear activation profile
<http://vimeo.com/14824110>

ANSWERS:

- More interactivity
- The audiographic version allows to see what controls the sound
- The audiographic version makes the tree more lively
- Better understanding of space in which we move the cursor
- Better understanding of the sound samples
- More curiosity, desire to navigate, more imagination
- Without image, the sound is abstract
- Less surprise, research, experimentation

QCM:

What brings these variations of the activation profile:

ANSWERS:

3/6 Information on what happens for audio and graphics

3/6 An easier navigation to understand and to interpret

2/6 The shape of the cursor changes according to the activation zone

0/6 Complexity

0/6 Nothing

Interpretation and conclusion:

We are conscious of some methodology imperfections, which we've tried to improve in more recent works of the project. The questionnaire could have been more rigorous, It may have been better for the sound only presentation to distribute the audio items more regularly on the screen. We would have liked to use a kind of special Rycotte kind shield for the microphone. It would have been better to do all recordings in a anechoic chamber with a several devices such as mono, stereo and multicanal in order to compare the sound effects on this kind of sounds.

Nevertheless, according to the answers to this questionnaire, it seems that the audiographic version of the interactive profiles give more information about the navigation than both sound and image ones. It is also clear that the difference between the two profiles is perceived and understood much easier in the audiographic version than in the single modality ones and therefore makes sens. We are now working on more elaborate activation profiles and their audiographic behaviours and renderings.