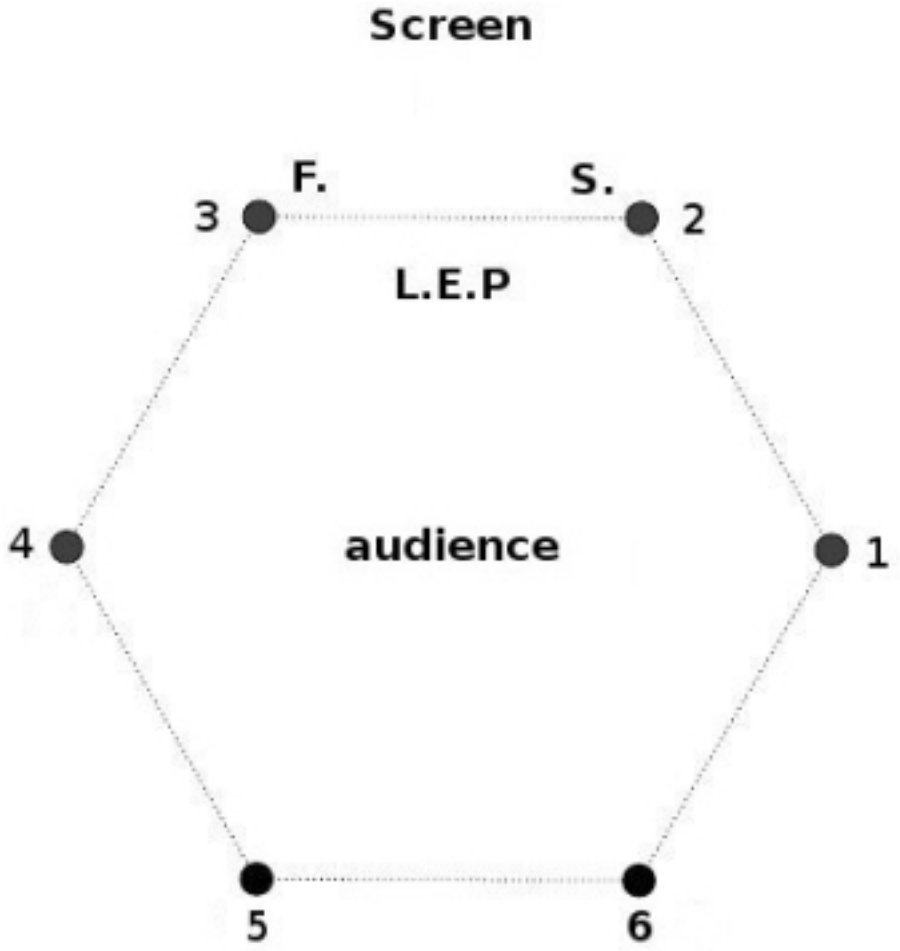
Set up



The composition makes use of the following equipment:

- a microphone used by the soprano
- a contact microphone used by the flute player
- a sound card equipped with at least two inputs and six outputs
- six loudspeakers
- four stands to place the loudspeakers at the right height according to the arrangement showed in the figure
- six cables to connect the six loudspeakers to the sound card
- two computers configured in this way:
  - computer 1 (OSC client): the operative system can be Windows or Mac, and the runtime of Max/Msp (version 4.6) has to be installed. Moreover the sound card has to be linked to it.
  - computer 2 (OSC server): the operative system can be Windows or Mac or Linux, and the java software has to be installed, as this computer runs the java application.
- a cable to connect the two computers in order to allow the OSC communication
- a projector
- a screen

The diffusion system constitutes six loudspeakers placed on the vertices of an hexagon (as regular as possible) as shown in the figure above: the six loudspeakers must be identical (i.e. same dimensions, same frequency response, same features, etc.) and they must be positioned as follows:

- speaker 2 and 5: at the bottom
- speaker 3 and 6: at the top
- speaker 1 and 4: at the middle (half height between the top and the bottom)

The pairs azimuth-elevation that identifies the six speakers in the ambisonic domain should be chosen in relation to the hall dimension and to the heights of the stands (the positions of the six speakers are defined on the surface of an imaginary sphere, thus the greater the radius of the sphere the more the elevation parameter is affected).

The default ambisonic azimuth-elevation pairs are:
- speaker 1: (90, 0)
- speaker 2: (30, -45)
- speaker 3: (-30, 45)
- speaker 4: (-90, 0)
- speaker 5: (-150, -45)
- speaker 6: (150, 45)

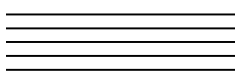
The arrangement of the performers should follow the one illustrated in figure: the flute player and the soprano have to take place back the speakers 3 and 3 respectively, the audience has to stay behind the live electronics performer (l.e.p).

Note: the three performers are required to read the thesis in order to understand the message the author wants to convey.

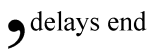
Legend

Common indications

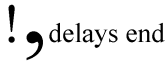
/*The chord C7 is played and diffused on channel 2*/ Comments: they describe what happens at the audio and video level.



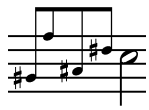
Empty bars: this indicates a period of time not specified during which the the live electronics effects and/or the video images take place. Often the l.e.p is responsible for how much these effects last, therefore he/she has also to conduct the soprano and the flute player.



Wait until the end of the delayed sounds.

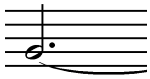


Don't wait until the end of the delayed sounds.



Small notes have to be played as fast as possible.

No vibrato



The sound/syllable must be sung/played without any form of vibrato. This is very important because a vibrato affects the the sound produced by the live electronics processing.

Normal breath.

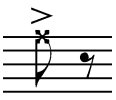
Short breath.

Instructions for the soprano

It is possible to find it on the interior

The words inside the square box indicates the text to be recited.

shouted



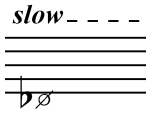
Sun

The sound/syllable/word has to be pronounced normally (speaking, except where there are the indications “whispering” or “shouted”).
Apart from the sung notes, that are indicated with the standard notation, the staff indicates approximately the speaking tone, where the third line represents the normal speaking tone.
The signs in the square brackets are the phonetic transcription of the sound to be pronounced, according to IPA (International Phonetic Alphabet).

sym

The sound/syllable/word has to be pronounced normally, singing with the hand (or hands) over the mouth.

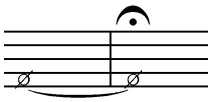
slow



[a]

The sound/syllable/word has to be pronounced normally, singing and moving the hand cupped over the mouth to affect the sound. The speed of the hand motion is indicated above (slow, fast, very fast).
Note: the hand should touch the mouth.

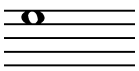
3 times regularly distributed



da - y

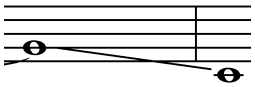
Idem, but the hand motions should be as regularly distributed as possible according to the number of times indicated.

Vibrato
slow



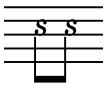
[e]

The sound/syllable/word has to be pronounced normally, singing with the vibrato to affect the sound. The frequency of the vibrato is indicated above (slow, fast, very fast).
Note: the amount of deviation should be equal to a semitone.

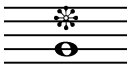


[i] [o]

Glissando.



Snap fingers with both the hands quite close to the microphone.



The note has to be sung with the mouth closed.

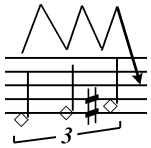
{Move to the vertex 4 of the hexagon}

The performer has to reach the point indicated in the brackets. The point to be reached is signed on the floor of the stage.

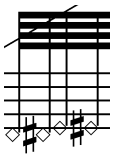
Instructions for the flute player

Position of contact microphone: remove cap at top of flute where cork is. Place contact microphone here directly beneath the lip plate. The end of the microphone should be where the lip plate starts. The input level volume of the contact microphone should be set to -30 dB.

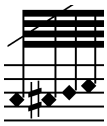
Note: during the performance the flute player has to pay the maximum attention neither to touch the microphone with the mouth, nor to breath into it (this in order to avoid any unsought noise).



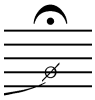
Covering the whole mouthpiece with the lips and holding it between the teeth as far inside as possible, blow a violent glissando as if warming up the instrument. The tone produced will be a seventh below written pitch.



Cover the entire mouthpiece with the lips and holding it between the teeth (without biting down), as far inside the mouth as possible; the result will be a blowing sound of definite pitch.



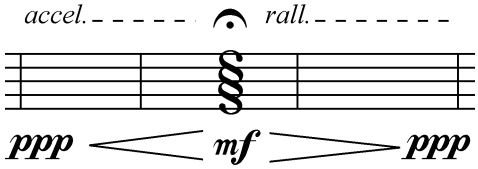
Idem, but with the tongue inserted into the hole of the mouthpiece, closing it about two-thirds; a slight whisper is thus obtained, pitched two octaves above the indicated fundamental.



Sound with a great amount of blow.

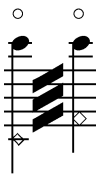
Tongue ram: tongue attacks (without blowing).

Pure key noise (without any sound or blow).



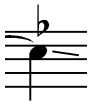
Series of pure key noises (without any sound or blow), without using recognizable patterns. The density and the velocity of the key noises are ad libitum but should follow the *accelerando* and *rallentando* indications, as well as the dynamics indications .

Double trill: the notes should be played as soon as possible in order to create a trill centred on the initial note, without using recognizable patterns.

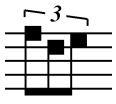


Harmonics tremolo: keep the pitch of the effect note changing the keys as fast as possible.
Note 1: also the noise of the keys should follow the dynamics indications.
Note 2: the tremolo on the harmonics of the notes B and B flat has to be performed trilling the key pressed by the right hand in the position used to produce the note.

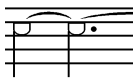
As fast as possible.



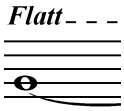
Bending: without changing the position, decrease (or increase) the note according to the amount indicated (flat, a semitone lower, sharp, a semitone higher), turning appropriately the instrument.



Very staccato, use the tongue very much.



Sing the sound/syllable/word inside the instrument covering the whole hole with the lips.



Flatterzunge

Defined group: the notes should to be played *accelerando* (or *rallentando* if beams are in reverse position relative to the example). The total duration is approximate whereas the number of the notes is that indicated.

Instructions for the live electronics performer

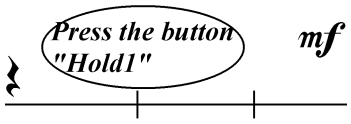
The patches can be run both on Mac and Windows, with MAX/MSP version 4.6 or higher and with the appropriate version of Ambisonics Tools for MaxMSP (that has to be installed following the README instruction).
The main patch to be started is called “MAIN_CONTROL”.

Special attention must be paid to the settings of the volumes: the flute player and the soprano must have the same output volume, moreover the volumes of the effects must follow the dynamics indicated in the score. The input level volume of the contact microphone should be set to -30 dB.
For the most part the effects are based on the filtering of the buffer of the patch “control_breath”: on such a buffer are recorded the breaths (through the embouchure hole) of the flute player plus their transposition at 4 superior and 4 inferior octaves.

The control of every patch is indicated in a rectangular box with the structure [command, name of the patch] :

START circle 3	Switch on the toggle to activate the patch.
STOP direction_6_B-F	Switch off the toggle to deactivate the patch.
OPEN sphere_formation	Open the patch.
CLOSE PART V	Close the patch.
START & OPEN 12lines	Switch on the toggle to activate the patch and then open it. Note: there is not the “STOP & CLOSE” action because of the strong optimization of the control of the patches.

The buttons to be pressed inside the patches are indicated with their name in an elliptical box:



The dynamics indications near the buttons (or near the patches) can indicate:
- the volume that the patch should have (the default volumes are already properly set).
- the volume level to be reached controlling a slider inside the patch.

The control of the patches is strongly optimized. Indeed an action can control various patches:

```
/*This action causes the stop of the patch
"Hold_stereo_circular" after its two volumes
decrease linearly to 0 over 30 seconds.
Subsequently also the patch "PARTII" is
automatically stopped*/
```

sentence end	Wait until the end of the sentence recited/singed by the soprano. Note: wait for the end of the sentence not for the end of the delays.
Images disappearance	Wait until the images on the screen are completely disappeared.

Audio effects explanation

- **default settings:** the sound of the soprano and of the flute player are reverberated with a short stereo reverber. Then the left and the right part of the reverberated sound are spatialized on channels (1,2,6) and (3,4,5).

- **control breath:** allows to create a complex soundscape of crossing breaths holding the sound (coming both from the flute player and the soprano) various times with a trapezoidal envelope of 4 seconds. The sound held is summed to its transpositions (using FFT) at 8 octaves (4 superior and 4 inferior) for which is possible the control of the volumes at pairs of octaves. This patch also allows to record on a buffer the sound processed: such a buffer will be filtered in various ways by the different algorithms (the sound in the buffer has a large spectrum due to the 8 transpositions).

- **part_I_3_directions:** allows to spatialize in 3 ways the sound resulting from the sum of 4 FFT-based bandpass which select from the buffer a frequency plus its 3 superior octaves (the bandwidth increases with the octave):
  - **part_I_directionT-D:** the sound is spatialized along a linear trajectory from top to bottom. When it reaches the bottom it restarts from the top.
  - **part_I_directionF-B:** the sound is spatialized along a linear trajectory from front to back. When it reaches the back it restarts from the front.
  - **part_I_directionL-R:** the sound is spatialized along a linear trajectory from left to right. When it reaches the right it restarts from the left.

  The velocity at which the 3 virtual sources move is identical.

- **Hold2PitchShifterRevLR:** the incoming sound is held (with a trapezoidal envelope of 4 seconds), pitch-shifted (using FFT) to the two inferior octaves and reverbered with a long stereo reverber. Then the left and the right part of the reverbered sound are spatialized on channels (1,2,6) and (3,4,5).

- **control_Redhae_formation: s**even sinusoids (starting automatically one at a time) are spatialized along trajectories that follow the curves of the Seed of Life symbol. The first sinusoid moves along the exterior circle, the other six sinusoids move along the six interior arcs (half a circle). The frequency of each sinusoid is a note of the triad of C major.

- **reverber+6delays:** first of all the sound is reverberated with a long stereo-reverber. Then the left (L) and the right (R) part of the reverbered sound are delayed six times (at distance of 1 second and with decreasing volume) on the six channels in the following order: (L,R) = (1,4), (2,5), (3,6), (4,1), (5,2), (6,3).

- **Hold_stereo_circular:** the incoming sound is held (with a trapezoidal envelope of 4 seconds) and spatialized along a circular trajectory having the radius of the hexagon on which vertices the speakers are placed. The patch has two buttons to hold the sound in two different ways:
  - the button "Hold1" holds the incoming sound, sums it to its transpositions at 8 octaves (4 superior and 4 inferior), reverbers it with a long (mono) reverber and spatializes it to the circular trajectory
  - the button "Hold2" holds the incoming sound, reverbers it with a long (mono) reverber and spatializes it to the circular trajectory.

  The two virtual sources move along the same circular trajectory, with the same velocity but with a distance of 180 degree from each other.

- **Lessinia:** six images of the symbol found in various parts of Lessinia are presented. Each time a new image appears on the screen the voice of the soprano is spatialized in a different channel. The images appear (and disappear) at the centre of the screen.

- **Northern_Italy:** twelve images of the symbol found in various part of Northern Italy are presented. Each time a new image appears on the screen the voice of the soprano is diffused on a different channel, and delayed one time on the channel at the opposite vertex of the hexagon (i.e. direct sound on channel 1 and delayed sound on channel 4). The position of the images follows the channel spatialization of the direct sound.

- **Italy:** six images of the symbol found in various part of Italy are presented. Each time a new image appears on the screen the voice of the soprano is diffused on a different channel, and delayed two times on other channels. The order follows the hexagon vertices counter-clockwise, according to the following pattern: e.g. direct sound on channel 1 and first and second delays on channel 3 and 5 respectively. The position of the images follows the channel spatialization of the direct sound.

- **Europe:** twelve images of the symbol found in various part of Europe are presented. Each time a new image appears on the screen the voice of the soprano is diffused on a different channel, and delayed three times on other channels. The order follows the hexagon vertices counter-clockwise, according to the following pattern: e.g. direct sound on channel 1 and first, second and third delay on channel 4, 6 and 3 respectively. The movement of the images follows the channel spatialization of the direct sound.

- **World:** twelve images of the symbol found in various parts of the World are presented. Each time a new image appears on the screen the voice of the soprano is diffused on a different

channel, and delayed four times on other channels. The order follows the hexagon vertices counter-clockwise, according to the following pattern: e.g. direct sound on channel 1 and first, second, third and fourth delay on channel 4, 6, 3 and 5 respectively. The movement of the images follows the channel spatialization of the direct sound.

- **Crop_Circles:** six images of the symbol depicted in various Crop Circles are presented. The images appears (and disappears) simultaneously. The direct sound is delayed 6 times according to the "reverb+6delays" spatialization.

- **control_pedal_fifth:** two low frequency notes (the root and its fifth) are filtered (with a FFT-based bandpass) from the buffer and are spatialized along two hexagonal trajectories creating a pedal effect. The root note moves in clockwise with a small radius (so the sound is loud), the fifth moves in counter-clockwise with a big radius (so its sound is not loud).

- **Hold8PitchShifterRevLR:** the incoming sound is held (with a trapezoidal envelope of 4 seconds), pitch-shifted (using FFT) to 8 octaves (4 superior and 4 inferior) and reverbered with a long stereo reverber. Then the left and the right part of the reverbered sound are spatialized on channels (1,2,6) and (3,4,5). The resulting effect of the filter applied to a voice or a flute (both without vibrato) is that of an organ.

- **control_InharmonicFilter:** the buffer is filtered (using FFT) with 17 bandpass whose central frequencies are placed at not harmonic distances.

- **control_6directions:** allows to spatialize in 6 different ways the incoming sound recorded in 6 buffers:
  - **direction_1_T-D:** the sound is spatialized along a linear trajectory from top to down. When it reaches the bottom it restarts from the top.
  - **direction_2_R-L:** the sound is spatialized along a linear trajectory from left to right. When it reaches the right it restarts from the left.
  - **direction_3_F-B:** the sound is spatialized along a linear trajectory from front to back. When it reaches the back it restarts from the front.
  - **direction_4_D-T:** the sound is spatialized along a linear trajectory from down to top. When it reaches the top it restarts from the bottom.
  - **direction_5_L-R:** the sound is spatialized along a linear trajectory from left to right. When it reaches the right it restarts from the left.
  - **direction_6_B-F:** the sound is spatialized along a linear trajectory from back to front. When it reaches the front it restarts from the back.

  The velocity at which the 6 virtual sources move is identical.

- **pedal:** a low frequency note is filtered (with a FFT-based bandpass) from the buffer and spatialized along two hexagonal trajectories creating a pedal effect. The first trajectory is clockwise with a small radius (so the sound is loud), the second one moves in counter-clockwise with a big radius (so its sound is not loud) and a bigger speed.

- **12lines:** this patch allows to play 12 dominant seventh chord. Each one of the 4 notes forming each chord is the sound resulting from the sum of 4 FFT-based bandpass which select from the buffer a frequency plus its 3 superior octaves (the bandwidth increases with the octave).

- **sphere_formation:** this patch generates a sound composed by a (major or minor) triad chord equally spatialized in all the 6 channel, plus 3 sinusoids spatialized along 3 circular trajectories with equal centre but orientated in different ways in the tridimensional space (this to reach the purpose of representing a sphere at audio level). The frequencies of the sinusoids are the root

note, its third and its fifth and changes with the chord played (the default chord is G major). Moreover the velocity of each sinusoids along the circular trajectories changes with the button pressed.

- **control_Sol_Formation: s**even sounds (starting one at a time), composed by the sum of a sinusoid and a FFT-based bandpass with a very thin bandwidth, are spatialized along trajectories following the circles that forms the Seed of Life symbol. The first sound moves along the interior circle, the other six sounds move along the six exterior circles. The frequency of each sound changes each time a new sound is activated. On the screen seven points moving around seven circles of different colours appear. As each circle appears, the velocity of the points moving on the screen gradually increments, as well as the velocity of the seven virtual sources along the trajectories.

- **part_VI_3_directions:** allows to spatialize in 3 ways the sound resulting from the sum of 4 FFT-based bandpass which select from the buffer a frequency plus its 3 superior octaves (the bandwidth increases with the octave):
  - **part_I_directionR-L:** the sound is spatialized along a linear trajectory from left to right. When it reaches the right it restarts from the left.
  - **part_I_directionB-F:** the sound is spatialized along a linear trajectory from back to front. When it reaches the front it restarts from the back.
  - **part_I_directionD-T:** the sound is spatialized along a linear trajectory from down to top. When it reaches the top it restarts from the bottom.

  The velocity at which the 3 virtual sources move is identical.