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aSail – aSynchronous as in life

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An audiovisual experiment, that implements spatio-temporal synchronisation between visible and audible events, happened. This experiment was materialized with light – array of LEDs, and digital sounds widespread by an array of loudspeakers. A computer program, based on a video white noise generator, calculates in real time unpredictable rhythmic sequences that are perceived as precisely located audiovisual events. For xCoAx, the experiment will be re-designed to combine synchronous and asynchronous audiovisual events in order to play with the spatial perception of the space where aSail is installed. Audiovisual asynchronism will convey the perception of distance by simulating the differences between light and sound speeds.

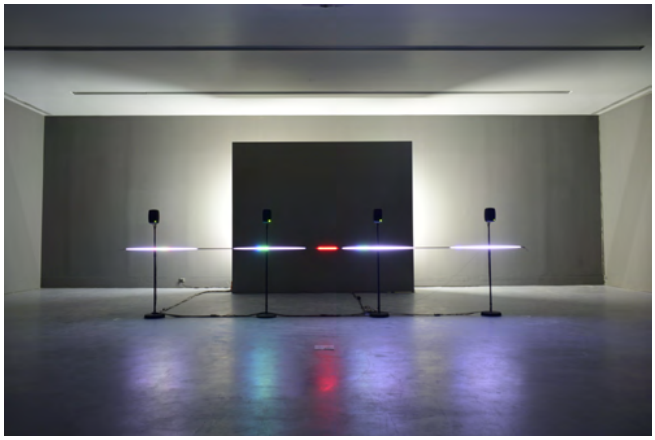


Fig. 1.

1 DESCRIPTION

Single perceptual object

In our everyday experience almost any audible phenomena has a visual event associated to it. For example, in normal conditions, without physical obstacles, when we see a glass crashing on the floor, we also ear the sound of the same glass hitting the floor. Bizlei et Al. (2016) emphasize that auditory and visual objects share particular properties: both have linked features that change over time and perceptually group together the acoustic or visual features that come from a common source. According to Teramoto et Al. (2012) most objects and events in the external world generate concurrent inputs to several different sensory modalities. For a long time researchers assumed that each input (audition and vision) were processed in the brain independently however recent studies on multisensory perception have revealed that different sensory modalities are closely related and mutually interplaying. The phenomena of hearing and seeing at the same time can be named as auditory-visual integration. Bizlei et Al. stated that what we hear and see take strikingly different physical forms, and are necessarily encoded by different sensory receptor organs, but auditory and visual features are effortlessly bound together to create a coherent percept. Binding stimulus features from a common source is not only a problem across sensory systems – within sensory systems, parallel and independent perceptual feature extraction mean that stimulus features, such as pitch and space, must also be appropriately combined into a single perceptual object.

Sail

The goal of Sail—Synchronous as in life, the audiovisual experiment that originates the current submission, is precisely to create a single perceptual object that would affect simultaneously the senses of hearing and seeing in time and space. This object consists of a horizontal line of three hundred RGB LEDs, four equally spaced loudspeakers, also horizon-

taly aligned, controlled by a computer, a four channel audio card and a microcontroller development system–Teensy 3.6. An original algorithm, implemented as a custom computer program, transmutes a real time white noise digital video signal into a sequencer where pixels brightness, above a variable threshold, trigger synchronous audiovisual events simultaneously on the loudspeakers and on the LEDs. The algorithm also determines the spatialization of the audiovisual events that occur on different locations of the line – constituted by loudspeakers and LEDs. For example if a sound is heard on the most left loudspeaker, a luminous event is simultaneously visible on the left side of the LED line. If a sound is moving from the left to the right, through the four loudspeakers, a synchronized luminous event will also move from the left to the right side of the LED line. For a better understanding of this experiment please attend the audiovisual documentation available at: https://vimeo.com/317813704.

Asail

For xCoAx 2019 submission, the previous experiment will be re-designed in order to experiment between audiovisual asynchronism and synchronism as a possibility to expand an illusory sense audiovisual spatialization. This new experiment will be titled aSail – aSynchronous as in life. aSail is constituted by exactly the same hardware, with exactly the same placement, as in Sail, however the algorithm will be re-designed in order to introduce variable time latency between the visible and the audible. The intention is that this latency induces to a depth illusion. Instead of an audiovisual spatialization in a horizontal line as in Sail, it is expected that in aSail an illusion of audiovisual depth spatialization on an horizontal plane is achieved.

According to Bizlei et Al., crossmodal integration is a term applicable to many phenomena in which one sensory modality influences task performance or perception in another sensory modality. In our everyday life experience, almost all audiovisual events are in fact asynchronous due to the light and sound different speeds. When one is three hundred meters away from a firework show, the sound of the fireworks has a latency of around one second. This latency reinforces the perception of distance.

Let's imagine aSail inside a three axes cartesian space, the visual events can only vary on the x (horizontal) axis because the LEDs are aligned horizontaly and all of them have the same height and depth. From a crossmodal integration approach it should be possible to induce the illusion of depth by playing with the latency of audible stimulus to visual stimulus. For example if there's a white flash on the led line synchronized with a bass sound, this perceptual object could be interpreted as being closer than a perceptual object in which the sound would be heard half a second later than the flash of light. xCoAx 2019 seems a great opportunity to experiment and premier aSail.

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