

SEAM PROJECT - SUSTAINED STEREOPHONY

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ABSTRACT

After decades of sound and music technology development, the everyday practice reveals one of the first walking dead: the stereophony. In less than a hundred years from its birth, the stereophony is not only at the end of its comprehension but also at the end of its necessity. The electroacoustic literature has constant focus, through history, to the listening. Listening as a starting point of thinking, as a background of composing, as a long-distance perspective. Actually today we know better than Blumlein how people listen, how ears and brain do what they do. What we lose versus Blumlein, is the necessity of listening, of reproduction, of listening of reproduction.

When the words no longer point themselves we lose, with the meaning, also the reality we used to refer, using them. The transition from the age of mechanical reproduction of reality, through the history of attempts to reproduce it up to the virtual reality, must pass through, preserving and sustaining, that concepts which have defined the necessity of reproduction. Sustaining the electroacoustic literature, the repertoire, means to sustain the necessity of some concepts, like stereophony, and their related consolidated practice, to the perspective of development or, at least, the surviving of comprehension.

1. INTRODUCTION

Sustained Electro-Acoustic Music is a project inspired by Alvis Vidolin and Nicola Bernardini's article [1] on *live electroacoustic music sustainability*.

The main ambition of this project is to grow the interpretation and the electroacoustic musical practice with the consciousness of the electronic and informatics problems that had made arduous to approach this music and prevented the growth of interpretative thinking. It is possible, with a community structure, to determine, build and stratify interpretation of musical core, the repertoire, concealing the environment-related technological issues. They are instruments, not the music itself, after all.

These are the SEAM organisation coordinates:

- <http://s-e-a-m.github.io>
- <http://seam-world.slack.com>

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2. PROBLEMS

Why a project about sustained electroacoustic music must focus on stereophony issues? The literature and the repertoire survive thanks to the community activities. Most of those activities require education, strong education about musical matters. The education, even music education, is layered, from roots to top floor of music knowledge. To look inside the twenty-third floor, you have acquired the bottom levels of knowledge, from the roots.

Especially the roots, the elementary concepts, the etymology of the basic lexis, is the most fragile and most violated place of knowledge, a place where stereophony, one of the keywords of the sound realm, just before to lose its meaning still losing its necessity.

Speaking about stereophonic sound in music classes, at each level of learning, should be a keynote, a moment in which by simple words, simple by different level of learning, people understand how they listen to something, perhaps the music, they also understand the sound reproduction meaning, with reproduction significance of something real, where per real we almost focus on what we perceive and are able to describe, like something about sound. So speaking of stereophony must be a grade zero of comprehension and, after, knowledge. How it could happen if the explanations about sounds, reproduction of sounds and stereophonic sounds are the following?

È bene chiarire subito la differenza fra il concetto di "mono" e quello di "stereo". Mono è un termine che deriva dal greco e vuol dire "uno solo", "formato da uno solo". Nel campo audio si definisce mono un segnale che viaggia su un solo canale; esso è costituito da un'unica onda. Si definisce Stereo una coppia di segnali audio aventi delle differenze anche minime fra loro, che viaggia su due canali indipendenti: il canale sinistro e il canale destro; il segnale stereo è pertanto costituito da due onde.

... and many greetings to Blumlein.

Which electroacoustic realm could be based on these explanations? The one we internationally have now on most of the music audible during electroacoustic concerts. The one that totally ignores the loss of the necessity of listening with both ears.

3. ROOTS

The healthy mental attitude to sharing knowledge forecast the roots knowledge and sharing, even without interpreta-

tions, they could be afforded later.

An observer in the room is listening with two ears, so that echoes reach him with the directional significance which he associates with the music performed in such room. He therefore discount these echoes and psychologically focuses his attention on the source of the sound. When the music is reproduced through a single channel the echoes arrive from the same direction as the direct sound so that confusion results. [...] Human ability to determine the direction from which sound arrives is due to binaural hearing, the brain being able to detect differences between sound received by the two ears from the same source and thus to determine angular directions from which various sounds arrive.

With those words, Blumlein describes simultaneously the fundamentals of at least two huge arguments: how we perceive acoustic sounds, how we reproduce sound to be listened to and perceived.

... it is fairly well established that the main factor having effect are phase differences and intensity differences between the sounds reaching the two ears, the influence with each of these has depending upon the frequency of the sounds emitted. For low frequency sound waves there is little or non difference in intensity at the two ears but there is a marked phase difference. For a give obliquity of sound the phase difference is approximately proportional to frequency, representing a fixed time delay between sound arriving at the two ears, by noting which there is a phase difference of π radians or more between sound arriving at the two ears from a source located on the line joining them: but above such frequency if phase difference were the sole feature relied upon for directional location there would be ambiguity in the apparent position of the source. At the stage however the head begins to become effective as a baffle and causes noticeable intensity difference between the sounds reaching the two ears, and it is by noting such intensity difference that brain determines direction of sounds at higher frequencies.

... the frequency at which the brain changes over from phase- to intensity-discrimination occurs at about 700cps. ... in any case the transference is not sudden or discontinuous but there is considerable overlap of the two phenomena so that over a considerable frequency range differences of both phase and intensity will to some extent have an effect in determining the sense of direction experienced.

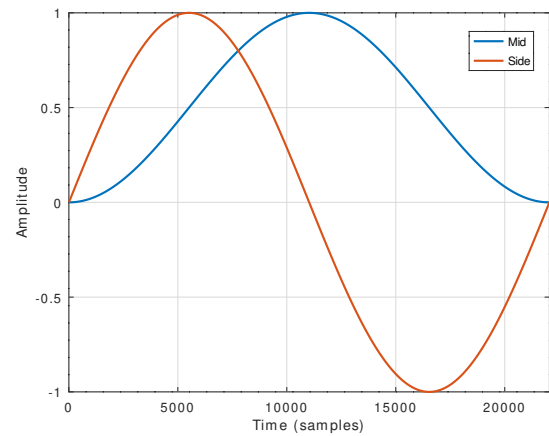


Figure 1. Mid-Side panner, 360 degrees sweep from left to right.

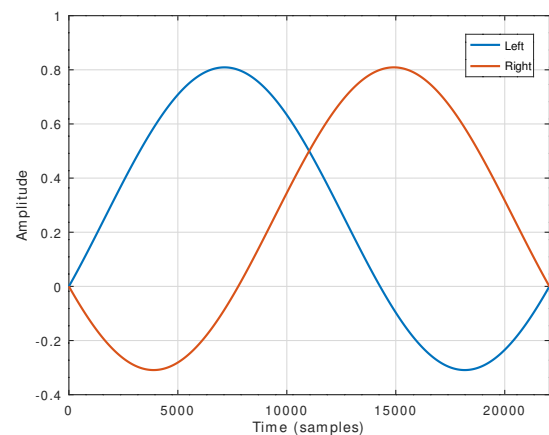


Figure 2. Mid-Side panner to Left Right amplitude matrix. 360 degrees sweep from left to right.

The invention also consists in a system of sound transmission wherein the sound is received by two or more microphones, wherein at low frequencies difference in the phase of sound pressure at the microphone is reproduced as difference in volume at the loud speaker.

4. MID-SIDE PANNER

```
mspan(x, rad) = m, s
with{
  m = (0.5*x) + (0.5*(x*cos(rad)));
  s = x*(sin(-rad));
};

import("stdfaust.lib");
import("../faust-libraries/seam.lib");
```

5. REFERENCES

- [1] N. Bernardini and A. Vidolin, "The title of the journal paper," in *Sound and Music Computing*, 2005.