

An Approach to Spatio-temporal Computer Music

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1. Introduction

There is now a vast array of electronic devices available for the creation and organisation of sound. However, no matter what equipment is used, electronic music has, in the large majority of cases, only one actual instrument – the loudspeaker. This instrument is remarkable in its ability to create an enormous range of sounds. In fact so much so, that loudspeakers are often wrongly assumed to be able to create, or reproduce, any sound at all. For musicians and composers, loudspeakers tend to become conceptually invisible in the creative chain. This is despite the fact that loudspeakers do have limitations and these limitations strongly influence the type of music created for them.

For composers in the early days of electronic music, loudspeaker technology might have been seen as a means of liberation from the restrictions of acoustic instruments. They could produce sounds with dynamic, and frequency ranges far greater than what was possible with acoustic instruments¹. However while loudspeakers have many advantages, it became apparent, during the development of electronic music, that they are inferior to acoustic instruments in the way that they render sound as a spatial event. To many listeners, sound heard via loudspeakers does not seem real. It does not seem to live in acoustic space in the way that sound from an acoustic instrument does. This may be one reason why many musicians in the academies and elsewhere limit their musical practice to traditional acoustic instruments despite the enormous popularity of electronic music.

By way of a background discussion, this paper will cover the issues raised above, and outline some approaches to sound spatialisation using loudspeakers. This discussion will provide the rationale for the SNet software project that is the main focus of the paper. SNet is a program, designed using the “Max”² programming environment, to generate spatio-temporal music. In this context, spatio-temporal music refers to music in which the spatial position of sound, in a multi-speaker sound system, is considered as one of the primary compositional parameters. The software consists of a connectionist style network of nodes. This network has been designed to mimic some aspects of the behaviour of biological neural networks, in order to create spatio-temporal coordinates in real time. The discussion of the software will include the function and design of the software, and a discussion of its behaviour.

¹ Loudspeakers are also acoustic instruments, however in common practice they are considered differently, possibly because the generative facility is electronic.