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The Analysis of Music for Performers and Real-Time Electronics:
An interactive aural approach from the TaCEM project

ABSTRACT

Background

The TaCEM project (Technology and Creativity in Electroacoustic Music), funded by the United Kingdom's AHRC (Arts and Humanities Research Council) and led by the three authors of this communication at the University of Huddersfield and Durham University, has been investigating the relationship between technological innovation and creative processes on the basis of nine case studies from the electroacoustic repertoire. For each case study, both historical and analytical considerations have been tackled; for the latter aspect, an interactive aural approach (Clarke 2012) has been adopted, leading to an important work of analysis-oriented software development (Clarke, Dufeu, Manning 2013). Indeed, the study of a repertoire in which scores, if present at all, provide only limited information on the electronic processes at play, can benefit significantly from an emphasis on the aural and an interactive engagement with the musical potential offered by the technology. Besides, reconstructing digital environments used for composition or performance with technology can greatly enhance the understanding of electroacoustic music and, in particular, foster its poïetic analysis (Battier 2003, Clarke, Manning 2008, Dufeu 2010).

Aims and repertoire studied

This communication addresses a particular subset of the case studies of the TaCEM project: those involving performers and live electronics, namely Philippe Manoury's *Pluton* for piano and 4X (1988/1989), Jonathan Harvey's *Fourth String Quartet* (2003), and Cort Lippe's *Music for Tuba and Computer* (2009). The software developed as part of the project aims at facilitating the analysis of the music as sound and implements emulations of the technologies employed by the composers. Both accessible to non-specialists and featuring advanced functions, these freely available applications must enable their users to engage interactively and aurally with the works, their musical structures, and their associated techniques. The specificity of Manoury, Harvey, and Lippe within the nine case studies is the analytical consideration of the modes of interaction between performance and electronic processes.

Methods

Depending on the composer's aesthetic project, a digital environment for music performance can produce a variety of musical and sonic outputs that largely exceeds the classical instrumental model: for instance, time-varying timbral behaviour (Settel, Lippe 1994), generation of gestural-dependent sequences (Manoury 2003), spatialisation of the sound projection (Bossis 2015). Analysing these processes cannot only rely on the examination of the score, often limited regarding the electronic production, and on the existing recordings, simply offering one musical result amongst many other possible configurations. Therefore, engaging with a software reconstruction of the studied processes enables the analyst to explore the entire set of musical possibilities and its relationships with the gestures of the performers. For instance, in some sections of Manoury's *Pluton*, Markov matrices generate sequences relying on both some degree of randomness and the dynamics of the pianist's performance (Manoury 2003); thus, from a performance to another, the material produced by the real-time environment can vary significantly. Providing an interactive access to such a process complements usefully the listening of a particular concert or recording, in that it allows to experiment with the available parameters and listen to a wide range of possible musical outcomes.

The reconstruction of the environments for the performance of these three works was made possible by accessing the computer sources developed in the Max software (Lippe, Puckette 1991). The Max programs, called patches, developed specifically for Manoury, Harvey, and Lippe's works are primarily intended to be operational in the context of a rehearsal or a concert; nevertheless, they constitute an invaluable source for musicologists, as they fully inform on the sound engines, their interconnections, and their integration into the written score. In their own developments, the authors of this communication have extracted the relevant modules and imported them into the TaCEM software, adapting them with additional functions and visualisation modes whenever relevant to the musicological scrutiny.

Implications

Developed specifically for the study of the considered works, the TaCEM software enables the user to play with instrumental samples as a source and with the parameters of the electroacoustic processes, allowing for an in-depth analysis of the music and the full integration of the electronics into the performance. Some interview videos with the composers — except Jonathan Harvey, who passed away in 2012 — and their collaborators are embedded in the software and complete the documentation of the creative process and the analytical findings. This approach is integrated within a book publication under finalisation, in which the written text links closely to the interactive examples present in the software applications, along with demonstration videos for those readers who wish to be introduced to the software's operation modes and functionality, as well as the actual analytical examples. With such an articulation of the main project outcome, the reader of the analyses of the case studies can engage with software resources corresponding to particular aspects raised in the text, and use the applications to conduct further research themselves.

Keywords

Computer music, contemporary music, electroacoustic music, interactive aural analysis.

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