On the Use of Computer Systems in Contemporary Music

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Abstract

The motivations, goals, and initial hypotheses as well as the approach and the results of a research project on the use of technological tools in the compositional process are discussed. Design suggestions for computer music tools are developed under the perspective of some of the results of our study. We report on software development directly influenced by the project.

1 Motivation and goals

The use of computer systems in contemporary music seems to be characterized by the following problems:

- Composers using computers to realize their music are often unsatisfied with the features offered by existing tools.
- Music composed and produced with the aid of computers is generally not very well considered by the audience, even by supporters of contemporary music.
- The existing computer music tools are used only by a very restricted community of composers.
- The "computer music scene" seems to be guided by Technologically oriented paradigms.

In a two-year research project we tried to find some explanations for these observations and to develop suggestions for a more satisfying use of new technology in contemporary music composition.

2 Hypotheses and strategy

Our study was guided by the following three initial hypotheses:

(1) In the traditional socio-philosophical discussion, art and technology are opposed to each other by their goals, epistemological interests, and their criteria of validity. We assumed that this divergence is responsible for an unsatisfying application of new technology in the arts.

(2) Computer tools seemed rarely employed by artists because the particularities of artistic imagination are not well understood or not seriously taken into account in the process of designing compositional systems.

(3) The social context and especially the working conditions of artists appear to be of crucial importance for a fruitful evolution of artistic creation. Thus, these conditions have to be improved to encourage a successful employment of computer tools in composition.

In the course of the project we examined these hypotheses both by theoretical analyses and empirical studies. The theoretical work covered an investigation of the compositional process, an analysis of contemporary concepts of composition, and a musicological interpretation of the different currents of today's compositional thinking including an evaluation of what is called computer music. The analysis of the music software was divided into two categories: sound processing and synthesis tools (SpecDraw, AudioSculpt, csound, ISPW, Foo) and systems for computer assisted composition (PatchWork, Max).

The empirical studies included structured interviews with composers, interviews based on case studies, ongoing group discussions with composers as well as interdisciplinary participatory system design and development in the area of sound synthesis and processing (Foo, AudioSculpt, GST).

3 Results

3.1 Theoretical and empirical research

By the means of the above mentioned theoretical analyses and empirical studies the validity of our three initial hypotheses was tested and led to the following results.

3.1.1 Art versus technology

Our first hypothesis - based on the opposition of art and technology typical for the socio-philosophical discourse (for details see [9] and [10]) - could be confirmed insofar as the divergence between artistic and technological criteria and objectives can explain some of the problems artists encounter when using new media. Confronted with the technological potential, artists have to preserve and defend their own artistic position against the implicit paradigms of temptations of technology. They must dissociate themselves from a certain technological habit which is inherent to computer tools and which aims mainly at regulation and control. Any relationship between art and technology is characterized by this tension which artists cannot ignore. They respond to this problem - which also bears interesting potentials - in various different ways.
3.1.2 Artistic imagination

Our investigations on the particularities of artistic imagination resulted in the following understanding of the compositional process:

- Composition must be considered to be a highly individual activity which can neither be sufficiently described by scientific models nor documented by the means of abstract concepts. Usually, composers tend to develop their own creative strategies according to their proper exploration of the musical material and these experiences influence directly the artistic imagination.

- The compositional process cannot be understood as sometimes assumed - as a transformation of a clearly defined idea into a work. It is rather characterized by vague initial ideas, an affective attitude towards an unclear utopia which only gradually concretizes when confronting it with the conceptual and technological means at disposal. And sometimes, it is this confrontation itself which is the actual source of an artistic intention.

- The important phases of the compositional activity such as the development of the initially vague ideas for a work or the search for new possibilities through the exploration of the material escape any form of reproducible description. The descriptions usually given by composers are rather theoretical (re-)construction of a practice (11) which seems to have little in common with their actual proceeding. What is described as artistic imagination reveals itself as a construct rooted in mythical, cultural, and historical attributions - a form of description that constrains the typical redundancy and monotony which are also part of composition.

- Although composition certainly requires craftsmanship, this competence cannot be described as a generalizable know-how. By developing their own ways of creating, choosing, or treating the material, composers invent new ways of proceeding which may intentionally contradict established approaches (e.g. by using technological tools).

To summarize: The difficulties to verbalize, to generalize and to formalize the compositional process are responsible for the problems system designers are confronted with when trying to build systems suiting the needs of composers. Nevertheless, we conclude that the unawareness of the particularities of artistic imagination, which follows from these difficulties, cannot be made entirely responsible for an unsatisfying usage of technology in contemporary music, but is only one of the reasons for the problems of composers using new technology.

3.1.3 Social context

Our third hypothesis concerned the dependency of artistic creation on environmental factors. This takes place. Composing appeared in all our investigations as an essentially context-sensitive activity (i.e. it shows a high degree of dependency on the conditions under which composers have to work). This concerns both the social environment and the material needs, which can be characterized by the following polarities revealing opposing aspects:

- Either composers use technological tools on their own, or they work with assistants;
- Either they have enough time to explore the possibilities of tools, or a production has to be finished under extreme time pressure;
- Either composers have the possibility to work with musicians already while composing, or only little rehearsal time is available before the premiere;
- Either the financial and material resources are adequate for a project, or composers are confronted with extremely limited resources;
- Either the use of a certain material or formal procedures is eschewed and is therefore expected to create a positive resonance in the public, or it is regarded as old-fashioned and will be rejected, etc.

Besides, the creative use of new technology depends on how composers manage to establish themselves in the artistic field which is governed by competition and demarcation, on what role the specific piece plays in this process, and how that piece can be expected to be received by the audience and critics. All these factors influence the artistic work and are - beside all presumed artistic inspiration - responsible for success or failure of a composition. The myth of the isolated genius who liberates himself or herself from all contextual dependencies cannot be kept up any longer when considering the social context.

Thus it can be presumed that the social and material context in which composers work accounts much more to the success or failure of a compositional project than the quality of certain computer systems or the emergence of the objectives of art and technology. Of course, the computer tools have to fulfill the highest possible ergonomic standards and it is also important to improve the communication between artists, scientists, and technologists - but the institutional and social environment appears much more significant because it establishes the basis for any creative use of technology.

3.2 Design suggestions

Our studies show that it is of main importance to improve the working conditions of composers, especially to arrange sufficiently long exploration periods for the discovery of the artistic potential of new technologies in the first place. Besides that, the following aspects should be considered:

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The use of participative evolutionary design strategies [12] for the development of tools for sound synthesis and computer aided composition allows composers to discover their actual needs and to communicate them to the software developers.

The basic criteria sound synthesis and computer aided composition tools have to fulfill are: modularity, openness, programmability, transparency, and a user interface adapted to novice as well as expert user.

- Besides standard visualization techniques, other non-numerical methods of representation, control, and modeling of sound objects should be employed. Genetic and neural, physical modeling, and virtual reality technologies offer a broad range of new possibilities in this direction.

- Institutions have to support an experimental exploration of the technological potential during dedicated and sufficiently long time spans. Whenever necessary, competent assistants should be able to help the composers on a conceptual, theoretical, and practical level.

- A successful collaboration of the different disciplines - a prerequisite for the use of technology in the arts - implies that traditional conceptions and paradigms inherent to the respective areas have to be questioned.

3.3 Examples

The development of three computer music tools was (partially) influenced by the project:

- The sound synthesis tool FOO [5] was developed in collaboration with the composer Ramón González-Arroyo at the Zentrum für Kunst und Medienkultur Hamburg (ZKM) in Germany.

- A participative evolutionary development approach was followed, resulting in a highly flexible and modular tool which responds well to the individual approaches of different composers.

- AudioSculpi [2] is a spectral editing tool using modern visualization methods developed by Chris Rogers at IRCAM based on traditional sound analysis/synthesis techniques (SPW [13]).

Sophisticated sound transformations can be performed by directly editing the graphical sound representation. AudioSculpi allows for a very intuitive access to the different features of complex sound material, even for less experienced users.

- GIST [9] has been developed in collaboration with the composer Manuel Roehn-Iturbide at IRCAM following a participative evolutionary development approach as well. GIST is a toolkit for granular synthesis applications on the ISPW [4]. Its modularity and conceptual orthogonality makes it applicable to a wide range of very diverse synthesis applications and it can therefore cope with the highly individual approaches of composers mentioned above.

References


