

## **The Digital Art: IRCAM**

### **Jean-Baptiste Barrière**

The IRCAM (Institute for musical/acoustical research and coordination) is a centre devoted to musical research under its various aspects: musical acoustics, instrumental studio, construction of sound processors (numeric synthesizer hardware, e.g. the 4X, which is the most important system existing at the moment), simulation, analysis, modelling and synthesis of sounds, elaboration of sophisticated logical software for the control of musical structures and compositions, analytic and theoretic studies, pedagogy and finally production and diffusion of oeuvres. The simple listing of these different domains shows the diversity and richness of the problems which the IRCAM has decided to deal with. It also points out clearly, how the IRCAM—since its conception—has been subject to a well-grounded and creative will: Trying to resolve—by group work and by giving room to a new type of relations between researchers and musicians—the problems of musical creation, inaccessible to individual solutions. For as Pierre Boulez once stated: "The intuition of the creator on its own is too weak for the total translation of a musical invention. Thus it is necessary to have a recourse to the collaboration of the scientific researcher in order to envisage the future on a longer term, to imagine less personally limited solutions (...)

What we need is that the musicians internalize a certain scientific knowledge as an integrated part of their creative imagination. Pedagogical sessions will give both scientists and musicians the opportunity to teach each other their points of view and their trains of thought. Thus we hope to forge a kind of common language—almost inexistent for the moment—by forming a team essentially oriented towards musical creation" (1973/74). In all these activities the computer has revealed itself—not from the beginning, but in the way suggested by Pierre Boulez' words—as a privileged tool, not only for analysis and scientific calculation, but also for the synthesis of sound and for composing.

The use of the computer forces the musician to define all his premises, but also to specify and bring forth, to explicate any kind of detail which he usually fails to notice, i.e. everything generally implicit and empirical in musical knowledge. This all happens as if the computer were—at least for the time being—the last and final stage of what H. Dufour has called "artifice of writing", i.e. as if it opened a new space of possibilities for composition by forcing the explication of the processes and of the internal structures of the function mode of music. The computer asks for explications and formalization of everything still transmitted orally in music, of what was considered relevant for the knowledge of a "school", what was verbally transmitted and not written, resting on the "work" accumulated within thousands of years, whether this was produced by the gesture of the violin maker, by the interpreter or by the resulting sound material. This is the great power and at the same time the great difficulty in the musical utilization of the computer.

Everything has to be explicated beforehand, no real empiricism is possible. Nothing can be left to hazard, not even hazard itself: the computer is a deterministic machine and even the "random event" must be simulated (and thus becomes reproduceable!). So every knowledge has to be exteriorized and formalized to render it useable—and it is exactly this process making knowledge recognizable as such.

Problems of this kind are also exemplified by the research work about the synthesis of sound, particularly by the method of "synthesis by rules", which was introduced at the IRCAM in the realization of the synthesis program CHANT, originally developed for the synthesis of voice and found out to be so general, that it is now used for the generation of any kind of sounds,

whether deriving from instruments or not. This methodology—inspired by simulation techniques and by the synthesis of the word—consists in the elaboration of rules of correlation between different parameters describing the physical evolution of sound production models, such as the voice or instruments.

Once a good model has been realized, what counts more than just the strict imitation of the original is the knowledge just realized and given at one's disposal, which can be reused and transferred upon new applications in maybe very different contexts. Thus, an understanding of the qualities of a voice or a given instrument allows the shaping of richer and more interesting synthetical sounds.

Since the end of the 1950s, i.e. since people have become able to produce synthetical sounds, it has been known that any sound whatsoever could be synthesized. But very early it was noticed that not all of the sounds are interesting. The simulation and the synthesis by rules teach us the construction of sounds starting at the experience of voice, instruments and their handling, as has been acquired over thousands of years. To understand that means also to understand why they are musically interesting to us, and this again opens all by itself a way towards a new music, establishing a continuity between material and organization.

Thus the computer allows the compositional activity to extend to the material—thanks to sound synthesis—and in the same time to realize the old dream of a continuity between micro- and macro-structures.

In every section of musical life the computer is radicalizing the attitudes, questioning the habits by its demand for a complete redefinition of the problems and by its constant regression to modelling—as a structure as well as an instrument of knowledge. For this reason the computer takes a very important role at the IRCAM, because in the end it perfectly responds to the vast project enounced by Pierre Boulez.

Surely this project cannot be but the object of a slow and profound evolution, the milestones of which must be in a direct connection with the theoretical and practical problems of composing: those of organization (and) of the material. It is in the field of a clear-cut correspondance between organization and material, where the stakes of a definite and general musical utilization of the computer are played. And only if this relation can be practically thought through, will the computer develop a purely musical sense.

For if the computer shall effectively be the instrument of a vast enterprise of reconsideration and constitution of the musical knowledge, this would not make sense unless new musical pragmatics are established, and not only in theoretical areas. Hence the necessity for IRCAM to maintain the production of works as one of its major missions, not in contradiction with musical research, but constituting its correct and necessary extension, with in return for research a fertilization and constant renewal of its problems.

For the same reason of why the synthesis of sound in general is the test for the analysis of sound phenomena in a general sense, of the comprehension and integration of those phenomena and of the knowledge resulting, for this same reason IRCAM thinks it necessary that the production be a test for the research work, without limiting each other, but rather bestowing great care upon the preservation of mutual independence.