Why Simulate When We Can Get the Real Thing?

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Computer music often uses mathematically-physical models as an excuse for compositional principles. Markov processes, generative grammars, fractals, cellular automata, chaos and catastrophes have alternatively been the paradigm du jour. This approach is typically justified through an argument of universal homomorphism between all natural phenomena. This paper underscores the relativistic tone of this argument and criticizes its stance by comparing this "scientific" approach to music with the "academic perspective" bias of paintings. The paper also explores alternate views of musical research which dispel concerns of modeling for concerns of practice and abandon the question of the nature of musical sound in favor of reflections on musical production in cultural contexts.

Foucault's Order of Things:
In The Order of Things Michel Foucault contrasts three epistemes which characterize the study of human sciences in the Renaissance, the Classical era and modern times. These epistemes are the guiding principles of the sciences whose function is to "order things" - that is to understand nature and predict its behavior. In Foucault's view, the Renaissance episteme is mainly characterized by classification via resemblances or similarities: things are related because they look alike or because they are "spatially" next to each other. In contrast, the episteme of the Classical era separates things instead of underscored their resemblances. Furthermore the Classical model carries out this differentiation by means of conventional signs which are no longer considered part of the world but an "intrinsic part of knowledge" (Gatting, 1989, 148). The modern episteme acknowledges the failure of representation of the classical era by recognizing the relation of representation to history. Relationships between things are now sought "outside representation, beyond ...immediate visibility, in a sort of behind the scene world even deeper and more dense than representation itself" (Foucault, 239). This schema of Western thought as presented by Foucault is useful in understanding the relationships between computer music and the sciences.

Computer Music and the Sciences:
In broad terms, the discipline of computer music evolved from two major sources. It derives from early experiments in tape music such as Schaeffer's Musique Concrète (1966) and Stockhausen's Elektronische Musik (1963) and from attempts at automatic composition such as Xenakis's formalized music (1971) and Barbata's algorithmic music (1966). In short, computer music operates on the elements of music: sounds and on the organization of these elements: musical composition. The need for the computer simply stems from the increasing complexity of the controls required for real time sound generation or process calculation. However, being "symbol manipulators" in addition to computing devices, computers help in the implementation of formal models, and computer music can, by extension, encompass the "modelization of music". In a sound synthesis program this modelization is a dynamic representation of the acoustical properties of the desired sound waves. The relationship between these acoustical models and the physical sciences is fairly straightforward (Mathews, 1969).
When it comes to composition, however, the relationship between computer implementation and reality becomes more problematic since the object to be generated is not physical in the sense of an acoustic wave but a cultural organization of sounds which, like language, is somewhat arbitrary.

**Automatic Composition:**

Automatic composition follows two major philosophies which roughly correspond to the Renaissance and the Classical epistemology defined by Foucault. The Classical view, probably best represented by Xenakis' formalized music (1971), sets a priori organization principles, such as groups of permutations or generative grammar, and uses these implied rules to guide their composition. The Renaissance view, on the other hand, stipulates an idyllic relationship between the temporal structure of music and the natural time series or the spatial structures which can be observed in the world assuming that whatever is "beautiful" in one domain will automatically be so in the musical domain.

At least three questions come to mind when thinking of automatic composition in the sense defined above:

First, there is an inherent incongruity in the formalization of music as a problem. Granted that artificial intelligence has eloquently divided its scope into well-defined and ill-defined problems, it has also assumed that all issues and activity under its scrutiny can be seen as a problem. Without pretending to fully understand the cultural and historical role of musical composition in societies, it certainly cannot be framed as a problem requiring a solution satisfying particular objectives; in fact, it must remain an open question with which each culture resonates in defining its identity. The framework of scientific discourse rests outside of the realm of music and the arts. For example, there is no relationship in form or in kind between the laws of tonality and the laws of gravity as there is no relationship between the geometrical laws of perspective and the beholder's perception of reality in a painting.

Second, as Boulez has said, when "[c]omposition chooses to approach as closely as possible the most perfect, smooth, unchallengeable objectivity...[s]chematization, quite simply, takes the place of invention: imagination-an auxiliary-limit itself to giving birth to a complex mechanism" (46). This poses the question of the relationship of the composer to the work. Without falling into a individualistic model of authorship we must recognize that the composer cannot be limited to the neutrality of programming. His/her being-in-the-World must remain one of the essential components of his/her trade.

Third, from a cultural perspective, it is interesting to note that the mathematical models used in composition are often subservient to the marketing of sciences. Indeed, the popular knowledge of science is derived from publications which, without fairness to multifaceted research, choose to report on fields because they offer pretty pictures to feed our video cravings or allow a cultural exercism which satisfies our societal schizophrenia. Information theory, fractals, "cellular" automata and, now, chaos have been treated in this way. It is too easy, but irresponsible, to jump on the bandwagon and take hold of a fashionable model, use it to generate sequences of sounds with a computer "algorithm" and dare to call the result a composition.

This is not to say that computers and sciences cannot have any interaction with music. Indeed, speaking of information theory Shannon stated in 1956 that "the concept [of..."
information theory] will prove useful in other fields...but that the establishment of such an approach is 'emergent matter' (3). Why then, could be a saner relationship between science/computer and musical composition?

Computers and Music:
This question, in fact, is only one aspect of the question of the relationship of societies with the computer as a technological—that is a cultural—artifact. As Weizenbaum has reminded us (1972), computers only exist because, as a society, we have elected to construct and use them as devices of control (census) and defense (Manhattan project). Emphatically, there is nothing inevitable about their in society. This calls for a critical and responsible stance to be taken by composers whose concern should be primarily music and its cultural import.

Compositions are made of sounds and composers should certainly be aware of the science of acoustics. In this respect, their knowledge of computer should be tantamount to their knowledge of other musical instruments. In fact, in this regard, computer music should not be a field in itself but a branch of orchestration. Within this context, the scientific study of sound properties and the techniques of computer aided sound synthesis should be stressed in the formative years of composers. Composers should be familiar with the properties of sound in order to play/know them with imagination. In effect we should re-introduce the discipline that Pierre Schaeffer tried to define at the outset of his research: "Practice your instrument".

From a compositional point of view, the relationship of the composer to technology should be one of criticism rather than one of faddish acceptance. Being one of the main agents of musical discourse, the composer should constantly question the role of composition and music in society. S/he should understand the cultural implications of musical production by always facing the same question: Is musical composition an activity which can be mastered and thus automated in assembly lines where robots/computers efficiently produce material for advertisement or the latest Milli Vanilli? Or is musical composition the cradle of a new society, as Attali claims (1977), and should the use of technology be ecologically limited to the resources of the "local village" in resonance with familiar circles.

In any case, musical composition should be brought down from its pedestal and be reclaimed by ama-teurs, those who love. Composition does not belong to the intellectual close circuit of universities. Musical productions should be offered in a ritual for enjoyment rather than recycled to an all-accepting audience. Contrary to Sartre's belief (1965), the intellectual is not the heroic figure who draws society behind him, neither is s/he the all-encompassing inter-disciplinary panel which only repeats and restates the dominant ideology in more fashionable terms (Althusser, 1974). Intellectual do not exist, there are only teachers, composers, writers, scientist, engineers, workers... who contribute to shaping society by responsibly being-in-the-world.

Conclusion:
Although defined as a discipline which draws on state-of-the-art high technology and sophisticated break through models, computer based musical composition avails itself to be very conservative at the service of the "new world order." It follows Renaissance and Classical epistemes contemporary to Machiavellian politics and despotic sovereignty. It is already an instrument of surveillance in participating in the construction of the top 10
lists, guaranteeing fast development of products efficiently delivered to market. It is
time that, as composer, we search for relationships in a world "... deeper and more dense
than representation itself" in the core of our being, to make musical composition a
celebration of our personal and societal ambiguities rather than another commodity on the
exchange market.

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