# Programmed Music – From the Composer's Viewpoint

The title of my talk is also the problem which we are trying to set ourselves in Utrecht. The subject could imply the way in which the computer might be regarded by the composer, or the way in which it suits the musicologist or critic to regard music composed by the computer. I do not mean either of these aspects. What we want to do is to occupy ourselves with the situation that arises for the composer who is faced by automated equipment, with the relationship which the composer – for better or for worse – must assume towards the computer, with the consequences for compositional theory as well as for musical practice resulting from automatic routines. We pay special attention to the electronic studio and to the demands which it is well on the way to making on the composer. We surely agree that not all composers, not even the electronic ones, are crowding in on the computer with regularity, and that electronic studios do not see their ultima ratio in music machines. Let us not even mention the financial problems. Nonetheless, we herald an era of the computer which has been prepared by numerous experiments in the United States, but in Europe, too. This allocates electronic studios with a special task; after all, it was they who gave music a hand in entering the electronic age and replaced *interpretation* by *realisation*. Why should they not indicate the way from *composing* to *programming*, seeing that they have been able to have the most experience in the use of technical media?

It is at present not possible to predict the extent to which composers will compose with the computer; we may assume, however, that hardly anyone will possess his own computer and learn how to program it. Composers will have to make use of public institutions with computers and computer programs at their disposal. There will also be specialized programmers to advise composers and write programs for special requirements. In spite of – or perhaps because of this service, the composer will still be dependent, dependent on computers, programs, calculation time, programmers and the specialist knowledge of whoever is operating the machine, dependent also on the policy of the studio, conservatory or computer centre. It is difficult enough for the composer to express his musical ideas in the form of notes, and still more difficult to do so in words. What must he tell the mathematician, the cyberneticist?

It is not the first time that electronic music has placed the composer in a comparable situation. Stockhausen appreciated the generator for not having to be convinced of the sense of music before consenting to emit a tone. On the other hand, I have heard studio technicians tell a composer, "You can't do that", when the latter wished to know how to realise his idea of a particular sound technically. In an American studio I was shown voltage-controlled generators and filters. When I asked what could be used to control the equipment, I was told that anything at all could be used – a sine-wave or a sawtooth-wave, anything. The generator does not have to be convinced of the sense of music, and neither should it be attempted to convince the composer of the sense of a generator: there is none. What one should do is build the generator in such a way that the composer can make music with it. The studio in America which I just mentioned appeared to have omitted to make the the voltage control musically usable as well as technically perfect; for nobody wants to have the sinus tone returned as an envelope or glissando after it has been ruined as a sound.

To put it bluntly, electronic studios have developed without the composer, and sometimes against him. The sinus tone was practically forced on him; compositional-theoretical consequences

resulting from the reduction to elementary processes were ignored, not even equipment or time were made available for this. The sinus tone remained what it was – a stunted flute. Studios without their own development laboratories – practically all of them – depended on standard measuring equipment which is on the market. The developments that were made in the studios were mainly technicians' ideas: keyboards, quartz-controlled generators, whole walls of switches and buttons, binary coding. I have yet to see a decent transposing machine or a really usable tape recorder. No wonder that some composers would rather work with defective equipment and refuse to send it out to be repaired, no wonder that they record shortwave radio and finally transplant electronic music to the concert platform where instrumentalists are allowed to improvise it. Irony of fate, indeed! Composers go to the electronic studio to escape the dictatorship of the orchestra and musicians' union, they praise the freedom which permits them to do everything themselves and even to mess around with a sinus tone for a solid hour, not realising that they are still being constrained, still being confronted by faits accomplis.

I naturally do not overlook the advantages of standardised equipment. The composer cannot be expected to build his own filters and modulators. The studio is more or less responsible for providing the necessary equipment in technically perfect condition. lt is true that the composer often doesn't know *what* he needs. The studio must therefore cooperate with many composers and collect suitable equipment, invent it, build it themselves, in order to gain experience which will take on the concrete form of equipment.

I wish that "programmed music" – if we are going to place this term side by side with electronic music – would learn a lesson from the history of electronic music and not just confront the composer with equipment, including programs, which can ostensibly be only one way and not another. I wish that the composers who, especially in the early years of serial music, theorised so industriously would be prepared to go over the criteria of their craftsmanship with computer experts, and take the trouble to experiment, seeing that we are all so proud of being free to experiment. I wish especially that there were institutes which would place computers and scholarships at the disposal of compositional-theoretical research so as to give the composer an opportunity of having a say in the construction of the new medium while there is still time. It is cheering to hear that a decision was made in Florence to cooperate more closely, and I hope that this collaboration will also bear fruit for programmed music.

I have said that the electronic studio must of necessity be standardised; nor do I see another way for programmed music. In suitable institutions, for example electronic studios with computers at their disposal, standard programs must be developed with which a composer can work without having to write programs himself. These standard programmes must therefore be so general that various composers can use them to realise their personal requirements. This presupposes close contact between composer and computer laboratory, and really also contact among composers. One can hardly send experienced composers into seclusion to discuss computer programs in which they themselves are most likely not even interested. But it should be possible to allow experienced composers to participate in existing developments. – However, instead of talking about my theoretical wishes, I had better tell you what we are doing in this field in Utrecht and what experience we have made up to now.

Programmed music can just as well be instrumental as electronic. In the latter case one might be tempted to make a distinction between composition and realisation, which means that on the one hand the computer would deliver an electronic score which the composer would have to realise in the traditional fashion. On the other hand the computer would only deliver the sounds for an electronic composition. Personally, I do not think that this distinction is very important. For if electronic music means *sound composition*, the computer which makes the sounds is producing music. That is why we in Utrecht have decided not to develop composing programs for electronic music so far. If a computer produces sounds, they do not only result in a given structure (a sort of electronic piano reduction) but are themselves structured; to put it another way, the computer sound is a composed sound, and sound programs thus belong to the category of composing programs. But we do not primarily compose particular sounds, be they electronic or instrumental, but musical structures which are heard later during performance as instrumental sound or electronic sound. In this sense I shall speak of *structure programs* when I mean programs which form the structural premise of all sound-events.

In Utrecht we have developed a comprehensive structure program [*Project 2*] which is primarily intended for instrumental composition. It is supposed to help the composer empirically to understand the concept of musical structure and to find an answer to the question: what in music is programmable? The answer might be: everything the composer knows about music. Question: what does the composer know about music? Or, better still: what does the composer know about himself when he composes? Whoever wants to program music ought to keep the answer to this question in mind. The answer is: not much. – Before writing a program or using an existing one for compositional purposes, a composer must be aware of his habits and criteria. Not until he knows what he wants and what he is going to want and that the decisions he must make now are rationally connected with the ones he will make later, can he start on the program.

The structure program already mentioned is primarily intended for composers who feel that a computer will extend their range of experience and provide them with a wider view of possible constellations of material. For this very reason it will also be of great educative value. In order to increase this use still further we have divided the program up into a series of test programs which can be used singly and which show the composer the effect of the sub-programs which he can call in the complete program.

A second use of the structure program is as a preparation for sound production with the help of a computer. In my opinion it ought to be possible not only to occupy a given time-structure – that is the distribution of points in a given duration, points of entry or more generally points of change – with sounds, but to make the structure audible as sound. We come across the first case in instrumental music and in many electronic works, too: time-points are characterised by the insertion of timbres; these timbres are usually also characterised by certain pitches and degrees of loudness. In the second case the time-points are closer to each other so that thousands of them per second are audible – as sound. These closely neighbouring time-points can of course no longer be provided with timbre; amplitude values are used instead. Timbre is then more the result of rapidly changing amplitude. Criteria of macro-time structure (in instrumental music) and micro-time structure (sound production by the computer) appear to be comparable with each other if we assume

that the data for the intervals between the time-points are part of stock compiled by the composer,

that data have been chosen according to *selection* and

that the selected data is arranged in a sequence according to a *permutation*.

Criteria for selection and permutation can be either serial or stochastic in nature, they can exclude repetition or include it, in groups, too.

A first experimental sound program based on the above considerations has been written in the Utrecht studio. As it is still in its testing stages there are as yet no practical results.

From the composer's point of view, programmed music ought to be concerned with the relationship between composer and computer and form this relationship in such a way that it is not the composer who is at the mercy of the computer, but rather the other way round. For this, however, we must break through the frontier consisting of computer, programmer, program and finally the nimbus surrounding the computer laboratory.

From the composer's point of view, programmed music ought not to establish itself as a third category alongside instrumental and electronic music. It does not necessarily depend on the musical insight of programmers, nor on mathematics, theory of numbers or information theory. Music is programmed in order to take the consequences of insight into compositional theory, and programmed music should continue to work with these consequences and exert all its flexibility to make further consequences possible instead of establishing its own aesthetics which only serve to conceal the failings of composers or programs.

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