Stephan Kaske

A Conversation with Clarence Barlow

Introduction

Clarence Barlow was born in 1945 into Calcutta's English minority. After studies in mathematics and physics he moved to Cologne, West Germany, in 1968, where he has lived and worked ever since. In 1971 he began to apply stochastic compositional processes and finally to use computers for his music. His tremendously complex piano composition *Çoğluoautobüsişletmesi* (1978–79, Wergo Records, 60098, reviewed by Curtis Abbott in *Computer Music Journal* 7(4):66–70) proves Barlow to be one of the most individual and interesting composers of contemporary music. This interview took place on the afternoon of 11 August 1984 in Munich, Federal Republic of Germany.

Background

Kaske: Could you tell us a little bit about your compositional background? Why did you start to work with computers?
Barlow: I found it necessary to work with computers because I began to write complex structurally organized pieces in the early 1970s. This was probably due to the fact that I was always interested in mathematics and physics and such things and actually studied mathematics at college.

But let's put it another way. You asked me about my compositional background. When I started seriously, my music was somewhere around 1780 in style. I very gradually developed through the nineteenth century, writing music in the style of Haydn, Schubert, and later Sibelius, whose music became a great influence. Then I went in a rather Russian direction: Tchaikovsky and Rachmaninov. After about seven years of composition, I finally crossed the threshold into the twentieth century. I then wrote music in the style of Bartok, Hindemith to a certain extent, Prokofiev, and finally I was writing twelve-tone music in 1965.

The first time I ever used a computer was due to my plan to write a piece for cello, trombone, vibraphone, and percussion. This was a kind of homework given to me by Bernd Alois Zimmermann, which I began writing after his death (he never saw the composition, unfortunately). I heard a cello repeatedly playing a low C in my imagination and then gradually moving up through the range. I tried to write it down until I found that I really did not know how many Cs to write before the first D-flat came in. I now knew I needed a strong structure, a strong system by which to develop it. I had never written any algebraic rules for composition until then. My music had been highly serial. I had specified rows and rows of parameters for different aspects, but in this case I realized that I would have to adopt a stochastic approach. I formulated the rules accordingly. For example, the lowest note should remain constant and the highest note should move up in a sort of sinusoidal curve. First very slowly, then a little faster, and then again slowly reaching the top note of the range. I also wanted the most frequent note to form a parabola, somewhat moving between these two. The distribution of the frequency of occurrence would be also a kind of parabola in the third dimension. Having conceived this model I then started to throw dice and coins and realized that I would have to work for about six months several hours a day in order to get two or three minutes of music. So it was after about two months of despair that I suddenly realized that computers could do this. You see, it was not so much that I saw a computer and said "Ah, what can I do with this?" It was just the other way around. I had a musical problem and I did not know what to do with it, until it suddenly hit me one morning lying in bed before I got up that a computer could do it.

Then I found a couple of people that could program computers, and they tried to solve this problem for me. They did not succeed. I never thought that I wanted to become a computer programmer,

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Fig. 1. Clarence Barlow teaching at the Cologne Music Academy (Musikhochschule Köln).

but then I was forced to, because these people did not succeed. So I learned Fortran and within one week I had my piece.

Kaske: Did you consider this a breakthrough in your compositional development, or did it follow more or less a linear progression?

Barlow: It was a turning point, but long before I even dreamt of a computer. The fact that I came up with an algebraic model for composition was the turning point—the fact that I wrote stochastic music. The computer entered about three months later.

Kaske: Where did you work at this time and where did you have access to computers?

Barlow: The second of the programmers I approached was a student of Cologne University. He told me that I could attend a computer course in the Easter holidays, which I did. So that is where I used the computer for the next two years: the big Siemens 4004 with 100 Kbytes of memory.

About Computers

Kaske: How did you proceed from this point? Did the computer become a more important part in your compositional thinking after this?

Barlow: I think it obviously had an effect on my compositional methods, in that I knew that it was available, but I can swear that every single piece that I have composed since then was begun without thinking about the computer. In 1971, at about the same time I started computer programming, I wrote a piano composition that was a piece actually only explicit in the form of instructions, *Text-music*. And it was about a year later that I had the idea of writing a program to install all the mechanisms of the piece. Now there are 15 versions of the piece, seven done by other people, and maybe a total of seven or eight are the result of this program. That is one example. Then I started to write an electronic piece in Cologne's Music Academy (Musikhochschule Köln) in the electronic studio there, which used an ARP synthesizer, no computer. The plan was very clear. But I realized that I would have to work for two years on that ARP synthesizer using all the available time, as the only one in the studio, to do that piece. That's again where I realized, a computer could do the piece much better. So I went to the EMS studio in Stockholm and did it there. Computers made my pieces available, made them possible for me. But I think the fact that I never thought of the computer at all for any of these pieces, shows that it was just my structural thinking that led to my "habit" of using the computer finally.

Kaske: So for you using a computer does not have a purpose in itself?

Barlow: I hate the computer.

Kaske: That is a surprise. Maybe you do not want to say that you hate the computer, but you hate programming?

Barlow: I hate having to sit at night for hours and hours in a terribly inhuman environment, pushing little keys and getting bugs all the time and having to debug the whole thing, just because I want a result that is clear to me but that I cannot work out because it is so difficult to get all the details together. I've even bought my own computer now, because I did not see any way out. Obviously it is fascinating to find, when you have obtained the result, that you created it. You type the name of the program and type "return" and it starts off and you get your menu on the screen. It gives you whatever

you want. That's wonderful, but it is not that which fascinates me so much as having this result. If one day biophysicists or whatever reach the point where they are able to tune into our brainwaves and to structure our minds with something like a feedback so that we can just sit there and not have to work in a slavelike fashion, I think I'll probably switch my computer to this new medium.

Kaske: It is definitely a problem of the musician/machine interface in this case that bothers you.

Barlow: Obviously I exaggerated a bit when I said that I hate computers, but I never wanted to use them. And now, in the process of writing my second piano trio I have just started to think about the technique of composition—I knew months before what it was going to sound like—and I am beginning to realize now—with a sinking heart—that I will probably have to program a part of it, because there is such a lot to manage at one time.

Çoğluotobüsişletmesi

Kaske: Let us talk about your piece *Çoğluotobüsişletmesi*, which is your most popular composition. Wergo published a record including two versions of the piece, the first played by the pianist Herbert Henck omitting parts of the original score, since it is virtually mechanically impossible for one pianist to play the piece alone. The second version was realized on a DEC computer using the 4X synthesizer at IRCAM in Paris. Why are there two versions?

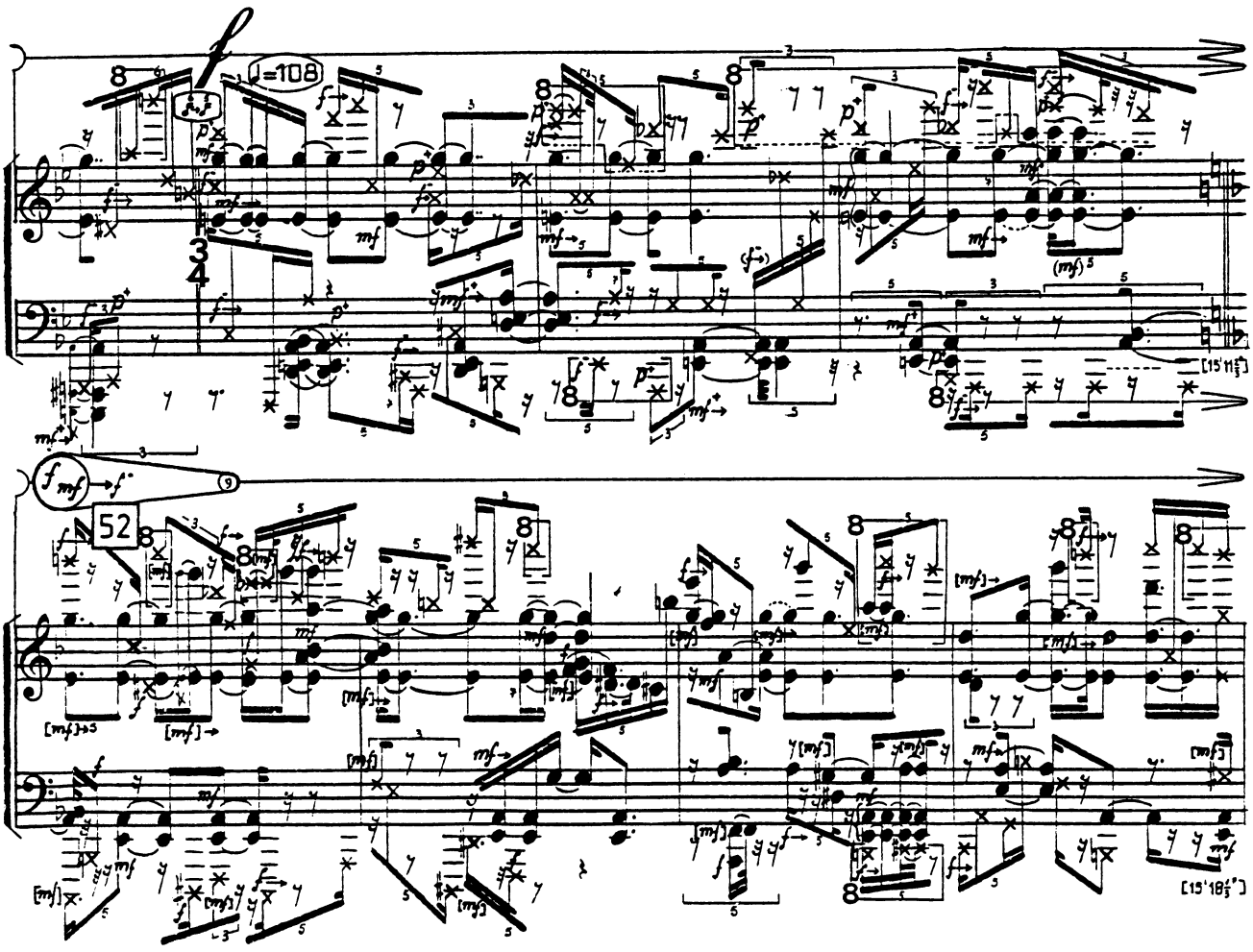
Barlow: The composition in its original shape is a piano piece containing all the notes in the score. Now, in fact no single pianist can tackle all these notes and come out alive, I imagine. So I decided to thin out the score a bit for Herbert Henck, not only just to give the poor man a break but for the simple reason that I thought, through inaccuracy of human execution a lot of the subtle details might get lost. It might help the piece to loosen up the structure and make some of the textures more transparent. Of course, once I decided to obliterate part of the score, I put a new dimension into the piece by obliterating more and more, until there are large, total absences, general pauses towards the end, this process stopping just before the last three minutes. So that gives it a new angle, and the advantage of it is that the texture for example around the twentieth minute is so transparent, that it really becomes very exciting when the pianist plays it. You have these little snaps entering in one tempo and in another key overlapping and disappearing, little bits of threads that have been cut off at both ends. So that's why I have this piano version. But if I do meet this phenomenal pianist one day who is able to play the whole score, that would be it. Or if a piano duo—which is much more realizable—were willing to sit down at one piano and play the piece, I'd be very, very happy. This is why I took the trouble to notate the entire score, including all these obliterated bits as well in the shape of crossed heads.

In order to be able to hear the whole piece, the way it is, I had to resort to a computer. The B side of the record gives you the piece as it is scored, but in a very sterile digitally-synthesized realization. The pianist, on the other hand, gives me a very musical interpretation, but less perfect.

Kaske: Tell us a little bit more about the compositional techniques you developed in the *autobus*. Maybe you can give us a very short outline of the theory behind this piece.

Barlow: Let me put it this way. Every piece I have composed in recent years is the result of a musical inspiration. It is not the result of a desire to fumble with formulas. My inspiration for the *autobus* piece came to me in a bus sitting in Eastern Anatolia on the 11th of May, 1975. I imagined a tremendously virtuoso piece with a high degree of polyphony. After analyzing this first idea I began to see that the piece consisted of several streams of music, each of which could be a chordal stream in addition being monodic, in which stream tonality and metricism would play an important role in that these phenomena would increase or decrease as I would like. There might be bits where three or four of the streams would be atonal and the remaining ones strongly tonal or maybe half tonal, the same going for metricism, that is, a strong or a weak feeling for metricism. In other words what I wanted to do was to create and manipulate fields of tonal and metric strength. In order to do that I had to understand what tonality is. So I reduced the problem to the

Fig. 2. Excerpt from the score of Çoğluotobüsişletmesi *by Clarence Barlow.*



interval, the building block of the mode, the tonal field. I went back to the old Pythagorean idea that the smaller the number, the more harmonic the interval. I discovered that this was not sufficient, because the number 7 is smaller than 8 and 9, but not used at all in classical music theory. I realized, as many others have done before me, that the divisibility of the numbers is also important. So I was forced to develop an algebraic coefficient for numbers that contained both aspects, the concept of smallness and of divisibility, which I call the *indigestibility* of the number. Using this algebraic formula I was able to develop a harmonicity coefficient for any desired interval given its frequency ratio.

For metricism I also worked on what I call the *indispensability of attack* on any given pulse of the meter on any given level, be it on the 16th-note level or the 32nd-note level. The harmonicity and indispensability ratings enabled me to develop a priority system in the sense that the more support given to the field desired, the more probable the event would be. This brought me to the domain of stochastic procedures and consequentially to the computer. I found it impossible to write this piece by hand. I wanted to write it in four different streams running at the same time and I'd developed eight different parameters for each of these streams, so I used a computer, which meant several months of programming.

Digital Sound Synthesis and Computer Fetishism

Kaske: The computer version of your *autobus* is the first time—except for an electronic composition (*Sinophony II*) done at EMS, Stockholm, in 1973—you have used computer sound synthesis in your compositions. You have not considered computer sound synthesis a timbre source for your music so far. Will you continue using the computer as an algebraic device for your compositional structures incorporating sound synthesis only very occasionally, or will computer sound synthesis become an important part of your work in the future?
Barlow: At the time of composing *Sinophony II*, I had a musical approach which was very anti-aesthetic, if you like, or anaesthetic. It was not important to me to produce sounds like "Wow," but I put them together through constructivist and structuralist thinking. I had about 400 sine tones together at the thickest part of the piece and they form groups. The groups are so arranged that they work a bit like overtone spectra, except that these overtone spectra are a little squashed, the whole octave compressed into a fifth, and the whole spectrum is squashed correspondingly. But in spite of that they blend surprisingly well to form a kind of timbre.

This timbre, as you see, was the result of a mechanistic kind of thinking. It was not something I aimed at, it was not a sound I envisaged. It was the result of mathematical manipulation. That's the way I used to think in those days. Now I am in a phase of composition, where I have certainly returned to a type of music that has to really sound well, it has to please me. I am not satisfied with the general run-of-the-mill electronic synthesis. Most synthesizers that I have heard sound so clinical, so artificial and so clichéd. They sound like everything coming out of the East and West Coast studios in America. They all have the same kind of general scheme and I do not want that. I want something different, but the computer cannot give me what I want, at least not those computers to which I have access. For example, if a computer could give me perfect piano timbre so good that I couldn't tell it from the real thing—not that I want to use that—then I would go on, and I would ask: Can it give me perfect voice timbre? And if it could do that, then I would believe that it would be worth my working with it. If it could do all that, I would go on and make other sounds with it.

I prefer to work with instrumental timbres because they sound so much more alive and exciting. If I could understand the stochastic aspects of what makes instrumental timbres so alive, then I would create my own timbres and instruments like that. I am not averse to using an instrument as limited as, for example, the Yamaha DX-7 for synthesis in the case of pure-pitch music. I write much music that doesn't depend on timbre so much. Pitch and rhythm have been of great importance to me. That is the reason why I would not be averse to using a DX-7. But if I wanted to use the whole paraphernalia of computer synthesis, then I would much prefer to write something really exciting in timbre. So I would use the DX-7 or the most fantastic computer music studio on earth, but anything in between seems to me to be too large for the results that it can provide and not sufficient for timbral composition. So I am not terribly interested in that direction yet.

Of course it could also be the fact that I live in Europe, where you are not seduced by sound synthesis techniques at a very early stage. We began to use the computer very early—look at Xenakis—but mainly for composition, and we remained there for a while, since we were quite happy with what it was giving us. I said earlier that I used a computer only when I had a problem. I never had the need except in the case of difficult pieces. I have realized three compositions up to now synthetically: *Sinophony II*, *Relationships Version 4* for two pianos, which is very difficult to play, so I have a computer realization of that, and the third is *Çoğluotobüsişletmesi*, the computer version.
Kaske: How do you explain the phenomenon that one can tell the origin of computer music pieces being produced at US studios by their timbres? Pieces from Stanford's Center for Computer Research in Music and Acoustics, for example, cannot be mistakened for M.I.T. pieces and vice versa. They have their very own atmosphere of sound. Do you believe that this phenomenon originates in the different hardware and software facilities of these

studios? Are certain synthesis techniques favored by the different hardware and software of these studios? Most composers have only limited time to complete a piece so they resort to the appropriately "fastest" techniques. Or do you think that many American computer music composers are simply sound fetishists?

Barlow: The latter. I think it's not the hardware or software but the compositional techniques in which composers tend to immerse themselves that are so uniform. Composers just can't break away, their imagination obviously doesn't reach the point where they could write something completely different from everybody else around them. I mean, look at European composers of instrumental music. You find certain cities where everyone writes the same. People living in Cologne tend to have more or less all the same sound in general, this postserial approach that was first presented in Darmstadt in the 1950s and 1960s. Obviously there are exceptions. In Paris you have this tremendous love for instrumental timbre and there is a kind of neo-impressionist music coming out of that city. It's not that much the hardware, it's the composers' brains. It's obviously their inability to stretch their imagination.

Computer Music

Kaske: Is that the reason why—according to our observation—you did not attend the computer music conferences in the past?

Barlow: No. For one thing I must say that I am terribly misinformed about everything. I never read any magazines, any lists of important events and I miss everything. I heard about the Venice conference after it was practically over. I might have attended the Rochester event, but then it was a long way to go and I was also discouraged by the fact that my piano piece *Çoğluotobüsişletmesi* had been refused for presentation and for lecturing purposes. If it had been accepted, I might have crossed the ocean. It might be of interest to you that I have never been in America. But I do hope to change that, maybe next year.

Kaske: A large group of programmers come into computer music without being musicians. On the other hand there's a lot of young composers who have no idea how to program, but who are prepared to face new challenges. And there are the established composers who doubt if they should risk the challenge of programming. It looks as if you are almost an outsider. You work with computers but you do not consider yourself a part of the computer music community.

Barlow: That's because I don't believe that computer music really exists. Is my music computer music? To my knowledge I was probably the first person in Germany to work with computers and for many years the only one. But I never thought of myself as a computer composer. I was a composer who occasionally resorted to a computer just as I might well use a pencil. I didn't make a great fetish or aesthetic out of it. Whenever I give a lecture on what they call computer music, I usually open it by saying that it doesn't exist. Algorithmic composition and digital sound synthesis exist but neither the one nor the other has any aesthetic implications.

Kaske: So in your opinion there is no such thing as computer music as a genre?

Barlow: No, but it does of course happen that if there is computer music it's because all the composers who use computers tend to have the same aesthetic, the same way of composing. If I had a reason to go to M.I.T. or to Stanford or San Diego and do a piece at one of these places, I think it would sound quite different.

Kaske: . . . which is true for quite a few European composers doing a piece at an American studio.

Barlow: You see, that belies the hypothesis that it could be the hardware. Okay, everything has the same sort of scheme there, as I said before, the same luster or the same sound in general. That may be a result of the hardware. But if the musical composition styles could diverge a little bit more, could be more individual, then I think one would forgive the general overall sound. After all, the piano music of Chopin, Scriabin, and Mozart also have the same timbre, and that of Bartok and Stockhausen. But we forgive that fact, because the music is so different. We don't mind the fact that Stockhausen's piano pieces are for piano.

Kaske: Why is there such a thing in America that calls itself the computer music community?

Barlow: Just for the same reason that suddenly people get fascinated by the double bass and all decide to use it, and there will be a double bass scene. Computers are one of those fads of our time. Every twelve-year-old boy today wants a computer. You have this machine. So you come and you sit and you drum your fingers a little, saying: "Now, what can I do with it?" And you get an idea to program, not the other way around. It is not a tool any more, it's a fetish.

The IRCAM Experience

Kaske: You worked at IRCAM in Paris. How would you compare your experiences there with your feelings about American studios?
Barlow: Well, IRCAM is really in America, as far as I can feel and see, even though I have never been in America. It was certainly nice working there, but then, what really is a bit bothersome, is the fact that it is after all in France. There is this French bureaucracy on the first floor that is pretty damaging to creativity.

But it's a fun place to work if one avoids going upstairs and if one realizes that one will not get much support or cooperation. Also if one can put up with working in an artificially lighted underground cellar situation. Almost everything I know about American computer music stems from IRCAM. Many of the American composers I met there write rather academic music, but it was fun to go out and have wine with them. Come to think of it, I think that I liked those best who were slow, who didn't write much.

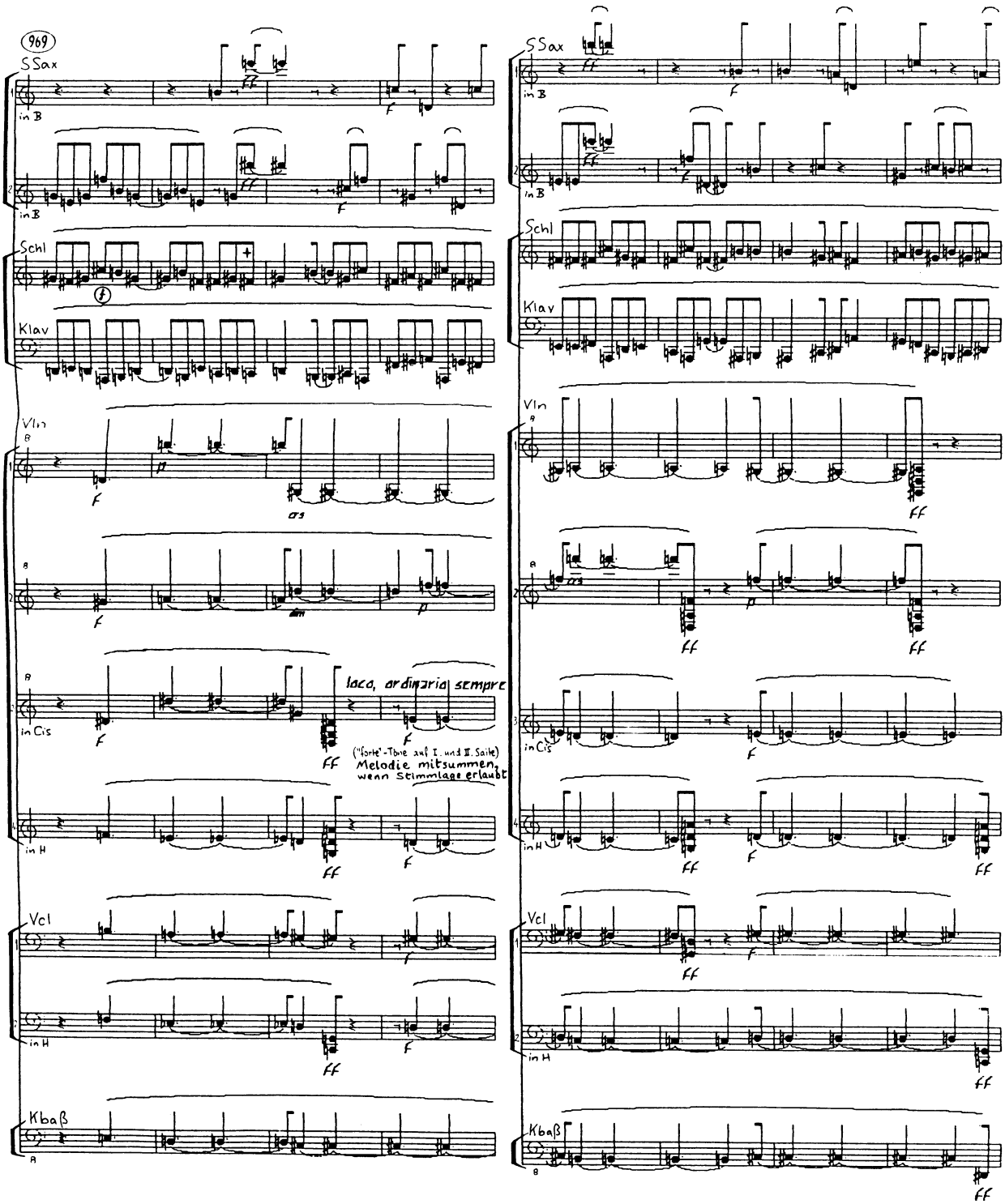
Computer Music in West Germany

Kaske: Let us come back to Germany. Why has the impulse of electronic music, which was created in the 1950s by Stockhausen and his colleagues, not been pursued by other German composers in such a way that computers were used for the solution of compositional problems. Three German composers, Brün, Koenig, and Laske went abroad to pursue their compositional projects, and young composers have to go to the United States to study the techniques of computer music. Germany is an "underdeveloped country," as you called it once. Do you see any chance for computer music here, and if not, why?
Barlow: I think something is happening, but very slowly. Germany always tended to wait until other people have done something to make sure that it's good and then copy it like mad. So I think there will be a great revolution here in a very short time and there will be studios all over the place. I know a lot of composers whose music is very structural. They would really profit by using a computer. But they've been hesitant and they've thought it would take some of the control of the composition out of their hands. This is the way they've been thinking. Now they are beginning to realize that something can be done with computers after all. Let me give you an example: Cologne Music Academy. Seven years ago I approached them; I needed money. I offered them my services in teaching "computer music." And they said: "Do you really believe that one can make music with computers?" I said, "Sure, Xenakis has, I have," but they didn't even want to listen to it. But suddenly a month ago I received a phone call. They want me to teach computer music there. It's this German desire for uniformity that makes it start now all over the place at the same time.

January at the Nile

Kaske: Let us talk about your most recent piece, *January at the Nile*. Which new aspects entered into your theoretical considerations?
Barlow: In the piece *January at the Nile* my original inspiration was a melody that I thought to be in a vaguely D-major tonality that repeats itself, getting more and more burdened as time goes on, becoming richer by more neighbor notes and passing notes until it breaks down because of its sheer weight. That is the feeling I had in 1981. It was not only a verbal feeling but I actually heard this in warm cello sounds. The technique I employed was of having all the notes of one generation of the melody carried over into the next. In other words, the melody repeats itself again and again, but in each

Fig. 3. Excerpt from the score of Im Januar am Nil *(*January at the Nile*) by Clarence Barlow. The score was printed under the control of a computer program called SC developed by the composer. Certain comments were added by hand.*



new generation a whole string of new neighbor notes enter, which are then carried over into the next generation. Their harmonic importance increases as time goes on, so that they begin to gradually form their own tonal fields, and they get their own neighbor notes. At the beginning these neighbor notes support a given key. At the end each of them have their own key moving very rapidly in succession. So you end up in a feeling of multitonality which becomes so rapid that it becomes atonal. That is a totally different approach than my work on the *autobus*.

Kaske: There are also aspects of sound synthesis incorporated in the piece. Patterns and chordlike structures are created that resemble human voices or something like a speaking pulse.

Barlow: This is an almost peripheral aspect which, however, cost me most of the time. I think eighty percent of my time went on this orchestrational aspect of the piece. I had the idea at some point of having the first three minutes not played explicitly—the range of the melody by the way is all around the open C string of the cello. I decided to just have the overtones of the melody being played, upwards from middle C. This gave me, of course, the freedom to shape the timbre of the imagined result in sound. I hoped that one would hear the residual tone clearly if one would play sufficient overtones. I decided to generate these overtones through natural harmonics and shape them dynamically in such a way that a timbre would result. Since I find speech timbre very interesting, I decided to make it sound like speech.

Kaske: But cello tones are very complex sound events and their single partials are very hard to control or to predict. Were you able to create speech sound by simply applying an "additive synthesis" technique to cello sounds? Did you make any experiments, for instance by adding sine tones, before that?

Barlow: Yes. I generated the resultant score using sinusoids and it does resemble speech sounds to a high degree. The natural harmonics of instruments I hoped would be close enough to sinusoids to give me this result. I don't think that this is why it doesn't work that well; I think it's rather the inaccuracies of the amplitude, the attack, and the playing together. I have heard the computer synthesis of the first three minutes very many times; and recently while presenting a string ensemble performance of the piece I was suddenly able to hear speech at the beginning. It was a result of constant conditioning. I knew where to look for the proper phonemes and I now heard them, much to my own surprise. For this piece I chose 200 words from the German language that did not contain any noise spectra and created sentences using these. I spoke them on tape, analyzed them using Fast Fourier Analysis and wrote a series of programs that finally gave me a printed score using scordatura on the strings.

Future Projects

Kaske: What are your future projects?

Barlow: My most immediate big project is the real-time installation of the *autobus* algorithms. I would like to be able to one day sit on the stage and raise the tonality potentiometer and hear the music getting more tonal. And do the same with the metricism parameter, the melodicity parameter, and the rhythmicity or syncopation parameter. Dynamics and articulation would be other parameters. Even consonance and dissonance that is a physiological phenomenon and not so much a psychological one—it has to do with the roughness of sound and is independent of tonality—I would like to install this parameter as well.

Kaske: This is certainly a dream of every composer. But the improvement of the musician/machine interface, making the programming environment more comfortable, might call for a machine that knows something about all these things.

Barlow: Yes, I'll have to do a mass of programming.

Kaske: And you might have to apply artificial intelligence techniques to these programs to make them more knowledgeable. I understand that you want to be able to shift from one stage of a parameter to another without intermediate steps. Tell us a little bit more about this musical scenario.

Barlow: I would like to be able to become a freely

improvising musician sitting on the stage with a really relevant music coming out which you can very clearly hear. Those people who like my *autobus* piece are the public for whom I would like to do something spontaneously. The *autobus*, for example, is a fixed piece in which I laid down all the parts in advance. But I'd like to decide on the spot in a hall: "Oh, this is nice. I'd like to stay here for a while." Or: "Let me move over to that mode." Or: "Oh, I never thought of that mode. Let me type it in quickly." And then I would have the computer evaluate it and modulate into it. I don't know enough about artificial intelligence. I am a little wary of it. My formulas for this piece are algebraic in nature. I see no other way for me than writing these formulas as algorithms. And those should be as efficient as possible.