

Barcode

it's possible to think of a system or a set of rules which once set in motion will create music for you. Now the wonderful thing about that is that it starts to create music that you've never heard before. This is an important point I think. If you move away from the idea of the composer as someone who creates a complete image and then steps back from it, there's a different way of composing. It's putting in motion something and letting it make the thing for you.¹

Barcode was an extremely important piece for two main reasons. Firstly, it was the initial step away from writing music for live performance and towards the electronic production of music. Secondly, it set the initial role of the composer as 'planner and programmer'.

In 3-Orm's response to *Basso Bagatelle*, Dominy Clements had written that 3-Orm 'enjoyed the quirky nature of the music as it came over on (my) computer generated tape'. Following the workshop performance of *Circlet*, Gemini said that, although the players were able to perform the work, they found it 'tiring'; describing it as 'high octane'. It became apparent to me that, as opposed to Reich's liking for mechanical playing by humans,

I think there's a human activity, "imitating machines," in the sense in which (say) playing the phase pieces can be construed; but it turns out to be psychologically very useful, and even pleasurable. So the attention that kind of mechanical playing asks for is something we could do with more of, and the "human expressive quality" that is assumed to be innately human is what we could (do) with less of right now.²

this music would be performed more accurately and more genuinely by electronic means. I did not want humans to imitate machines. The mechanical playing that interested me was exactly that; performance by machines and not humans playing mechanically.

Writing music for purely electronic performance was not something new to me; I had previously written a number of works for synthesiser and computer. I did however, question whether it was a failing in my compositional work, a failure to express to the players my intentions and whether my style of music was simply not performed well by classically trained musicians. Much of my work had been performed successfully by various ensembles and, whilst a student at Bath College of Higher Education, I formed my own ensemble (The Belshaw Band) solely for the performance of my own music. This ensemble played a number of live gigs and produced studio recordings. However, the majority of the performers in that ensemble had backgrounds in rock and jazz rather than classical music. I believe there is a fundamental difference in the way that musicians schooled in rock or jazz approach music, from musicians who have been classically

1 Eno, Brian. *Generative Music*. A talk at the Imagination Conference in San Francisco, June 8, 1996. Text viewed at <http://www.inmotionmagazine.com/eno1.html>

2 Reich, Steve. *Writings about Music*. The Press of the Nova Scotia College of Art & Design, Halifax. 1974. p. 34.

trained. It was a combination of that approach and sufficient rehearsal time that had produced the successful performance of my work.

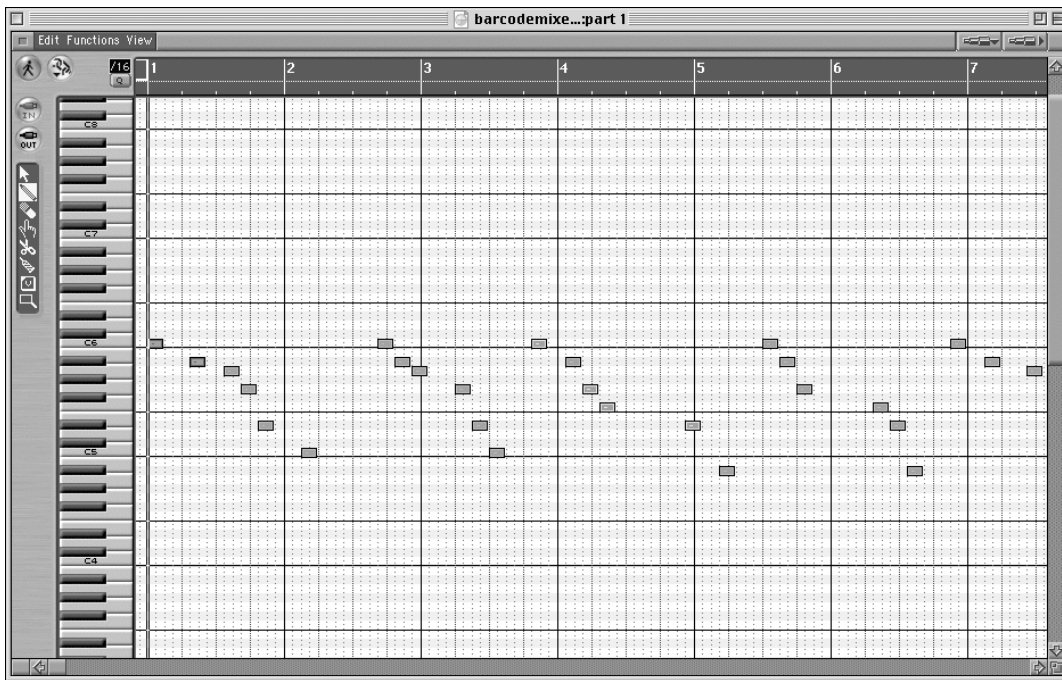
I concluded that it had often been due to a lack of rehearsal time that a piece had been disappointing in a workshop performance. This had certainly contributed to the difficulties in the performance of *Circlet*. Another issue that had surfaced in the past with my music is that it looks deceptively simple; there are no complex rhythms. It is, however, in the style of playing, the manner of performance, the 'high octane', 'tiring' element that the difficulty becomes apparent.

Ultimately I believe that the majority of my music, and certainly the most recent pieces, is better performed by machines than humans. It has a mechanical, non-expressive quality that is difficult, if not impossible, for humans to emulate. It is music that is created on a computer, to be performed by a computer, and it is those very qualities of the computer performance that I am aiming for. The strictness of the performance, the lack of human expressiveness; the computer does not tire and can achieve balance and power that is beyond human capabilities.

For these reasons *Barcode* was conceived as a purely electronic piece. It was not written for any specific instruments but as six different parts. It was composed using the numerical series from barcode measurements, a barcode that, unlike previous ones, was not a found object but one that was produced using barcode generating software. The score included in the folio is an arrangement of this electronic piece, (the score was produced only after the piece was finished and was therefore not referred to at any stage in the compositional process). In a similar way to that in which Bang on a Can arranged Eno's *Music for Airports*, when I produced this score, I did so with the intention of creating a piece for live performance. With hindsight I now believe that, at the time, I felt it necessary to produce a score to give the piece some legitimacy. I had a subconscious sense that there was a necessity for a score to be produced. At that stage, I had intended it to be dual purpose (for live or electronic) but now I consider it to be solely a studio piece. Therefore the score is included in this folio for reference only.

The role of the composer as a 'planner and programmer' was developed through the use of the tables³ and the computer software. Once the tables had been completed, my primary role was one of entering data. In *Barcode* the numerical series produced from the barcode measurements, in conjunction with the other tables and procedures, produced a series of data that was entered into sequencing software to produce the music. The software used for this piece was Emagic Logic and in particular the matrix editing screen, where notes were entered through the click of the mouse.

3 For full tables see Appendix 1.



Barcode developed further the techniques and practices that were explored in the previous pieces in two main ways. Firstly, it employed an approach to composition where, once the initial parameters have been set, the generation of the music ran by itself. Secondly, it used a development of the harmonic language used in *Sign of the Circlet* where the difference between each note group involved as small a change as possible. Rather than using note groups, the six instrumental lines in *Barcode* were constructed from the arpeggios shown below.

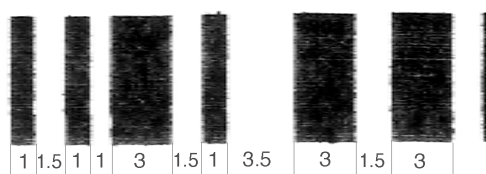


This was a small, but significant change, from the arpeggio figures used in *Sign of the Circlet* that had been constructed from the underlying note groups. Here, rather than each instrument having its own arpeggiated figure (as the bass and cellos did in *Sign of the Circlet*), all parts used the arpeggios in either ascending or descending pattern.

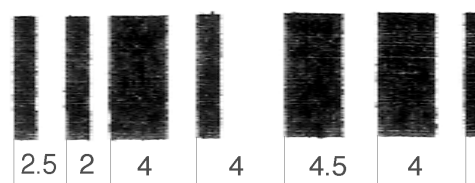
The principles for the generative system that created this piece were first explored in both *Basso Bagatelle* and *Sign of the Circlet*. That is, the numerical series produced from numbers taken from a barcode generated a variety of cells made up of either notes or rests. In the previous works, when I took the initial measurements, I worked in whole numbers and any measurement that was not exact was rounded up or down to the nearest whole number; for *Barcode* I used 0.5 as the smallest division. This decision was taken so that semiquavers were generated; this resulted in a greater rhythmic interest within the work whereas previously, all the cells had been firmly rooted to the quaver pulse, in this piece there is far more variation and interest in the resulting rhythmic patterns.

Here the development of notes within cells compares with *Basso Bagatelle* which employed the use of randomly generated cells and *Sign of the Circlet* which used arpeggiated figures. In *Barcode* the arpeggio phrases are more clearly defined and involve a number of choices (ascending or descending, continuous or broken).

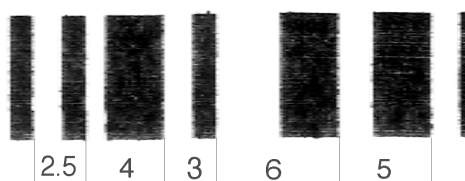
The method for taking measurements from the barcode was also changed for this piece. In previous works, the only measurements that were taken were those between the stripes. For this work, measurements were taken in a variety of ways; between all stripes:



from white to white stripes:



and from black to black stripes:



These measurements are then used to create the left hand column for each category as shown in the following excerpt from Table 1 (the full table is printed in Appendix 1).

ALL				B-B				W-W			
1	2	3	4	2.5	5	7.5	10	2.5	5	7.5	10
1.5	3	4.5	6	2	4	6	8	4	8	12	16
1	2	3	4	4	8	12	16	3	6	9	12
1	2	3	4	4	8	12	16	6	12	18	24
3	6	9	12	4.5	9	13.5	18	5	10	15	20
1.5	3	4.5	6	4	8	12	16	2.5	5	7.5	10
1	2	3	4	2	4	6	8	5	10	15	20
3.5	7	10.5	14	6	12	18	24	2	4	6	8
3	6	9	12	2	4	6	8	4.5	9	13.5	18

Table 1 (excerpt)

There were six factors that determined the music that would be played by each part. All of these decisions were made by a random number generator selecting numbers that related to various predefined choices. The six factors are shown in the headings from the following excerpt of table 2:

Instrument	barcode reading	group	notes	start	arpeggio	fluency
1	b-b / r	2	held	notes	ascending	restart
2	all	1	separate	notes	descending	continue
3	all / r	1	separate	rests	ascending	restart
4	b-b	4	separate	notes	descending	restart
5	w-w	3	held	rests	ascending	restart
6	w-w / r	3	separate	rests	ascending	continue

Table 2 (excerpt)

This table provided the following compositional information; the second column (barcode reading) determines which of the six possible barcode readings the part is to use. The available choices are: ALL (the distance between each stripe black or white), BLACK (stripe) TO BLACK (stripe) (b-b) and WHITE (stripe) TO WHITE (stripe) (w-w). These readings can be read from top to bottom or from bottom to top (reversed (r)). The third column (headed group) refers to the three main columns of Table 1, which have been subdivided into four smaller columns. The first sub column of each main column shows the measurements as a ratio of 1:1 (group 1), the next column 1:2 (group 2), the next 1:3 (group 3) and finally 1:4 (group 4). The fourth column in Table 2 (headed notes) defines whether the notes are played either as a single, held note or as individual notes. Column five (headed start) decides whether the part begins with notes or rests. Columns six (arpeggio) and seven (fluency) define whether the part plays firstly the arpeggio in ascending or descending form and, secondly, whether it continues across the underlying arpeggio changes or begins anew.

The following example shows how all three parameters (the arpeggios, table 1 and table 2) create the music. The top line of music (2) is constructed from the tables for instrument 2, the lower line from instrument 3.



first arpeggio

all					all/r (read from bottom to top)			
1	2	3	4		1	2	3	4
1.5	3	4.5	6		1	2	3	4
1	2	3	4		1.5	3	4.5	6
1	2	3	4		1.5	3	4.5	6
3	6	9	12		1	2	3	4
1.5	3	4.5	6		3.5	7	10.5	14
1	2	3	4		3	6	9	12
3.5	7	10.5	14		1	2	3	4
3	6	9	12		1	2	3	4
1.5	3	4.5	6		1.5	3	4.5	6
3	6	9	12		3	6	9	12
1.5	3	4.5	6		1.5	3	4.5	6
1	2	3	4		1	2	3	4

Table 1 excerpt

instrument	barcode reading	group	notes	start	arpeggio	fluency
2	all	1	separate	notes	descending	continue
3	all/r	1	separate	rests	ascending	restart

Table 2 excerpt



resulting music

As can be seen from the previous example where there are semiquavers they alternate between being at the start of the cell to being at the end.

Table 2 actually consists of four different tables. These four tables generate clearly defined parts for each of the six instruments. Each instrument used each multiplication of the numerical series (as shown in column three). The reason that I decided to multiply the original reading by two, three and four was that my intention had been to produce a piece that lasted for twenty minutes. However, the total number of events produced from the original measurements was fewer than the number of events I required. Multiplying these rows of numbers by two, three and four produced a sufficient number of events; the total number of events is 3,800 (380+760+1140+1520). Translated into quaver events, at a tempo of 90 beats per minute, this would produce a piece exactly twenty minutes long. However, I noticed that on my metronome there was no marking for 90, the closest markings were either 88 or 92. I therefore decided to set the tempo at 88 beats per minute as 92 would have produced a piece that lasted less than twenty minutes. I could, of course, have chosen to multiply the original row by ten and this would also have produced a total of 3,800 events. However, this would have produced cells or rests that were too long. Where the original reading was a three this would then become thirty; producing either a thirty note cell or a rest of just under four bars. Previous experiments had shown that this would have only produced long passages of silence interspersed with repetitive arpeggios and not the result I wanted. The option I decided on gave me a good balance of short cells, held notes and silence.

There was another, important, factor in the completion of the piece. The system that I had put in place was a generative system that produced a block of musical material. There were important decisions that went into the production of that system. As I have shown in this writing it was not a system that came about by accident but had been carefully evolved through a number of experiments. However, unlike Eno who 'become(s) an audience to the results'⁴ this work has been edited to produce the final result. I listened to the results and then made certain changes to those results. The generative system had produced a block of raw material from which I have extracted elements to produce the finished work. This is similar to a sculptor carving from a slab of marble or a jeweller polishing a diamond. All the raw material was in front of me, I had to use my craft to bring particular elements to the fore. This has parallels with my intervention in the earlier works, where I attempted to smooth the joins between the various sections. However, those intrusions were made by looking at, and working from, the score; the decisions here were made on a purely aural level, only by listening to the piece using the mixing desk to create a balance of the different components. It was in this piece that there was the first successful combination of the composer and the engineer.

This intervention can be seen as negating the system; why put in place a system in which you do not have confidence? Most systems composers see the system as everything, in the same way Reich sees the process as everything. I am not, however, trying to recreate what has already been achieved. I have evolved a system for generating a block of musical material that I can then redefine should I feel it necessary. It was never my intention to produce an all embracing system where all elements were decided by that system. My intention had always been to introduce an element, or elements, of fuzziness into the work.

Arguably the most important external decision I made was the addition of the pulse through the piano playing block chords. When I first listened to the work I thought there was something that did not feel quite right, but I could not define it. It was only after

4 Eno, Brian. Sleeve notes to *Discreet Music*. Obscure Records, London. 1975.

repeated listening that I realised it was the sense of pulse that is evident in, for example, Riley's *In C* that I was lacking. I felt that it was necessary for there to be an anchor for the random elements; something constant against which those elements could be measured. I achieved this by creating a series of three note chords that were extracted from the original arpeggios (by using the lowest three notes):



A feature of this work that points the direction for some of the later works in this folio is the introduction of elements from ambient music; a music where very little appears to happen.

It's not a music of great dramatic highs and lows – it doesn't have big peaks and valleys and so on. It keeps within a fairly tightly constricted range Things do happen in Penguin Café Orchestra music ... that some events are taking place, development is taking place with the music it just doesn't happen in a terribly obvious or assertive way.⁵

Whether we were in the first, second or third movements, most of the music seemed to consist of the immaculate soloist, Colin Currie, pattering out soft, nonstop marimba passage work over slow string chords that wouldn't have troubled the harmonic sensibilities of Sir Arthur Sullivan. This was minimalism stripped even of its overlapping pulses and whooshing changes of tonality.... Depending on your mood, you could declare it numbingly soporific or beguiling hypnotic.... But as the piece progressed I kept waiting for something else to happen. There were contrasts but they weren't so contrasting that they really registered. It all sounded like a nice backing track for a missing tune.⁶

These ideas are predominantly in evidence from the start of the piece where the high pianos appear to float and drift apart from the rest of the material. Further examples of elements from ambient music include the use of long sustained notes and chords to create the impression of stasis even when there is movement above or beneath the surface. The relationship between ambient music and the later works is an issue that is detailed in greater depth later in this commentary.

Barcode was the first piece to show convincingly that all the previous investigations had been worthwhile. I had developed a compositional method that involved pre-defined elements, random elements and compositional decisions. There are two major advances

⁵ Richard Williams. *The South Bank Show: The Penguin Café Orchestra*. Tickell, Paul (producer) Andy Harries (director). LWT. 1987.

⁶ Morrison, Richard. *Prom 10*. The Times. 28/7/2003. p.15. Review of the premiere of Joe Duddell's *Ruby*.

that *Barcode* provided. The first was the move away from live human performance; the second was a move away from the concern with the disruption of the process. In that respect, this piece had moved away from the earlier research. I was no longer producing work that disrupted a musical system, instead that sense of disruption, or randomness, had become the major element. The addition of the steady pulse provided the combination of the constant and the random, or the linear and the multiple. In *Barcode* a linear musical section (the piano pulse) is overlaid with random (multiple) elements that have been triggered by the barcode measurements. There is a combination of the linear and the random that was not evident in the earlier works; here the combination provides a piece that retains an element of unpredictability yet flows smoothly from start to finish.