
How Roberto Gerhard was persuaded to make the soundtrack for the 16mm film *DNA in Reflection*

Hans Boye

1. MAKING THE FILM

Shortly after I arrived at Cambridge in the beginning of October 1961 as a research student at the MRC-unit in the Cavendish Laboratory, I met an Indian research student, Anand Sarabhai, who had already been working there for some time.

Anand had an idea about shooting film through a kind of kaleidoscope, which showed a 45-degree sector of the "real world" mirrored all 360 degrees around thus making symmetrical patterns out of anything the kaleidoscope was aimed at. It had a front lens creating images between two glass plates fixed together at a 45 degree angle. The direct image and the reflections of it from the glass plates could be viewed through a small lens near the eye, - the optical principle being that of an astronomical telescope with the angled glass plates working as mirrors in between the two lenses. Another type of kaleidoscope has just a ground or opal glass in front and the opening between the glass plates is populated by coloured glass bits that also create symmetrical patterns when mirrored by the glass plates. The eye-lens at the rear is also in this type used for viewing the patterns.

Using his kaleidoscope Anand had become fascinated by the patterns he could see by watching the models of the DNA-molecule at the Laboratory through it. But getting those symmetrical patterns recorded on film was not very straight-forward, particularly not when you are research students on a limited budget. Our primary assets were Anand's kaleidoscope and an old English 16mm film camera, which I bought cheaply in Denmark, while I was a student there. This camera was not well suited for the purpose: it didn't have a reflex-viewfinder or an exposure-meter behind the lens, the lens was rather poor (without anti-reflex coating) and the spring, that should transport the film, had lost so much tension that it often needed manual cranking to get started...

Despite these obstacles, I managed to get it all working as well as it could with the available equipment plus an extra kaleidoscope (bought locally) as a viewfinder. And then we could start experiments to get the nice patterns in focus on the film and with the right exposure. That cost several reels of 16 mm Kodachrome film - partly because the speed of the Kodachrome film was low, the available illumination was not so powerful and only a little light came through the kaleidoscope. The mirror-images of the original 45-degree sector lost brightness quickly the more times they were reflected, so a long exposure was needed. In the end we had to use a very slow filming speed (about 8 frames per second instead of 24) which meant that the turntable for the DNA-model needed a double reduction-gear to obtain a suitable speed of rotation.

With the technical arrangements under control we could start shooting the film during weekends at the Lab. We shared the expenses for raw film and for having the film copied after we had assembled the various shots to a film and had found a suitable soundtrack.

2. IN SEARCH OF A SOUNDTRACK

First we explored the 'usual' options for getting a soundtrack for the finished film: the easiest option would be to use existing music - if we had been able to find something suitable - but it would probably be too expensive in royalties. The next option was to get somebody to play some

suitable music live, so we tried to engage a local steel-drum band to play their Latin-American rhythms, but it didn't turn out right. However, during one of the sessions with the band, Anand and I tried to use the steel-drums for making sound effects that followed the film, and that gave us a good idea of what we were after as the third option: some kind of sounds or maybe electronic music that would fit the animated images.

At that time Anand came to think of a local composer, Roberto Gerhard, who had once 'made music' with a sculpture consisting of a metal plate studded with metal rods of different lengths. The artwork thus appeared as a 3D-landscape of metal rods, and if one tapped the individual rods, they would give off different tones. Roberto Gerhard borrowed the sculpture from the artist and shortly after he could present a musical composition created by recording the sounds from the sculpture, manipulating them and mixing them into a new recording. Maybe this music is part of Roberto Gerhard's *Sculptures I-V* (1963)? Roberto Gerhard had already made the musical part of the soundtrack for the film *This Sporting Life* (1963), so since we were in need of a soundtrack, that would suit the abstract images of our film, it seemed appropriate to get in touch with Roberto Gerhard.

It was Anand who first contacted Roberto Gerhard and invited him to see our (silent) film. After having seen the film at the laboratory on a Sunday morning, Roberto Gerhard was at first rather reluctant to take on the task of making a soundtrack for it, - he was probably very much aware of the fact, that making just 8 minutes of soundtrack meant a lot of work at the tape recorders. We had also made it clear that we could not offer him any payment, except for a free copy of the film with the soundtrack. This was not such a tempting proposition for a busy composer trying to earn a living from his compositions. Nevertheless - after some thinking - Roberto Gerhard agreed to make the soundtrack on two conditions: 1) that we supplied him with a frame by frame chart of what the images were like during the whole film and 2) that he could make his own promotion with the reel of finished film we would supply him with. We were not quite sure of the extent of the last condition but assumed that it meant that Roberto Gerhard could use the film for promoting his compositions.

3. MAKING THE SOUNDTRACK

Following the acceptance by Roberto Gerhard, I immediately sat down and described the images of the film, frame by frame (about 12000) and with 24 frames to a second as a chart on plotting paper. After having had the chart in his possession for some weeks, Roberto Gerhard called Anand and told that he had something he wanted us to hear, so we arranged for another Sunday morning meeting at the laboratory. Anand picked up Roberto Gerhard and one of his tape recorders (a Ferrograph full track model) and took him to the laboratory where we played the tape and the film together. We were very satisfied with the part of the soundtrack Roberto Gerhard had already made, since we thought it fitted well to our film. But we could understand from Roberto Gerhard's remarks, that the job had taken much - too much - of his time, and he wasn't happy about that, but since he had started on it he also wanted to complete it. After some further Sunday morning test-runs of film and soundtrack - sometimes arranged with short notice - Roberto Gerhard presented us, after a total of a couple of months, with a reel of quarter-inch tape (full track, 15 inches per second) which we then could get added to the film. After these Sunday morning meetings with the composer at work, it was clear to us that Roberto Gerhard was a demanding and professional composer with a reputation! I regret to say, that at that time we were not fully aware of Roberto Gerhard's background and how many compositions he had made, - if we had known more about him, we might not have dared to approach him and ask him for a 'free' soundtrack. We were obviously amateurs in this area and Roberto Gerhard deserves credit for putting up with us!

With the soundtrack in my hand I could make an appointment with Colour Film Services Ltd. in London in order to have Roberto Gerhard's quarter inch magnetic tape transferred to 16 mm

perforated magnetic tape which could then be fitted to the 16 mm Kodachrome (positive image) original film. This took place during a session with an experienced film-editor, where the film was shortened in selected passages, in order to obtain an acceptable fit with the sound on the 16 mm perforated magnetic tape. The next step was to have made a negative, optical soundtrack from the 16 mm perforated magnetic tape, so that a positive optical soundtrack could be printed together with a copy of our film on a special 16mm Kodachrome printing film. The first trial copy of the film with the soundtrack showed that small corrections were needed before we had four further copies made: one for Roberto Gerhard, one for Anand Sarabhai, one for me and one for The British Film Institute, who wanted to acquire a copy for their archives.

These operations, including the total of five copies of the film with the soundtrack were all paid for by Anand and me together, and later The British Film Institute paid us the cost of their copy. As soon as we got the copies in our hands, we went to Roberto Gerhard's house to deliver his copy to him. He was out for an evening stroll with his wife and we caught up with them on the way, presenting him with the copy and thanking him for his work for us. At that occasion Roberto Gerhard reminded us once more that we would all be free to do our own promotion with the film, which we once more agreed to...

4. PROMOTING THE FILM.

Our way of promoting *DNA in Reflection* with Roberto Gerhard's soundtrack was a little bold: we arranged a showing at the MRC Laboratory at Hills Road in Cambridge and invited a number of distinguished guests, - amongst those Roberto Gerhard himself, and Francis Crick (he and J. D. Watson had discovered the DNA-structure ten years earlier), just to mention two. To this day I regret that we did not specifically point out to those in the audience who had not already recognized Roberto Gerhard that he was with us that evening. My only excuses are that neither Anand nor me had much experience in a role as a host at such an occasion, and that we were quite young and inexperienced at that time. Please accept my sincere apologies, Roberto Gerhard! After the showing of the film, Roberto Gerhard remarked to me that the 16 mm optical sound was 'a little coarse' compared with his original tape, - he put great weight on sound quality, but he was also aware that 16mm optical sound could not give high quality sound.

Later on there was a showing of 'Musically Outstanding Films' at the National Film Theatre at the river bank in London, where Roberto Gerhard's/our film was invited. For the catalogue Roberto Gerhard explained that he intentionally compiled the soundtrack from 'layer upon layer of sounds from his library of recorded sounds in such a way that it was in opposition to the precise description of the film supplied by the film makers'. And he named it again 'an aleatory soundtrack' meaning that the sounds were picked randomly from his library. Since the soundtrack now and then seems to accompany the images quite well, the term 'aleatory' may be useable as long as there is an element of randomness in the way it was composed.

5. THE SOUNDTRACK - IN RETROSPECT

Sadly enough, then, I don't know much about how Roberto Gerhard made the soundtrack and which equipment he used for it. Since Roberto Gerhard was a private man with a serious attitude and since my knowledge about composing 'electronic music' was rudimentary, I didn't dare ask him about details or invite myself to see his workshop. I guess that I had the feeling that Roberto Gerhard preferred to make his compositions in solitude.

Now, so many years after and with a little more knowledge of audio equipment, I have been trying to figure out how the soundtrack was composed, by listening to the original tape with which Roberto Gerhard supplied us. At first one notices that the original magnetic tape harbours sound with much more distinct high frequencies, as one would expect, when comparing with what comes

out of the optical soundtrack. Maybe Roberto Gerhard emphasised the high frequencies because he knew they were going to be attenuated, when transferred to the optical soundtrack? And listening to the soundtrack without the images makes me feel that something is missing, maybe because I have become used to images and sound together. To me it does not sound like a 'stand-alone' composition, so it could be interesting to know whether the soundtrack has a close relationship with *Audiomobile No. 2* or any other of Roberto Gerhard's compositions?

Analysing details of the soundtrack in order to find out how it was made is not an easy task (for me at least). Somewhere in the first part I think I can recognise a quotation from Roberto Gerhard's 1st Symphony and several times some sounds have been played back from a tape moved irregularly by hand. It is intriguing to listen to the often encountered 'background' sound resembling a multitude of morse-codes, dripping water or distorted birds. If these sounds were made 'from scratch' by adding many sounds together manually, then I understand Roberto Gerhard's remark about things having taken too much of his time. In this context, I should state that playing the soundtrack backwards does not reveal many more recognisable quotations from existing music, - Roberto Gerhard didn't pick the easy solutions. Of course (?) one can hear sounds that are probably slow playback of 'normal' sounds, tape-loops maybe modulated by other sounds and electronic equipment - all adding to a very complex sound-mixture.

There is no doubt in my mind that the soundtrack which Roberto Gerhard composed for our film, is perfect for accompanying the images, and it is also clear to me that only an experienced and very capable composer could have made it. Naively one could think that making 'electronic music' was just a matter of having a couple of tape recorders/computers and some different sounds and that's it! It is not, because you also need the skills for altering the sounds and assembling them together in an imaginative way. Roberto Gerhard had these important skills and the artistic imagination.

Hans Boye, April 2010.