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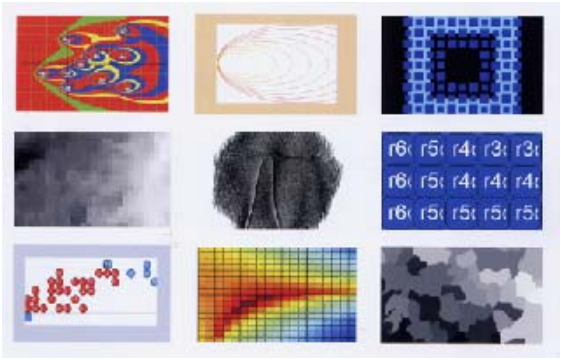


From Simulation to Algorithmic Art

In October/November 2005 I had my first exhibition of computer graphics in Zagreb, Croatia. Soon after that I put graphics from the exhibition on the Web and informed about that my friends and colleagues who were not able to attend the exhibition. Among others I sent this information to Professor Felix Breitenecker. In his reply Felix sent me an unexpected offer – he asked me to write a story about my "new profession" (in his words) for the *Simulation News Europe* and also to present some of my graphics. I decided to accept this offer, and here is a short story about my work in computer graphics:

The story starts at the time I was working on my master's degree in physics at the Institute of Physics in Zagreb. I believe it was in 1973 when the Institute got the first table programmable calculator, and after a while I realized that I was spending quite a bit of time writing programs for it. Finally I decided to leave the Institute and to start working on computing. In 1974 I was employed in the computing group of the civil engineering enterprise that was using IBM 1130 computer (later it acquired IBM/370 machine). In addition to my everyday job developing computer programs and running various applications, I spent some time developing computer graphics printed on a classical printer – graphics consisted of letters, numbers and special symbols.

In the mid and late 1970th I privately purchased a small Commodore 64 computer equipped with the Basic programming language. Since the output was on the TV screen, it was possible to program continuous graphics using colours. It was great fun, and I spent many nights programming graphics – my family liked them, but I was not showing them in public. Since Commodore 64 was not a powerful machine the graphics were emerging on the screen quite gradually, which gave the effect of nice animation!

After that period of time I occasionally worked on computer graphics, e.g. in University Computing Centre in Zagreb where I was working from 1979-1989 and where I started the affair with computer simulation (on the UNIVAC 1100 mainframe). In 1989, when the era of personal computers was well underway, I moved to the Faculty of Economics, University of Zagreb, but neither high quality graphic cards nor colour screens were available for some time yet.

At the end of 2001, when my first grandson Vilim was a just over a year old, I started worrying that in a few years time he would play on his PC some stupid and cruel games, and I thought that I might possibly develop more creative software with graphical, dynamic and interactive features for him. After some investigation I found and purchased *Liberty Basic* programming language over the Internet and I did a part of the job for my grandson. However, in the meantime I discovered that I was spending more and more time developing rather interesting computer graphics, since the hardware and the software finally had an excellent potential for doing that.

After a year or so I discovered that the *Mathematica* software has exceptional programming and graphical abilities, and after that I started using both of these programming tools. I developed diverse types of graphics, some of them discrete and some continuous in character, some in black and white and some in colour.

I was working on computer graphics when I was not too busy with my "serious" job, and I did it just for myself, so that only my wife and my children saw them. The graphics appeared only on the computer screen and I printed just a few of them, e.g. for my late mother. Therefore, my close friends were quite surprised when they received the invitation to the exhibition and asked me why I was keeping this activity a secret. But, as the matter of fact, I wasn't hiding anything - I was just working for my own satisfaction.

It was in early 2005 when my son Ranko who graduated in visual arts suggested that I present these graphics in public. So, I showed some of the graphics to the owner of the Canvas gallery in Zagreb; having studied them carefully, he proposed me to make an exhibition in his gallery! This came as quite a surprise for me, and encouraged me to start working on a coherent series of graphics. It was not an easy task for me, so it took a couple of months before I was able to form the first coherent series of graphics with the help of the gallery owner. Having learned this lesson, I was able to prepare the second graphical cycle on my own.

I had to master a number of other things in graphics, too. First of all, there is this huge problem of the difference in colours shown on the screen and printed; this difference appears since the screen is the source of the light while the paper absorbs and only partially reflects light. Therefore, it is virtually impossible to get the same colour effect on the screen and on the paper. Another point I had to learn was how serigraphy functions, since one of the graphical cycles was planned to be realized in this technique. For example, certain colours can cover some colours, but cannot cover others. So the process of preparing the graphics for a serigraphy has to be carefully planned.

Now, let me say a few words about the creation of graphics on the computer. From the very beginning, I established the principle of developing computer graphics exclusively by programming, without any subsequent intervention on it (with Photoshop or similar tools). Therefore I was using only general purpose rather than specialized graphically oriented programming languages. I want graphics to be fully contained in the algorithm of the computer program that generates it, so that all my efforts are focussed on constructing the appropriate algorithm. However, one can hardly do it all at once with the first version of the program; after you produce a graphic and view it on the screen you check its aesthetic value, and then you typically want to make some change – so you try to make an appropriate change in the program, check the resulting graphic, etc. Thus developing program that generates graphic becomes an iterative process in which you constantly mix the rational component required for programming and the irrational one required in checking the visual appearance of the graphics generated by the program code.

Such a type of computer graphics is called "algorithmic art", since graphics are fully based on computer programs that contain a precise algorithmic description of the way the graphic will be produced. A comment by my colleague from Budapest after he saw the exhibition was quite interesting: his view was that I am now not doing something completely different from computer modelling, but that I rather found a different way of expression. And it seems that this may be not too far from the truth.

My computer graphics could be roughly divided into two classes: the "constructivist" and the "non-constructivist" ones. For the constructivist type of graphics one has to have a rather precise idea of what the graphic should look like, and tries to build an algorithm that will generate a construct he imagined. However, this doesn't mean that the author doesn't need to try various alternatives of structures and colours in order to achieve a graphically interesting pattern. An example of this type of graphics in my exhibition was the *Cartesian rhythm* series of graphics (they were produced by using the serigraphy technique).

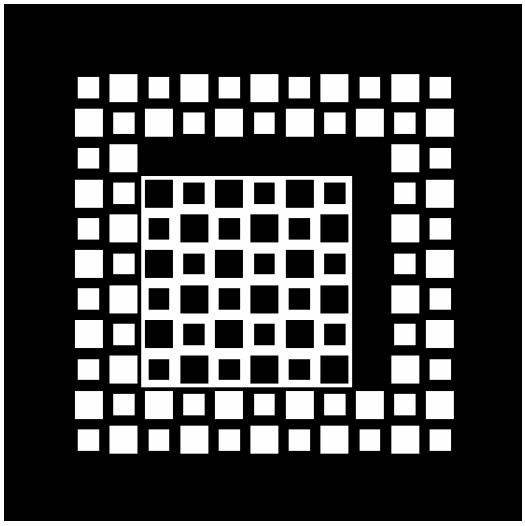
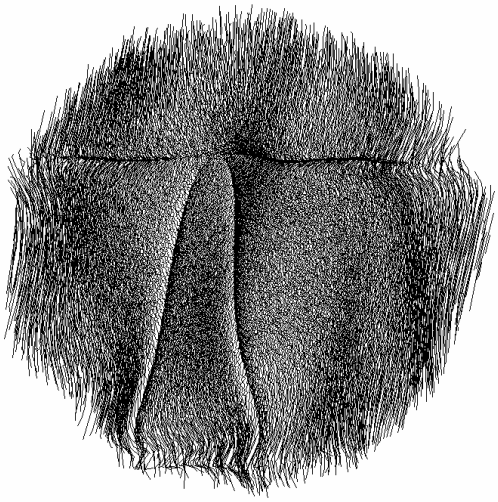
The second type of graphics I develop is more complex, based on algorithms consisting of different mathematical and computational constructs. However, one should know that a

complex graphical form doesn't necessary require a complex algorithm; on the other hand, more complex algorithms don't guarantee more interesting graphics. With this type of graphics it is far more difficult to predict precisely what the output will be, and therefore much more experimentation is required, especially if one wants to achieve a consistent graphical cycle. An example of this type of graphics on my exhibition was an *Evolution* series of graphics (they were produced as ink-jet prints).

Finally, if you would like to see all the graphics from the exhibition and find more information about the exhibition, visit the following Web address:

http://free-zg.htnet.hr/vceric/graphics/

These Web pages also contain information on algorithmic art, as well as on important artists from this field.

Vlatko Ceric

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