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GENERATING ART

Driessens & Verstappen
talk to Arie Altena

Erwin Driessens and Maria Verstappen are two Dutch artists who have been working with algorithmic art since the early nineties. They conceive physical or computer algorithms which create forms. They also had much success with their installation Tickle Salon, *for which they won first prize in 2002 at Life 5.0, an international conference for art and Artificial Life.*

Arie Altena Many of your works involve the automatic generation of forms as a seemingly continuous process. However, you often present finished objects. Is your work mainly about the creation of an algorithm or is it about the end product?

Maria Verstappen We have been concerned with this for a long time now. It actually goes back to the early nineties, when we were still at the Rijksakademie in Amsterdam. We were confronted with the idea that there is a very compelling relationship between the artwork, on the one hand, and the art spaces which present it, plus the journals and magazines which in turn reflect on it, on the other. The art world is a self-perpetuating system. We established at the time that the artwork is essentially a strategic element in ensuring the continuity of institutionalized art. New art has to be shown every month, the production must go on. The magazines give glowing reviews to the galleries and art institutions, which buy large glossy advertising pages in these magazines. The so-called new and interesting therefore seemed to be very closely bound up with mutual commercial interests. We asked ourselves whether it would be possible to automate the production of art, and so meet the continual demand. It was a somewhat nihilistic response to the powerless situation in which we seemed to find ourselves. If you automate art production as a reaction to this, you need to have an end product, because only then will you know if your plan was successful.

Erwin Driessens It also had to do with the fact that at the time you could immediately see who had made a particular work of art.

Everyone had their own style, their own way of doing it. As if every artist had a developed a method of producing art. As if style was a system to be able go on producing art.

AA Is style based on a particular set of rules then?

MV That's what we thought at the time. When we tried to apply our idea it quickly became clear that you won't get far with such a nihilistic view. It turned out to be quite a job to devise a system which could produce something new each time, a system of which even we didn't know what would come out of it – otherwise it wouldn't be new. The challenge in our work, at the time, was to find a way to build a form of emergence into the system, to create a changing output.

AA You took a step back as an artist.

ED We wanted to be both artist and viewer at the same time. To be surprised ourselves by what it produced.

MV Right from the start we developed in two directions. We tried to formalize a way of dealing with the properties of the material, on the one hand. You could say that we devised physical algorithms in which plastic materials independently took on a detailed fixed form. At the same time we were working with the computer and programming. We conceived formal systems, worked with mathematical formulas, with the aim of being able to cultivate images instead of designing them by hand. We turned the computer models into objects later. Here we found ourselves up against the limits of what was programmable at the time. You may think that you can programme anything, but the technology sets the limits. Which in itself results in an individual style.

AA Can you give an example of a physical algorithm?

MV Take beeswax, a material which can easily be shaped: you liquefy it by heating it, it solidifies again as it cools. So you can easily do an experiment in which you pour molten wax into water and scoop it out again. Two liquids in motion, water and beeswax, together make a complex structure which is revealed by the solidified wax. It is a purely physical expression of wax. We made a machine, *The Factory*, which does that. *The Factory* shows a continual cyclical process of solidification and liquefaction and records the individual expressions

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of form of the successive lumps of wax on video.

AA What about the computer models? Did you immediately start working with genetic algorithms – computer algorithms which grow and change constantly?

MV We were busy developing things mathematically, of some things you could say, with hindsight, that perhaps it was a generative system, but they weren't genetic algorithms.

ED In the beginning it was just fiddling about. We were mainly trying to find out what the scope of a particular programmed system was. When you're just starting out you think it's fairly straightforward. We tested formulas. We wrote something down and then looked to see what came out of it. The formulas were fairly primitive functions based on circles and lines which we made combinations of. We were still too much involved in the design. Now we are at a stage where we leave even the composition of the formulas to the computer. To reach that level you need to be thoroughly familiar with programming.

AA In the type of generative system which you both make, surely you decide the parameters? What exactly do you determine and how do you create it in such a way that as much as possible is left up to the computer?

ED You try to let the computer work out the details itself. You do not programme an image pixel by pixel. You just write a number of general things, for example: you want a 2D-image which changes with time. You can setup a repertoire of basic functions and a mechanism to link these functions to one another. The computer is then capable of creating short programmes for itself, which then leave their mark on the screen.

MV But we definitely want the images generated to intrigue you as a person. You must want to keep looking. We once wrote a programme in which every pixel on screen changed colour at random. But this simply resulted in noise. If you want to make something that results in a coherent form or style, then there needs to be a feedback mechanism in the software.

ED There has to be growth in it, a genesis.

MV We let go of control over the creation process to give the emergence a chance. We deliberately

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allow unpredictability in the process, because we want to be surprised by the results. The more distance there is between our input and the end result, the greater the unpredictability and the surprise element. The greater the distance, the more we like it. We initially made our work with beeswax by hand. We had a bucket of water and a spoon and we tossed the wax into it. The form was still influenced by your physical strength, which is why we made *The Factory*. Another important aspect is that there are limits to any system you set up. These relate to the state of the technology as well as the physical and chemical properties of the material. We did a project last year on changing form which was done by etching away and galvanizing metal. In such a case it is clear from the start what you can do. The results therefore show the possible variations in form within that particular process. That's the case with computer software, too. You make a decision at the beginning which dictates what is and is not possible.

ED Everything we do is bottom-up. We always try to start out with a primordial soup and then see what emerges.

AA One of your works in which the computer essentially takes all the decisions, is *Breed*, in which cells divide and divide again until an optimum form is created. You then create that form, initially a 3D-computer model, as an object. How do you decide where the programme should stop?

MV During the growth of a *Breed* object, in each division every individual cell divides itself into eight new units which may be either solid or hollow. The choice of which it will be is determined by what the immediate vicinity of the building block looks like. A response to every conceivable type of spatial environment has been incorporated into the genetic code of the object. This genetic code gradually mutates through an evolutionary process in such a way that it meets a small number of criteria.

ED We also include end criteria in the programme. The process stops when the form meets the criteria.

MV The underlying principle with *Breed* was that the 3D-computer models could also be presented as an object. This meant that in the final object all the building blocks had to be attached to one another.

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There should not be any loose or floating parts. This was included in the programmed constraints. Nowadays the objects are made under computer control. We built the first models by hand in layers of plywood, so the limit was what you can cut out by hand. The programme therefore makes an internal measurement: can this form be physically made? That is a defining criterion.

ED At the same time, what form it will take is left entirely open.

MV *Breed* mutates the genotype for the form and compares the result of this mutation with the previous generation. If a higher percentage of building blocks are connected to each other – and the phenotypic form can therefore be more easily made than the last one – then the new genotype is used as the basis for another mutation. This goes on until the genotype best meets the set criterion, and produces a phenotype in which all the building blocks are spatially connected to one another. The requirement that the results must be fully interconnected drives the development of the form. It is essentially a fitness criterion. A type of artificial evolution takes place in *Breed*. You programme a criterion and a form evolves which gradually meets that criterion better and better. In *Breed* the algorithms drive voxels (volume elements), these are the building blocks. You can draw an analogy with cells, to us pixels and voxels are cells. We often use terms from biology. You might think that we are comparing virtual processes with organic processes but, in fact, we use these terms in a more abstract manner.

AA Are you training the computer to become an artist?

MV In the case of *Breed*, not to become an artist but more of a structural engineer. The computer knows nothing about the aesthetic qualities of the generated forms. There is no aesthetic selection.

ED Artist is not the word I would use. Creator or maker is better. We are now working on a new project in which you, as the user of the software that develops the generative forms, can choose what you like or think is good.

MV You give an image a score, based on which the system learns what you like.

AA It has been suggested that Artificial Life (AL) art, which could also include *Breed*, goes a step further

than the readymade of Duchamp and the work of Warhol. In the sense that Duchamp and Warhol also stepped back – or appeared to do so – from their own artistic egos. What do you think of that idea?

MV Because of Duchamp, Warhol, and Beuys too, there has been some sort of short-circuit which has cleared the way for AL art, among other things. At least as important is that *IMA Traveller*, for example, one of our works which is based on AL software and in which you navigate through abstract areas of colour, was possible because modernism opened up the abstract domain. No one thinks it odd that *IMA Traveller* is abstract. We don't have to defend it. I think it's interesting that AL art can link up so easily with abstract art. It is also somewhat inherent to algorithmic art. You could say that AL art realizes the potential released by Duchamp, Warhol and Beuys. We use it as an area of exploration. They showed that everything can have an aesthetic quality, we are physically exploring that territory.

AA Do you see yourselves therefore more as researchers, investigating the field of aesthetics, than as artists?

MV We are not in a hurry to pin the label art on our work. Whether it is art or not, I don't know. I prefer to use the word artificial. But because we mainly present our work in an art context, it would seem logical for it to be called art. It sometimes seems to be that if you do research in art you are more likely to be seen as a scientist. But we feel that our work and our aspirations are entirely bound up with the visual and creative process. That's why the visual arts is the ideal realm for us to investigate. We are well aware of the limited role of art. We are so spoiled by the world around us. You are given so many fantastic visual impressions. And you would try to match that with art? A plant, for example, is so detailed, you cannot even get close to it with art. In a number of projects we observe physical phenomena. Through the way in which we record our perceptions, we try to reveal an underlying process. As in *Frankendael*, which comprises 52 photos taken over a whole year from a spot in the Frankendael park in Amsterdam. They have been put on film and time is compressed, which allows you to see certain changes which you would not otherwise be able to see. *Morphoteque 8* and *Morphoteque 9* show

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an abundance of potato and carrot shapes have been collected and recorded, they show the diversity of form within a species. The genetic potential is revealed. A work of art can attempt to evoke that sense of wonder about the physical form of the things around us. Not in relation to the external forms themselves, but in terms of the underlying processes which create them all. We don't want to simulate existing processes, which would soon fall short, but specifically, to make use of the particular qualities that artificial processes offer. In this way you can evolve a new, living world of phenomena.

AA It is a kind of artificial nature?

MV Our point of departure is usually a simple fact, an algorithm which does something locally, but which at a general level can evoke great detail and complexity. That is wonderful. This is also how we reflect on the world around us and our amazement about these things and how they are connected to one another, only grows. You can connect it with the aesthetic of the sublime. In our software packages you could say that we are describing the laws of an artificial nature. In the nineteenth century the sublime was linked to a sense of futility in relation to the unpredictable forces of nature. An important aspect of the sublime is the tension between pleasure and fear. You can now run a programme that shows something of the amazing power of the computer, that has something of the sublime about it. The underlying generative process cannot be directly grasped but we are capable of experiencing it through the machine. You can be overwhelmed by a sense of being out of control, and at the same time enjoy the spectacle. What nineteenth century painting could only portray figuratively, you can let the observer actually experience with AL. You can pick up the ideas from that era again, link them with the principles of abstract art from the last century and the achievements of Duchamp and Beuys. All these threads are being drawn together for us now.

AA *IMA Traveller* is, in that sense, the computational sublime.

MV The AL artist Jon McCormack used that term at a conference in Melbourne. It certainly makes sense.

AA Does this mean that you are essentially aiming at a visual impact

on the viewer?

MV We try to make sure our work is accessible. That is why it is important that it has a direct visual impact, which you also get even if you don't know anything about what's going on in the background. It's only now, at this moment in time, that the purely conceptual approach of the computer arts is coming together with a credible visual language. What you often see in computer art of the past is that it was more of a demonstration than something which you could really experience. We sometimes say ourselves, half jokingly, that we are aiming for a sort of Hollywood quality.

AA You mean a high resolution image in which you can immerse yourself, as it were?

MV That's why we also aim for a real-time experience. The best thing is when the area that you explore, as the observer, is built up in real-time, as in *IMA Traveller.* It did not exist until you found it, you are the first person to see it. It is not a pre-calculated set of images, as in film or video. It requires fast computers and refined software. The pixels must be transmitted at lightening speed. The image should preferably refresh itself sixty times a second.

ED An artwork of this kind really has to be a parallel world. It has to compete as far as possible with the world we know.

MV Well, it should mainly compete with the other media we know. These dictate our perception. I hope that when people see our works they encounter visual images which do not carry a message put there by an artist. You can talk about what is beautiful and ugly with a certain detachment once again once you realize that the things were created by a machine which has no notion of beautiful or ugly. If you like it, that's your personal taste.

AA With *Tickle Salon* and the tickling robot you are really competing with reality. The machines do something which we perceive as very human, stroking and tickling.

MV And they have surpassed human beings when it comes to stroking and tickling. They do it better. The psychology – of the machine doing it instead of a person – gives the machine an advantage. It does not have certain physical limitations, like the limitation of what you can do with an arm. Also,

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it is very selfish to want to be stroked. You want to be stroked, which you need someone else for. If it is done with love, that's an extra bonus. Sometimes it is just nice if that element is not there, that you don't have to burden someone else with it. What is amusing is that in art people often look for a clear statement from an artist, but this is not the case with *Tickle Salon*. Clearly, it creates its own context.

AA Have you ever been asked: when are you going to bring it out onto the market as a product? You haven't done that so far. Presumably you don't see yourselves as product developers?

MV We find it very interesting that the question is raised. We would prefer to leave it open for as long as possible. It is sometimes taken amiss that we haven't said anything about it. 'Tell us, is it art or is it a prototype for a consumer product?' We have not made any fundamental decision about that. To us it is what it is. You can see the machine entirely in terms of an invention – a tickling robot – which makes the whole question of art or the market irrelevant. But it looks as though you could sell it in a box. That's important, it's part of the experience. But we certainly don't intend setting up a production line with all the risks that that involves.

ED We are more interested in the question of whether or not something is possible. If it turns out to be possible, then we turn our attention to something else.

AA Do you do a lot of research before developing a project?

MV We do research, but we often begin from scratch. You cannot always use what you discover from research. During the research for the *Tickle Salon* we discovered that GPS software partially does what we needed, but that software is hard to get and not freely available.

ED It is often more difficult to tailor existing software to the things you do. It is often better to develop your own software. When we made *IMA Traveller* we had no notion whatsoever of AL and cellular automata. It was developed in parallel.

MV That's often the way it goes. You look for a connection somewhere and you find out that you are actually already connected.

ED That's also because the strategy we use is truly 'keep it simple'. We are certainly not the only people who do that, and then you soon find yourself developing something which others have also developed. Certain techniques and solutions reveal themselves. But I do read more scientific papers now than I used to.

The Amsterdam based artists duo Erwin Driessens (1963) and Maria Verstappen (1964) have worked together since 1989. They both studied at the Rijskakademie, Amsterdam and the Academy of fine Arts, Maastricht. They develop low and high tech systems (physical algorithms, evolutionary software, robotics) to generate a continually changing output of images, 3-dimensional shapes or movement. They have held numerous joint and solo exhibitions in galleries and museums in The Netherlands, France, Germany and other countries. <http://www./xs4all.nl/~notnot>

HEARING PURE DATA: Aesthetics and Ideals of Data-Sound

Mitchell Whitelaw

Digitalisation turns sounds and images (still and moving) into strings of zero's and ones. Pure data, in fact any data, can therefore become sound or image. The artists dealing with these issues operate between the worlds of experimental electronic music, visual arts, and design. Australian researcher Mitchell Whitelaw dives into the aesthetics of pure data, data bending, and sonification.

The basic resources, for sound artists and producers, are now digital. Production tools have for the past decade been moving from hardware to software; this process has recently reached saturation point, such that the computer has completely internalised – virtualised – the studio: the only vestige of hardware is an audio interface, necessary still to convert between data and audible signal. Creative sound culture is restless; casting around for