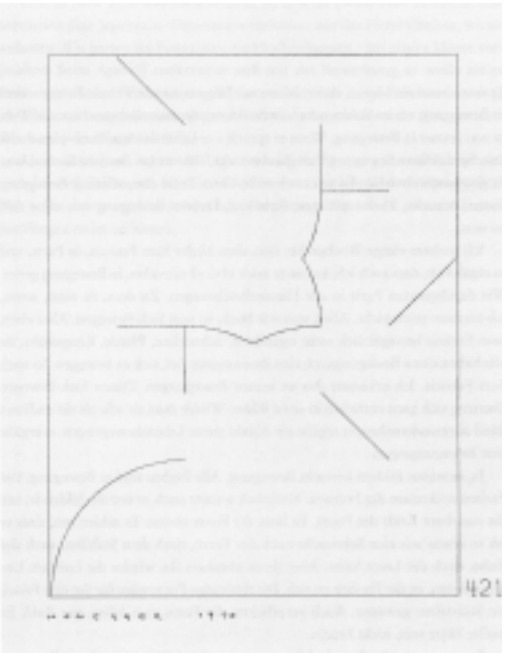
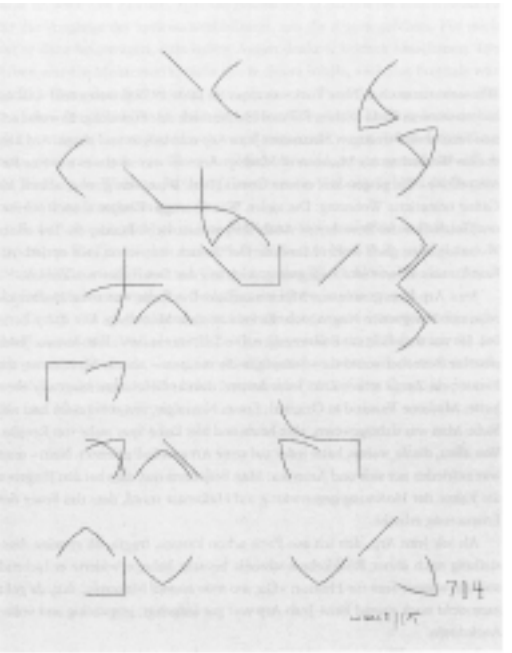
Programmes as space for thought?

Notes on the origins of Swiss computer art

Tabea Lurk

Gottfried Honegger





Introduction

As is common with newly emerging art forms, the beginnings of computer art in Switzerland are blurred and somewhat obscure. For a number of reasons it is difficult to put an exact date. Even though most of the protagonists are still alive, the search - beyond the personal contacts - in the period before the mid-1980s is a challenging one. This can be explained in part by the relatively late arrival of digital technology in the private sphere – personal computers did not appear in Switzerland until the mid-1980s.

Additional intentional obstacles that are inherent in the specific format of early computer art initially hampered the popularity that we see more recently – particularly as regards current computer and internet-based art. However, some of the aspects listed below continue to restrict the historical analysis. Few Swiss computer graphics dating from the 1970s were exhibited or published in the art context when they first appeared. Studies and aesthetic concepts in particular - presumably realised at the ETH or Swiss Federal Institute of Technology in Zurich, in the technical institutes across the country, or in research institutes such as CERN (Geneva) - that might help us draw an analogy to the well-known international computer art movements, have so far eluded systematic documentation. Computer art has always been bound by technical conventions, which are subject to constant change. Consequently these artworks are considered ephemeral, even though they are structurally reproducible. In the process, what has gone virtually unnoticed is the fact that computer art has developed a new type of originality whose principle of uniqueness is currently adding to its value. And finally there are the artists who have deliberately destroyed some of their earlier work or subjected it to self-censorship – at the time, at least, this was understood to be the logical consequence of disbanding the work concept.

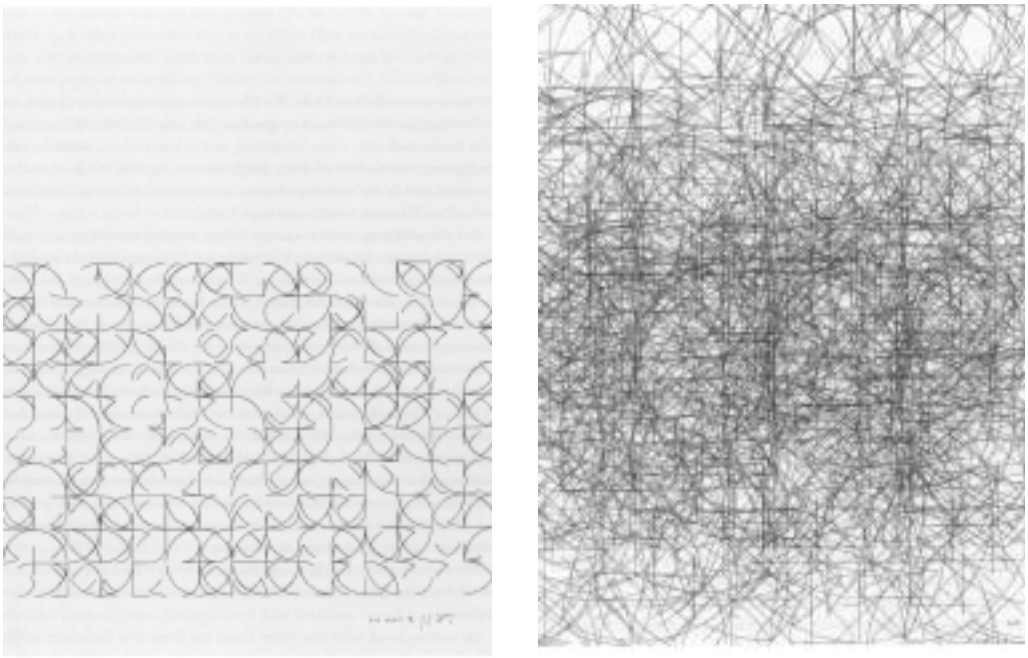
Yet even the few concrete examples, from which the six following artistic approaches are outlined below, provide us with an initial idea of what computer art in Switzerland can mean, how wide the intentional anchorage is, and what the concrete, visual results can look like. Based on the heterogeneity of the concepts, the following selection endeavours to present the aesthetic diversity inherent in the working methods of the artists. In the process, not only do the different artistic interpretations occasionally result in contrapuntal dynamics. It would of course also be interesting to take things further and trace artistic development within the framework of each individual oeuvre. Specific characteristics begin to take shape over time and their pithiness may well be lost in a cross-sectional overview. However, given the focus of the text, this second stage has been disregarded. Interested readers may glance through the monographic catalogues of the artists mentioned here to gain a better insight into the contexts that we have only briefly outlined.

Examples of artworks

A historical analysis of the first generation of Swiss computer art depicts the 1970s as the 'lost generation'. Yet we have reason to believe that even at this early stage the available computers were not used exclusively for scientific research or for office automation but also for more playful experiments with games, art and design that were indulged in during an occasional break from work. We can list a selection of at least 14 computer graphics from 1970-71, which were realised in official capacity by Gottfried Honegger (*1917 in collaboration with Professor Huber at the ETH Zurich. The illustrations were published at the end of the 1990s in the autobiographically inspired compilation of essays entitled *Dank dem Zufall* (Thanks to Chance)[1], where they were inserted between the pages to enhance the design. As the described by the artist, the illustrations were worked out on a CDC 1640-A computer:

Computer-generated (pseudo) random numbers were used to simulate the throwing of dice. For each picture the FORTRAN programme at first produced a table of the picture elements to be drawn. This table was then transposed square by square into the sketch. It took a few seconds to calculate the dimensions for an image and about a minute to draw it (with a CALCOMP Plotter 565). Repetitions can be expected only after 1400 000 000 000 000 images.[2]

[1] Gottfried Honegger, Dank dem Zufall. Eine zufällige Auswahl von zufälligen Begegnungen, Zurich 1998.
[2] Ibid., p. 126.



Computer-Zeichnungen [Computer drawings] (1979/71). Source: Gottfried Honegger, Dank dem Zufall: eine zufällige Auswahl von zufälligen Begegnungen, Zurich 1998, pp. 11, 43, 79, 59, 75, 103.

In general, however, these computer graphics feature only sporadically in catalogues of Gottfried Honegger's work – there are rarely more than two examples.[3] Chance is a key principle of form; one of Honegger's sources for the aesthetic concept of chance was the book *Chance and Necessity* by Jacques Monod (original: Le hasard et la nécessité, Paris 1970).[4] It is also known that Gottfried Honegger never really considered all the prints of a series to be an 'artwork' or a work sequence, but instead always selected individual prints according to aesthetic criteria, thus underscoring the deep-rooted relationship between the artist and the (abstract) interpretations of classic modern art. Moreover, the computer prints served primarily as a source of inspiration for sculptural work in the public space[5] and later for architectural surface designs [6]. According to Michael Gnehm, Honegger "simulated" chance even without a computer by "throwing dice according to a pre-defined programme and so deducing the elements to be used and their distribution on the 'screen' or in the 'spatial composition'".[7] However, in terms of the artistic concept and of the process from aesthetic design to technical computing, some things remain unclear – for instance, the interaction between the selection of design forms or the parameterization of the vectors and (arithmetic) values.

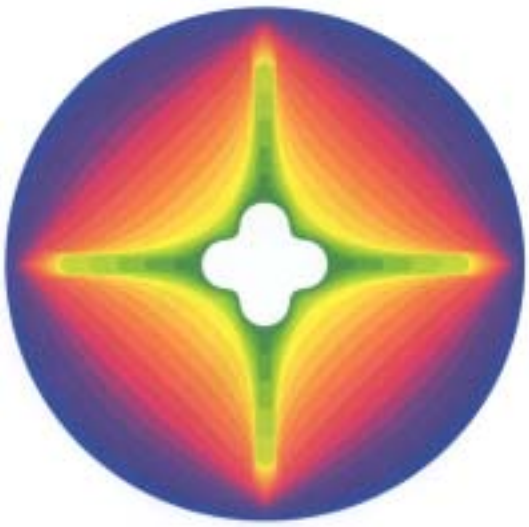
When computers were still gigantic machines (Gerstner), or to be more exact, even much earlier, namely in 1963, two years before the official start of computer art,[8] the artist Karl Gerstner (*1930) had brought out a slim volume on designing programmes, in which he had already drawn attention to the potential for designing something new through the iteration of formal and/or concrete[9] processes. In the 1970s Gerstner devoted himself more and more to the field of possibilities embodied by the computer. Even in the mid-1960s, computer engineers like Frieder Nake (*1938) and Georg Nees (*1926) actually had daily access to computing machines at the Institute of Technology (today University) in Stuttgart (Germany), where they could not only programme the computers themselves but were also able to evolve into 'computer artists' under the influence of the art historian Max Bense (1910-1990) and later Abraham Moles (1920-1992). For Swiss artists however it was the 'potential of the computer' that was initially more important and real than its actual availability.[10]

But Karl Gerstner had already had his first encounter with a computer centre in 1969 when he was invited to the Massachusetts Institute of Technology (MIT) in Cambridge, Massachusetts, USA. Shortly thereafter he

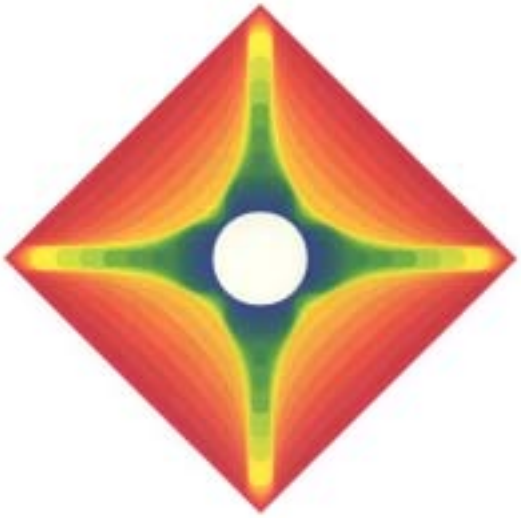
[3] Friedemann Malsch, Gottfried Honegger trotz allem: eine Rückschau, Vaduz 2002, p. 12; Gottfried Honegger, Kunst als Bekenntnis. Werkübersicht 1939-2006, Zurich 2006, p. 83; Michael Gnehm, Gottfried Honegger, Arbeiten im öffentlichen Raum, Zurich 2007, no page numbering, No. 14 and p. 141. All three publications carry one graphic each from the 1971 series.
[4] Honegger, Kunst als Bekenntnis, p. 82.
[5] Cf. Michael Gnehm, Kunst am Bau: Debatten um den öffentlichen Raum, in: ibid. (eds.), Gottfried Honegger, Arbeiten im öffentl. Raum, Zurich 2007, p. 135-159. Particularly the section on "Orte konkreter Kunst und Begegnungen mit dem Zufall", p. 138-145, in which Gnehm also mentions the works in ETH (p. 141).
[6] Cf. for example the manufacturing halls designed by Honegger for Renault in Cacia (Portugal) 1981/82.
[7] Gnehm, p. 141.
[8] At the international level, computer art starts in 1965 with exhibitions by Georg Nees (March 1965, Galerie des Studium Generale, Technische Hochschule, Stuttgart, Germany), Michael Noll and Bela Julesz (April 1965, Howard Wise Gallery, New York, USA), Georg Nees and Frieder Nake (November 1965, Galerie Niedlichs Bücherdienst Eggert, Stuttgart, Germany). These are followed in 1968 by *Cybernetic Serendipity* (Jasia Reichardt, Institute for Contemporary Art, London, UK) and fourth edition of *Nove tendencije* (Zagreb, CRO) that also display computer art. The exhibitions *Information* (Museum of Modern Art) and *Software. Information Technology: Its New Meaning for Art* (Jack Burnham, Jewish Museum) are held in New York in 1970.
[9] The history of exhibitions is not the only factor that substantiates the historical proximity between the first generation of computer art and what is known as Concrete Art, whereby the motive of programming is considered the unifying bond between the different genres and formats. Peter Weibel, the Austrian media artist and theorist even speaks of a *mental* and a *methodological* programming, but it is always about programmed art: "Only once with and once without a computer. Concrete Art is for instance programmed art without a computer, digital art is Concrete Art programmed with a computer." (Peter Weibel, Kunst als K hoch 8. Eine Korrektur, in: bit international [Nove] tendencije. Computer und visuelle Forschung. Zagreb 1961-1973, Weibel, (eds.), p. 9).
[10] Johannes Gfeller, Frühes Video in der Schweiz. Ein unbekannter Anfang – und eine vergessene Geschichte, in: Helmut Brinker, Wolfgang Kersten et. al (eds.), Georges-Bloch-Jahrbuch, Kunstgeschichtliches Seminar, University of Zurich 1997, Zurich 1997, p. 223.

Programmes as space for thought?

Karl Gerstner

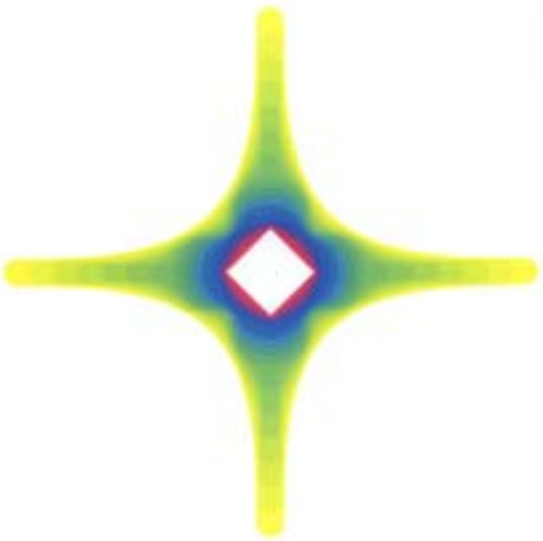


color form continuum blau [blue]. KonVision (1970). Relief in 18 layers (1982); 110 cm in diameter; depth: 5 cm.



color form continuum rot [red]. Version without contours (1970). Relief in 19 layers (1982); 105 x 105 cm; depth: 5 cm.

color form continuum grün [green]. Version without contours (1970).



color form continuum gelb [yellow]. Version without contours (1970). Relief in 16 layers (1982); 160 x 160 cm; depth: 5 cm.

color form (as of 1970). Continuous transition of the basic forms of circle and square, as well as the primary colours blue, yellow, red and green. The work was executed on a large computer system at IBM Stuttgart.

was able to realise his first works on *color forms* in collaboration with Klaus Thomas at IBM in Stuttgart.[11] The *color forms* are a "sensibility-based harmonisation of primary colours and primary forms",[12] in which colour theory concepts play a vital role. In addition to the basic stock that Gerstner derived primarily from Kandinsky's synaesthetic approach from *On the Spiritual in Art* (1911), he also paid attention to form-related theories ranging from Plato to the present day. Based on the pattern of four primary colours and four basic forms, the logical inference of these elements (also inspired by Benoit Mandelbrot's Fractal Theory) quickly led to the understanding that this artistic iteration could be realised less with compass and ruler, and more with the computer. For Karl Gerstner, the Stuttgart result bordered on a miracle, as he reports:

At the push of a button the figures appeared on the screen; sizes and dimensions could be adjusted at will, the number of steps chosen at will. And the machine made changes in a fraction of the time that the quickest draftsman would have required - until the result was one with my idea. The plotter used in those days then transferred to paper what could be seen electronically; each curve in the form of steps, but still something. The result was a series of eight computer drawings; four ConVersions and four DiVisions.[13]

color forms was then executed as coloured reliefs. Of importance here is however that "in the computer" Karl Gerstner had not, as suggested by Bense's approach, "seen the creator, but the implementer of ideas, the executor of the artist's ideas."[14]

An overview of Karl Gerstner's wide-ranging oeuvre to date provides us with an insight into his varied use of form, style and media technology to produce pieces that do not necessarily require a computer. And yet the work on and with the computer is still a constant. The artist has always ensured that "the machine realises (only) what (the artist) has entered as input." And Karl Gerstner specifies that the work is "realised" in a manner that would not be possible by a "human worker".[15] This specific computer-based aspect is also highlighted by the later example of *color spiral icon 65b* (2008).

The St. Gallen artist Bernard Tagwerker (*1942), is also primarily concerned with the use of the computer in a medium-specific or, more precisely, machine-specific manner.

I wanted to use the computer[16] at exactly that level where its skills lie. In other words, computing. Not so much at the level of the drawing and illustration programmes available today. They have eased the work process on the computer in that they allow one to experiment with options. [17]

In contrast to these programmes Tagwerker prefers the clinical use of the computer for information purposes, because for "operational, process-related systems an action is initiated, the outcome of which is unknown."[18] And chance, as the actual construction tool, is crucial yet again. However, while Roland Wäspe believes that dealing with the random distribution of defined graphic elements is founded principally on a deep-rooted "scepticism of the options available to an artist to explore something completely new,"[19] Marion Keiner comments that Bernard Tagwerker has come closer to the "disorder of chaos and chance" by dealing with law (legality) and order (.....).[20] This moment of tension between conceptual rigour (order) and aleatory is also expressed in *Konstellation* (1977/1) (reproduced here)

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[11] Karl Gerstner, Die color forms, in: Eugen Gomringer (eds.), Karl Gerstner. Rückblick auf sieben Kapitel konstruktive Bilder Etc., Ostfildern-Ruit 2003, p. 165.
[12] Karl Gerstner in a letter to Tabea Lurk, 14 September 2009, p. 2.
[13] Karl Gerstner, Die color forms, p. 165.
[14] Karl Gerstner in a letter to Tabea Lurk dated 14 September 2009, p. 2.
[15] Ibid. p. 3. The artist also notes that while the computer may be extremely good at calculating forms, it is completely inadequate when it comes to colours.
[16] Even today most of the works are realised on an IBM 2/86 computer in which a Dos system has been installed. The graphic programme used is VersaCAD.Version 7.02. The flat bed plotter is controlled by a special serial printer interface as interfaces such as HP-GL were still not a standard when the works were created.
[17] Bernard Tagwerker in an interview with Tabea Lurk on 14 September 2009, St. Gallen, Switzerland.
[18] Bernard Tagwerker, in: Zufall als Prinzip, Bernhard Holeczek (eds.), Ludwigshafen: Wilhelm-Hack-Museum, 1992, p. 208.
[19] Katalog: Tagwerker. 3.10.-15.11.1987. Kunstverein St. Gallen (eds.), St. Gallen 1987, p. 7.
[20] Marion Keiner, Chaos und Zufall in den Arbeiten von Bernard Tagwerker, in: Konrad Bitterli, Bernard Tagwerker. 1969-1995, Kunstverein St. Gallen, Ostfildern-Ruit 2007, p. 38.

that was created during Tagwerker's ten-year stay in the US. While the print had not yet been created on a computer – Tagwerker did not buy his first computer, a TI-99/4A, until 1984/85 in New York - the illustration was divided into squares by hand, then stamped (0 to 999), followed by a laborious series of 100 pencil and 100 chalk lines, resulting in an intricate web. Each line connects two number fields randomly drawn by the artist from a pool of numbers between 0 and 999.

Starting with *Konstellation*, Tagwerker still needed almost ten years before he was first able to develop work that had been devised on the computer. The first documented work is the six-figure collage *0°, 15°, 30°, 45°, 60°* (1986/1), in which a kind of master drawing was first drafted. The structure of the drawing is based on a square grid the density, margins and diagonals of which have been randomly selected by the computer. Five segments were then selected from the overall picture, enlarged and arranged in 15° steps in the form of an arc.[21] Brief series of other graphic work followed until *Arcs 1* (1989), also reproduced here, in which Bernard Tagwerker gradually iterated some aesthetic principles. The artist never deviated from the aesthetic programme even if it meant using extremely time-consuming and nerve-wracking procedures. An example is the 39-piece work titled *Verdopplung Horizontal – Vertikal* (1988) that covered a wall. In this 'doubling horizontally – vertically' the concentration of lines is continued randomly until a sheet of paper is completely covered with at least one layer of black. The procedure was conducted in four stages, each with a double border.

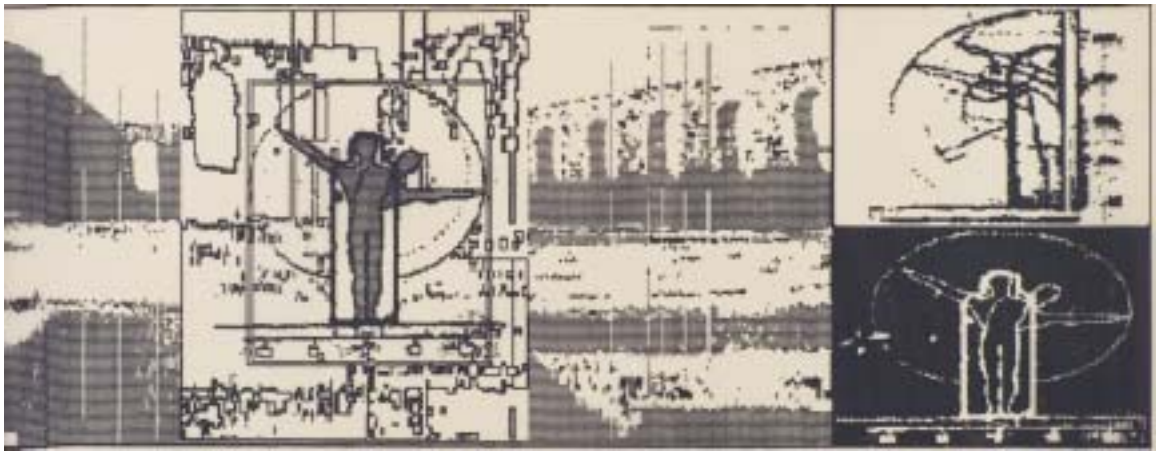
Where other artists would have considered certain prints or screens as rejects or would have interrupted some of the printing processes, for Tagwerker the creation process that he was engaged in at that very moment had to be completed before he could turn to another theme. The artist's method of work above all has more or less become the trade mark of his computer art. Tagwerker re-engineered an industrial flat bed plotter manufactured at the company Wild (later Leica) so that it could work directly on medium to large-scale screens. Attachment units were first developed that still enable drawing and sketching tools to be fixed to the plotter head. Then the standard optimisation of the vectorial printing process was manipulated on the software and/or at the steering level of the over-sized sketching gadget such that the normal optimisation of printing methods for industrial plotters between a point A and a point B was avoided and the paintings could therefore be realised layer by layer, in any number of colour coats. That the perfection of the manufacturing process is of relevance is also reflected in the fact that for Bernard Tagwerker the results are "more mechanical than digital"[22] - to the extent that the painting process itself becomes a mechanical process. And precisely this difference between an understanding of digitality that exists in calculated operations through the use of chance and produces graphical patterns, and the mechanical perfection of the plotting process that actually adds to the quality of a work, is what lends a completely different charm to Tagwerker's computer art.

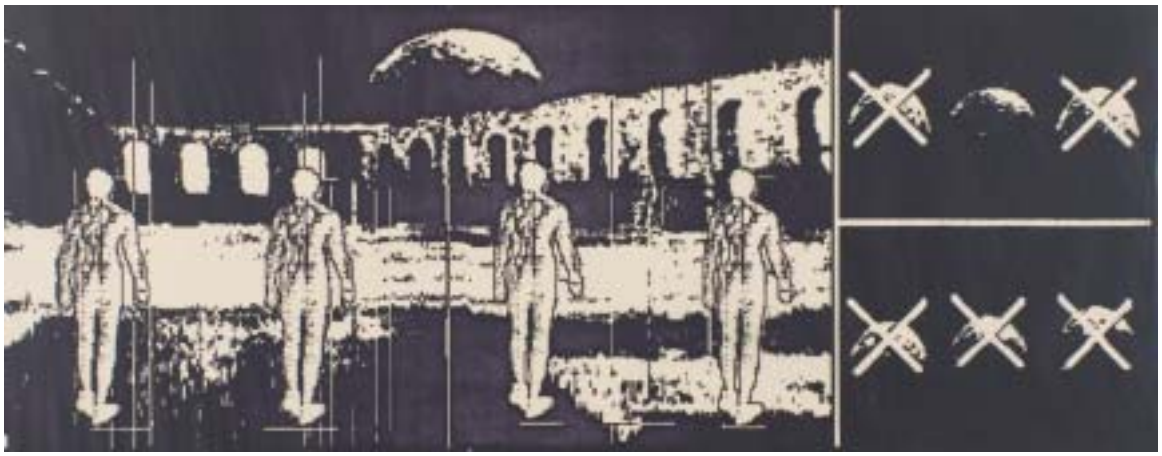
Bernard Tagwerker and Alexander Hahn (*1954) have been friends since their time together in New York. Shortly before leaving the US Tagwerker acquired the three-part sequence *Simulation Piece 1-3* (1985) by Alexander Hahn, and allowed it to be published in this catalogue. Indeed, Alexander Hahn, who is known primarily as a video artist, is also one of the pioneers of Swiss computer art and has been using the computer in art since the first half of the 1980s. In this context it is particularly interesting that his artistic origins lie in electronic art, specifically video art.

In contrast to the examples of artworks mentioned above, Alexander Hahn's computer-generated pieces present a graphic vocabulary that seizes not only on the visual fragments of everyday electronic culture but sometimes also on digital readymade sound and picture forms, and places them the context of art. One of the very first works to be written exclusively in code and on the legendary TI-99/4A (Texas Instruments Extended BASIC) is *A Young Person's Guide to Walking Outside the City* (1983).[23] For one, the aesthetic of the piece

[21] Konrad Bitterli, Werkverzeichnis, in: Bernard Tagwerker. 1969-1995, p. 148.
[22] Bernard Tagwerker in an interview with Tabea Lurk on 14 September 2009, St. Gallen, Switzerland.
[23] Alexander Hahn has published an animated video version of earlier work on the internet: http://www.alexanderhahn.com/Video/YoungPerson.html (12 September 2009).

Alexander Hahn





Simulation Piece I – III (1985), 38.3 x 67.5 cm. Computer drawing realised on a 128 KB Macintosh. The video images were digitalised with MacVision, edited with MacPaint, printed and copied on transparent foil. Photos: Johannes Gfeller.

draws attention to video games such as *Space Invaders* (figures) and *Pacman* (animation pattern); for another, it resorts to the 'found code' (recycling), or graphic software designs such as colourful fish, the programming (code source text) of which was taken from a computer magazine.[24] Prior to this the artist himself had already graphically programmed the game of chess on TI99 and integrated it into the installation titled *It that once beat the Masters*, created in 1982-83. The graphic material here seemed to be embedded in a system of Fresnel lenses that caused holographic distortions to the image.

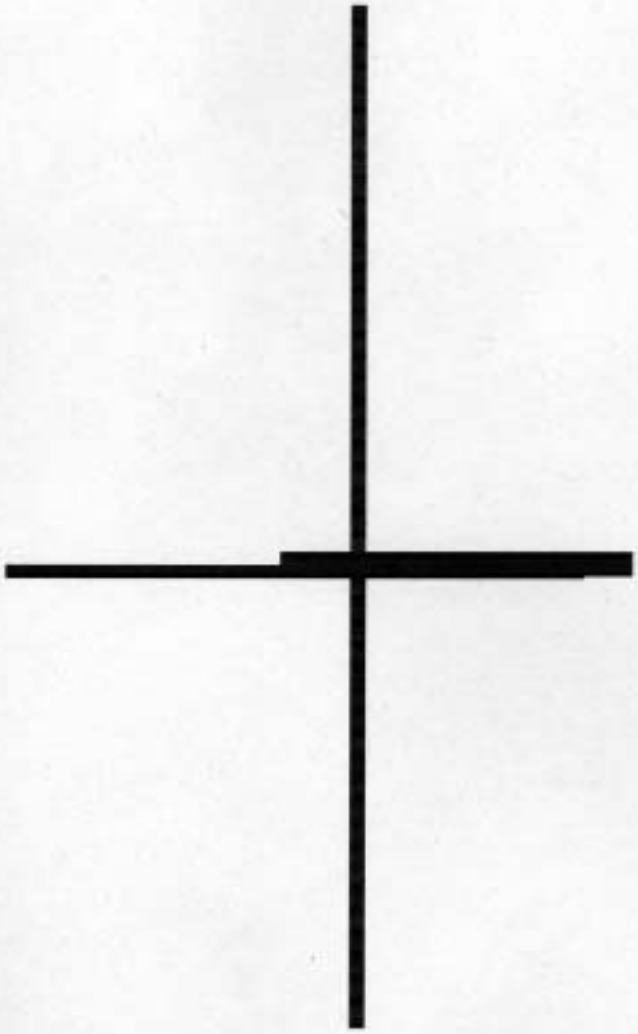
Alexander Hahn had started rather early to use the video camera as a source of pictures for processing or developing computer artwork. With the aid of a hardware-based video interface (MacVision), a Sony Video 8 camera[25] was attached to the computer and the graphic material was either played back on the camera, as was the case with the video tape *Aviation Memories* (1986), or was printed, as in the three *Simulation Pieces*.[26] Once the illustrations had been digitally composed, they were first printed in black and white on fanfold paper and then enlarged to the desired size (38.3 x 67.5 cm) with a photocopier.[27] The result is drawings with a unique materiality, printed as they are on transparent film. The sequence reproduced here, *Simulation Piece,* combines three different graphic elements: a view of New York from the roof of a building on 817 Broadway, like a cut-out in the background with arched windows reminiscent of antique ruins. There is also a male nude seen from the back (proportion study) in which the artist schematizes himself, and finally a view of the moon where one can choose from different lunar phases. The graphic material in combination is a repeated motive in other work of that period. In *Simulation Piece I,* one of the figures has been placed in a circle in such a manner that we cannot help but recall Leonardo da Vinci's famous proportion study of Vitruve (1505). In addition to the use of different contexts for the graphic elements, the format and form are particularly striking. On the one hand, Alexander Hahn highlights the process of selection during composition by reproducing the different graphic elements to choose from on the right-hand border of the picture. The unused objects are crossed out and the template used is easily recognisable. On the other, the pixel structure is obvious once the image is enlarged, and we find ourselves agreeing with Robert A. Fischer (1942-2001), one of the most important theorists of the Swiss media art scene as of the 1970s, when he says that Alexander Hahn (works) "only with the tools of the digital age, like a painter with an easel."[28]

Much like Alexander Hahn, Hervé Graumann's (*1963) computer works also have their origins in electronic culture, whereby Graumann's roots lie in electronic music. The synthesizer, sequencer and sampler play a central role and have facilitated experimental manipulation of electronic information, for instance audio and later video signals. In terms of form, the artists are also similar in the way they present their pieces - Hervé Graumann's work is also frequently or almost exclusively in the form of installations. However, the work of the Geneva artist is underpinned by an understanding of art that differs from the examples mentioned above and is highlighted by *Couleur Minute* (1989), Graumann's very first computer-based installation. This piece places an Amiga 500 computer on the floor of the display room; monochrome colour fields appeared on the monitor minute by minute. The colours shown are randomly chosen from the spectrum of the 4096 colours that can be used, and appear as plain, solid colour fields. The recourse to chance results in an endless, unpredictable colour film that can only be computed in real time on the computer. Mention can also be made of Graumann's interactive painter *Raoul Pictor cherche son style...* (1993) that has also become something of an icon. A slightly updated version has been available on the internet since 1997[29] and since 2009 can be downloaded as an iPhone application.[30]

[24] Other video works and computer video plays such as *Dream of Zanzibar* (1985) can be cited here, in which Alexander Hahn uses diverse methods to design the media-technical transitions between the worlds of art videos, electronic games and computers. Cf. http://www.vimeo.com/user439168/videos (29 September 2009).
[26] Other dot matrix prints such as *Computed Sunset II* (1985) are on display in the Solothurn monographs; cf. ibid. p. 89f.
[27] Large Format Xerographics is still in existence.
[28] Robert Fischer: Alexander Hahn. Electronic Media, Zurich 1989, p. 7.
[29] http://www.raoulpictor.com/ (12 September 2009)
[30] http://itunes.apple.com/WebObjects/MZStore.woa/wa/viewSoftware?id=328337770 (20 September 2009)

Programmes as space for thought?

Hervé Graumann



Composition verticale/horizontale à 3 éléments 1993-94

Hervé Graumann

Elément # 1_
nom: horizontale black+
Longueur: 63.9 mm
Epaisseur: 4.6 mm
Distance du bord gauche de l'élément avec le bord de page: 106.4 mm
Distance du bord supérieur de l'élément avec le bord de page: 118.6 mm

Elément # 2_
nom: horizontale medium
Longueur: 104.8 mm
Epaisseur: 2.5 mm
Distance du bord gauche de l'élément avec le bord de page: 58.6 mm
Distance du bord supérieur de l'élément avec le bord de page: 121.1 mm

Elément # 3_
nom: verticale black-medium
Longueur: 187.1 mm
Epaisseur: 2.8 mm
Distance du bord gauche de l'élément avec le bord de page: 121.1 mm
Distance du bord supérieur de l'élément avec le bord de page: 18.7 mm

Composition verticale/horizontale à 3 éléments (1993-94).

These works have been influenced by what is known as the 'paint box era', which starts with the Apple II computer and categorises these pieces under the (second-)generation of computer art that stopped producing vector-based picture elements, but were able to resort to graphic user surfaces and tools. However, the excerpts from the series *Composition verticale/ horizontale à 3 éléments* (1993/94) reproduced here are a later recollection of classic first-generation computer art: the structure of its composition is written down word for word on paper. In contrast to Graumann's installations that may be extremely ironical when addressing the computer and its environment,[31] the illustrations reproduced here, despite their special status in the overall work, can be associated with what the artist says about his beginnings:

At the time, I was making engravings, doing linocuts, a typographic technique. I tried to reproduce the point – the pixel – by taking as my model the screen with its vertical and horizontal axes. Taking two sheets of linoleum of the same size, I cut a vertical line into the first and a horizontal one into the other. The first sheet was printed and it shows a white vertical line on a black ground. Then I took this same sheet of paper and printed on it with the second line, which produced a horizontal line which now was not white because it was printed on black. The result was a double layer of black over the whole sheet, except in the horizontal and vertical lines, where there was only one coat of ink and a white dot. The white dot was where the two lines intersected.[32]

This completes the examples of computer art that had emerged only slightly earlier. In the case of Hervé Graumann, while a direct connection can be established in terms of style, form and, above all, intention, to the more recent computer-based art forms described in this year book, the work of Roland Jung (*1941) finally allows Swiss computer art to be metaphorically (re-)coupled with the historical precursor of the computer: the Joseph-Marie Jacquard (1752-1834) loom of which Charles Babbage (1791-1871) is supposed to have said:

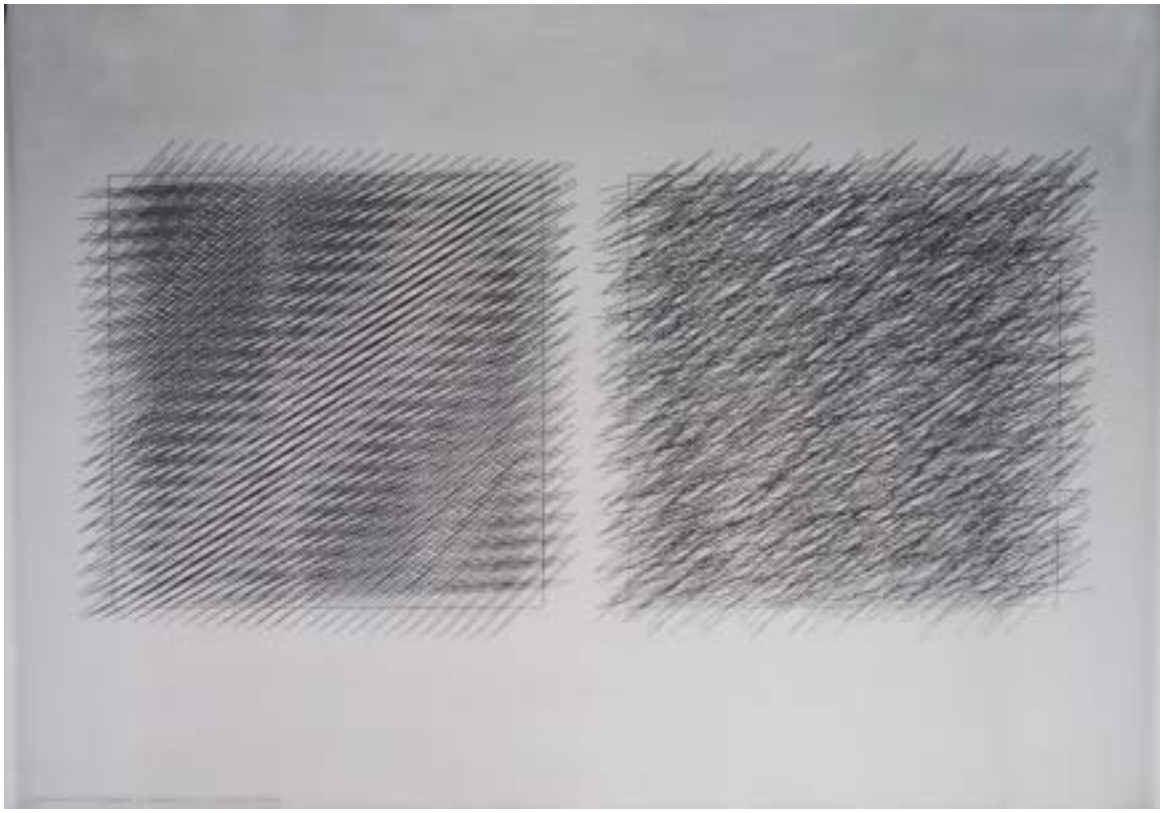
The fact is that with a Jacquard loom one can weave any conceivable pattern. In the factories there are artists who design such patterns. Based on their designs, a special machine is then used to punch holes in pasteboard cards. By combining these cards, the loom weaves an exact reproduction of the pattern. Even if the colour or shade of the threads is different, the designs on the fabric remain the same, distinguished only by colour.[33]

In fact Roland Jung first learned weaving not on a Jacquard loom but from scratch, before establishing contact in 1985 with the integrated gallery belonging to the NOKIA office (previously Riccho) in Zurich. NOKIA immediately recognised the potential for design not only in the computer but also in the artist and supported Roland Jung by allowing him to use some of the technical infrastructure for project purposes. The artist, in collaboration with an engineer and prospective computer scientists, was therefore able to expand his visions of structure-based art by using his own computer programme. A 'Jung programme' was developed which for years facilitated the creation of vastly different illustrations that were printed on medium-sized paper, examples being *Mixed6* (1993) and *Random3. Initial1* (1993) that are displayed here. They have been created with a 1986 programme version. Or the programme was used as a basis for sculptural objects, reflected in *Spiraltrichter/Cone spirale* (1985/86), also reproduced here.

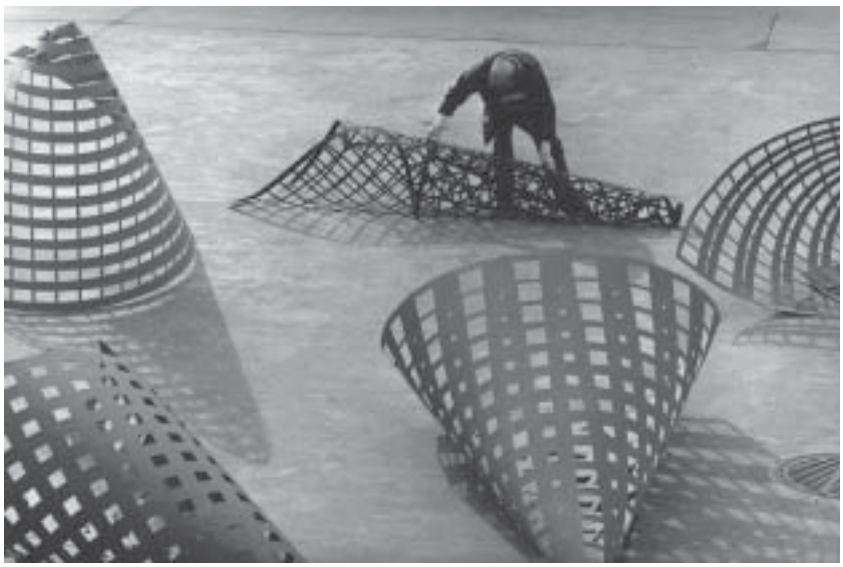
In contrast to Gottfried Honegger's monolithic sculptures in the 1970s and 1980s, Roland Jung's sculpture stands on thin metal and steel plates or industrially manufactured grills in which precisely calculated imperfections have been cut or lasered before being fully mounted. Fitted into the setting, objects emerge that seem to be light, almost transparent, despite the heavy materials used. The lines worked out on the computer are recognisable as sections or vacant forms. The range of forms has expanded over the years

[31] For instance, in *Hard on Soft* (1993) Hervé Graumann placed an ink jet printer on a sponge pedestal so that the movements of the print button during the print process caused the entire installation to shake.
[32] Laurence Dreyfus, interview with Hervé Graumann, in: Herve Graumann, Baertschi-Salomon (eds.), Geneva 2005, p. 51.
[33] Charles Babbage, quoted in: Irene Meichsner, Vom Webstuhl zum Computer, in: Deutschlandfunk, Kalenderblatt 7 August 2009, http://www.dradio.de/dlf/sendungen/kalenderblatt/1007887/.

Roland Jung



Mixed 6 (1993) and Random 3 (1993). Both works were created by the Jung Programme and printed on paper as drawings.



Spiraltrichter/Spiral cone (1985/86), reinforced iron, laser cut.

Detail of sliding door designed for the institute of music at the University of Zurich. Photo: Cristina Urchuegía.

as has the spectrum of materials used which now include glass – used for instance for facades or interiors.[34]

Conclusion

If we again pose the question of the visibility or presence of first-generation computer graphics in Switzerland, we encounter some extremely interesting aspects. An impressive array of art forms has developed in the country in which graphic computer art continues to exist. In addition to work that is graphically plotted on paper, there are manifold innovations in the field of sculpture, ranging from plotted paintings to architectural surface design.[35] Besides the forms of expression outlined here that belong either to the abstract tradition (classical modern) and Concrete Art, or are committed to electronic art (music and video), there are additional sources of inspiration that produce hybrid forms, particularly in later work, after 1990 to be precise. Work of this period is shown to increasingly integrate aspects of everyday culture as well as narrative elements. This computer art rests on a basic, ambivalent stance that falls somewhere between euphoria and criticism, enchantment and disenchantment. It is not uncommon for what artists perceive as the conflict potential of the computer, to be expressed in or compensated for in the production of artwork, giving rise to an associative, cybernetic self-indulgence in which computer art addresses, processes, and articulates not only the technical and economic aspects of the media, but also social concerns. And perhaps this is where the particular charm of this form of art is to be found.

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http://www.aktivearchive.ch

[34] By way of example we can cite the large glass plates in the institute of music at the University of Zurich which function as a sliding door dividing a room into two parts and one plate at the entry to the seminar room. Both are decorated with geometric patterns; or door elements in the renovated interiors of the ETH observatory.
[35] Examples that can be cited include the HRS office building in St. Gallen, Switzerland and the facade of the school complex in Halden, both designed by Bernard Tagwerker.