



## **COMPUTER GRAPHIC RE-VISITED**

**Jana Horáková, Jiří Mucha**

**Exhibition opening 5.10.2017, 5pm**

**Introducing the concept and technical implementation of the project**

**Speech by Frieder Nake**

**Jiří Valoch**

**Tour of the virtual exhibition opening**

### **01**

## **COMPUTER GRAPHIC RE-VISITED**

### **About the project**

A virtual reconstruction of one of the first exhibitions of computer-generated graphics and the first exhibition ever in the Eastern Bloc, organised in 1968 in the House of Arts by the theorist, curator and artist Jiří Valoch (\*1946).

The reconstruction of Valoch's exhibition can be taken as part of the post-modern phenomenon of remembering exhibitions. At the same time, it is an experiment which belongs to the domain of digital humanities, when high-tech tools are deployed within art history research. The project is unique in employing the technology of fully immersive virtual reality, whereby we work with virtual 3D simulation in a different way than is the usual standard. We do not simulate solely movement in virtual space, but also movement in time. The locating of the exhibition reconstruction directly in the space where the COMPUTER GRAPHIC exhibition took place in 1968, in the entrance hall of the Brno House of Arts, it evokes moving back into the past, or invoking the invisible present genius loci – the virtuality of the place.

The COMPUTER GRAPHIC RE-VISITED virtual exhibition is organised on the occasion of the 50th anniversary of Valoch's exhibition which will be commemorated in February 2018.

Concept and implementation of the exhibition: Jana Horáková and Jiří Mucha

## 02

### HaPoC4

#### International conference

4 –7/10/2017

The exhibition is part of the agenda of the 4th International Conference on History and Philosophy of Computing (HaPoC4) /<http://www.hapoc.org/hapoc4/>. After the conferences in Gent (2011), Paris (2013) and Pisa (2015) it is being held this year in Brno. Between 4 and 7 October 2017 it is being hosted by Masaryk University.

HaPoC is presided over by an international commission which sets as its aim to promote an understanding of computing methods and the operation of computer technology through historical, philosophical and methodological research. Together with the spread of computer technology in society the field of research is expanded by the social aspects of computing; mainly research into computer games and computer art.

Organisational committee of the Brno conference:

prof. PhDr. BcA. Jiří Raclavský, Ph.D., Department of Philosophy at the Faculty of Arts of Masaryk University

doc. Mgr. Jana Horáková, Ph.D., Institute of Musical Science at the Faculty of Arts of Masaryk University

Mgr. Helena Durnová, Ph.D., Department of Mathematics at the Pedagogical Faculty of Masaryk University

## 03

### COMPUTER GRAPHIC / 1968

#### Concept of the exhibition

Experiments in a number of art disciplines (poetry, music, visual art), created with the aid of an automated computer, represent the very few areas in current artistic output which may be thought to have a potential of further development. [...] There is a possibility shaping up of 'generating aesthetic information' – in which way the artistic production could be rid of dependency on the individual artist/producer. [...] The exhibition would certainly at least partly contribute to doing away with the uncertainties and 'concerns' about 'art created by dead machines', and show the aesthetic validity of this creative work and present one of the aspects of the so-called generative aesthetic.

Jiří Valoch

An excerpt from a letter by Jiří Valoch addressed to the management of the House of Arts where he outlines the concept of the future exhibition. The letter is kept in the archive of the Brno House of Arts. It is dated 13 June 1967.

## 04

### COMPUTER GRAPHIC / 1968

#### Description of the exhibition

The Computer Graphic exhibition took place in the first half of 1968, sequentially in three locations.

Brno House of Arts: 5/2 – 3/3/1968

Regional Gallery of the Bohemian-Moravian Highlands in Jihlava: 10/3/1968 \*– 31/3/1968

\*The exhibition opening in Jihlava was attended by Frieder Nake, one of the exhibiting artists, who also presented examples of computer-generated poetry and music.

Exhibiting artists / programmers:

Charles Csuri (b. 1922) / Columbus, Ohio

Leslie Mezei (b. 1931) / Toronto

Frieder Nake (b. 1938) / Stuttgart, from 1972 Bremen

Georg Nees (b. 1926) / Erlangen

A. Michael Noll (b. 1949) / Murray Hill, New Jersey

Lubomír Sochor (b. 1938) / Prague

Programming of graphics / computers:

Georg Nees used the ALGOL programming language, the Siemens 4004 system and a Graphomat Z64 plotter.

Frieder Nake worked with a SEL ER56 computer, later with a Telefunken TR4 and an IBM 360. Like Nees he used a Graphomat Z64 plotter.

Lubomír Sochor created his graphics on a French Nadac 100 analogue computer.

Leslie Mezei programmed his graphics on an IBM 1094, model II computer, the drawing was made with a Calcomp 565 plotter.

A. Michael Noll used IBM 7090 and 7094 computers and a Stromberg Carlson SC-4020 plotter which was replaced in 1968 by the later type, a Stromberg DatagrahiX SD-4360.

Exhibits on display:

Noll 3 items

Nees 7 items

Nake 36 items

Sochor 27 items

Mezei 6 items

Total 79 items

Source: A letter sent by Otakar Máček from the Regional Gallery of the Bohemian-Moravian Highlands in Jihlava to the Regional Gallery of Fine Arts in Gottwaldov during the handing over of Valoch's exhibition.

Jihlava: 11/4/1968 / Gottwaldov: 12/4/1968. (However, according to the accompanying letter Gottwaldov returned 81 items.)

An exhibition which does not exist:

There is no itemised list of the exhibited works in the COMPUTER GRAPHIC exhibition. The only available pieces of information concern their number. An attempt to seek out the original exhibits in the archives of the three institutions or in the property of Jiří Valoch were unsuccessful, with the exception of two photographic reproductions kept in the House of Arts. A valuable archive item is the exhibition catalogue containing six illustrational pictures referring to the works on display – two each by Nees, Nake and Sochor. During the reconstruction of the exhibition we also take into account the traces preserved in Valoch's correspondence, photographs from the exhibition opening in Jihlava and the witness accounts by the exhibiting artists.

A description of the exhibition is presented by Jiří Valoch in a study of the same name (published in the catalogue of the Orbis Fictus exhibition, 1996).

## 05

### Programmed art

Man develops a programme for computer.

Computer works exactly to the programme's commands and delivers a punch card.

The punch card is further processed by the plotter and 'translated' into the final graphic.

Frieder Nake, Notes for Jiří Valoch, October 1967

Source: Catalogue of the COMPUTER GRAPHIC exhibition 1968

Valoch placed equal emphasis on the process of the creation of computer-generated graphics as the result of those processes. Consequently the exhibition catalogue included texts by Frieder Nake and Lubomír Sochor, who were asked by Valoch to describe the processes of how their works originate including the technical parameters, such as the type of computer or programmes.

As can be gleaned from Valoch's text for the exhibition, he did not understand computer graphics as images but rather as traces, or indices referring to their DNA, i.e. computer programmes, and the processes of their origin, while he equally emphasised their genealogical kinship with the almost infinite number of original graphics, which could have originated based on the same programme. Even in the exhibition concept Valoch writes about computer graphics as not a set of works but as a series of variants. This aspect of computer graphics he probably attempted to imprint on visitors to the exhibition when he confronted them with dozens of graphics made on the basis of processing a single programme. Regarding 36 exhibits by Frieder Nake and 27 works by Lubomír Sochor we can infer that Valoch gave up on the possibility of selecting suitable exhibits in favour of presenting a spectrum of different variants of the graphic rendering of a single programme.

Valoch considered computer graphics as a welcome addition to the broad spectrum of concrete art. In the case of the works by Frieder Nake and Georg Nees he is even more precise and talks about stochastic graphics, as both artists used the computer as the generator of random numbers subsequently used in calculations, or they worked with a probability matrix from which the computers randomly selected possible solutions, and hence graphic rendering.

Philological education and his own experience as a creator of visual and concrete poetry were very likely the precondition for Jiří Valoch's ability to recognise the characteristic features of computer art, its innate intermediality, existence as a programme (script), as a process during the processing of the programme's commands and as a graphic output.

## 06

### Jiří Valoch

#### (b. 1946 in Brno)

Art theorist, curator, artist. He graduated from the Faculty of Arts of Masaryk University where in 1970 he qualified as a secondary school teacher of Czech and German. In his graduation thesis he investigated the development and typology of visual and phonic poetry. From 1963 he created visual poetry. His further development took him to concrete poetry and conceptual art. In 1968, when he was only 22 years old and still a student, he organised, in the House of Arts, the first exhibition of computer graphics in the Eastern Bloc, where he presented the figureheads of this budding art discipline from Europe, USA

and Canada. Between 1972 and 2001 he worked as a theorist and curator in the Brno House of Arts, where he staged numerous exhibitions of leading artists on the Czech and international art scene (V. Boštík, M. Knížák, V. Boudník, J. Kolář, B. Kolářová, A. Šimotová, L. Novák, R. P. Lahnse, G. Graser, R. Mielsam, R. Barry and others). He collaborated in unofficial exhibitions, samizdat catalogues and publications. He is the author of several monographs and a number of catalogue texts.

## 07

### Generative aesthetic

[...]

Generative aesthetic is, in this sense, an analogue of generative grammar when the former produces renderings of aesthetic structure and the latter grammatical schemes.

[...]

The effective aim of the system of generative aesthetic is to numerically and operationally describe the characteristics of aesthetic structures which can be rendered in a number of material elements, so that they can be valid as abstract schemes of the 'principle of creation', 'principle of division' and 'principle of quantity' [...]. The 'programmes' in particular 'programming languages' for 'machine-produced' renderings of 'free' (stochastic, intuitive) or 'fixed' (predetermined, dedicated) aesthetic structures equally belong to the system of the generative aesthetic and its projects, provided they count in metric (distances, lengths of words), statistical (sequence of words, positions) and topological (links, deformations) determinations, to create 'aesthetic information'.

[...]

It is possible to say that the artificial creation of probabilities of theorems and programmes deviating from the norm is the central motif of the generative aesthetic and its programmes.

Max Bense

Quotations from the text published in the programme of the COMPUTER GRAPHICS exhibition.

They are parts of text printed in the nineteenth volume of the rot edition, entitled 'computer grafik', Stuttgart, February 1965. The complete text of Bense's study was accompanied by computer graphics created by Georg Nees. The text was written on the occasion of the opening of the historically first exhibition of computer graphics (Stuttgart, 1965), in which Bense and Nees participated.

## 08

### Max Bense (1910-1990)

Bense studied mathematics, physics and philosophy. He was also an author of poems, works in prose and dramas. From 1949 he was professor of the philosophy of technology at the Technical University in Stuttgart. He was a key person in the Stuttgart school focusing on experimental research in the foundations of rational aesthetics. Influenced by cybernetics and computer art he concentrated on creating information aesthetics.

## 06

### The first exhibitions of computer art

COMPUTER GRAPHIC was one of the first exhibitions of computer art and the very first exhibition of art generated by the computer in the Eastern Bloc. As such, it deserves a place among the most important exhibitions of the first decade of computer art:

Year: 1965 /opening 5/2/1965/

Title: Generative Computergraphic

Location: Hahn-Hochhaus in Stuttgart, 8th floor, seminar classroom of the Philosophical Seminar at the Technische Hochschule Stuttgart, which Max Bense, one of the creators of information aesthetic, used for teaching, and to organise experimental exhibitions.

Curators: Max Bense, Siegfried Maser

Exhibiting artist: Georg Nees

Year: 1965 /8 – 24 April 1965/

Title: Computer Generated Pictures

Location: Howard Wise Gallery, New York

Exhibiting artist: A. Michael Noll (and Bela Julesz)

Year: 1965 /5 – 26 November 1965/

Title: Computer-Grafik Programme

Location: Galerie Wendelin Niedlich, Stuttgart

Curator: Frieder Nake

Exhibiting artist: Frieder Nake (and Georg Nees)

Year: 1966 /15 January – 15 February/

Title: Programm Information PI-21

Location: Deutsches Rechenzentrum, Darmstadt

Curator: Frieder Nake

Exhibiting artist: Frieder Nake (computer graphics), Gerhardt Stickel (computer poetry), Max V. Matthews, Ben Deutshman, Lejaren Hiller (computer music).

Year: 1968 /5 February – 3 March 1968/

Title: Computer Graphic

Location: Brno House of Arts

Curator: Jiří Valoch

Exhibiting artists: Charles Csuri, Leslie Mezei, Frieder Nake, Georg Nees, A. Michael Noll and Lubomír Sochor.

Year: 1968 /2 August – 20 October/

Title: Cybernetic Serendipity: The Computer and the Arts

Location: Institute of Contemporary Arts, Nash House, London

Curators: Jasia Reichardt (and Frank Friedman Oppenheimer, Renato Danise)

Exhibiting artists: in total 89 artists, among them A. Michael Noll, Charles Csuri, Frieder Nake and Georg Nees,

Year: 1968 /5 May – 30 August 1969/

Title: Computers and Visual Research

Location: Galerija suvremene umjetnosti, Zagreb (today Museum of Contemporary Art Zagreb)

Exhibiting artists: in total around 26 artists, among them A. Michael Noll, Charles Csuri, Georg Nees, Frieder Nake and Leslie Mezei.

(The exhibition was part of the agenda of the Tendecie 4 international conference in which Jiří Valoch took part as a member of the programme committee.)

Source: Information on the first exhibitions of computer art was acquired and verified from various sources. The most comprehensive data are available from the online database COMPART. Center of Excellence Digital Art: <http://dada.compart-bremen.de>

## 07

### The first decade of computer art

The development of computers began in the 1940s. They were the first machines for solving scientific problems capable of carrying out complicated arithmetic operations at high speed and with minimal errors. At that time the computer was unthinkable as a tool for artists. For this purpose it was too big, too difficult to operate and its cost was prohibitive. In addition, in order to control the computer one needed to learn a specific programming language. When the first scientists started to create computer graphics in the 1960s it was initially considered a mere experiment. Most of them worked for large companies or universities where they had access to the first computers, large machines occupying a number of rooms. The motivation for creating the first computer graphics was the desire to explore the possibilities of these powerful machines. The theoretical background for experiments with computer-generated art was created primarily by Max Bense and Abraham A. Moles, who, under the influence of cybernetics and information theory, developed information and exact aesthetics.

## COMPUTER GRAPHIC RE-VISITED

### Concept of the exhibition

#### Remembering exhibition

The virtual exhibition entitled Computer Graphic Re-visited can be classified as belonging to the 'remembering exhibitions' (Greenberg, 2009). It is an exhibition genre from typical post-modernist curatorial practice, where various strategies are harnessed to evoke memories of past exhibitions. Greenberg subdivides them into replicas, riffs and reprises. A replica refers to the haptical, physical recreation of the exhibition; a riff denotes tactics based on the manipulation and morphing of memories, and a reprise is a denomination for an on-line representation of an exhibition.

Computer Graphic Re-visited constitutes the fusion of two strategies – replica and riff.

#### Replica

An architecturally precise virtual simulation of the historical appearance of the exhibition space may be termed a replica of the original place. In addition the replica is situated in the identical place, the entrance hall of the House of Arts. The result is an arrangement described by the notion *mise en abyme*, in this case meaning that the virtual simulation is set into the physical space in a way similar to what we know, for example, from the historical emblems, where a diminished reproduction is located in their centre. It involves the layering of the physical and the virtual space, a fusion of sensory perceptions and memories (one's own and those acquired through archive materials or reproductions of the exhibits situated in virtuality).

#### Riff

The virtual exhibition entitled Computer Graphic Re-visited is not a replica, rather it relates to Valoch's exhibition more like a riff. A riff in jazz music is a short, melodically simple phrase usually continually repeated or transposed by means of sequences. This virtual exhibition is such a minimal riff, a fragment composed of 20 computer graphics (from the original 79 works) and with a few archive photographs. They are transposed into virtual space, thereby reinforcing the motif of the computer ontology of the exhibits,

to which the computer graphics presented at Valoch's exhibition and plotted on paper referred only indirectly.

### Sensory turn

The reconstruction of Valoch's exhibition in virtual reality corresponds with a turn from a traditional historiographical description to mediating an experience. This trend is characterised by the fact that rather than showcasing the glorified originals the emphasis is laid more on the physical and sensory experience.

Art history terms it a sensory turn and it refers to an increased interest in the reconstruction of the work-viewer relationship as a multisensory experience embracing distanced sight and touch, hearing, smell or the physical experience of space (remoteness or nearness, arrangement). The narrative of the traditional historiography gives way to experimental research based on the multisensory evoking of historical events.

## 08

### COMPUTER GRAPHIC RE-VISITED

The process of reconstructing the Computer Graphic exhibition from 1968 by Jiří Valoch. The first step in making a reconstruction of the exhibition focusing on computer art, Computer Graphic, from 1968 was the searching out and processing of information. The pieces of data were acquired mainly from the Brno House of Arts, the Moravian Gallery in Brno, the Regional Gallery of the Bohemian-Moravian Highlands in Jihlava and the Regional Gallery of Fine Arts in Zlín.

The key stone of the reconstruction is information pertaining to the individual works of art and their authors which had to be sought in materials from the particular period. The visitor will enter the authentic environment of the Computer Graphic exhibition by simply putting on the special goggles for virtual reality. In 1968 the curator Jiří Valoch organised an exhibition in which he collaborated with six computer-art artists from around the world. The reconstruction shows four of them.

The next step in the reconstruction was obtaining the exhibits from the past exhibition in sufficient quality for creating virtual reality. The works were acquired both by addressing their respective authors and the above-mentioned galleries. The German artist Frieder Nake provided twenty-two scans of his works, of which eight were selected to be set in virtual reality. Images by the Czech-born Lubomír Sochor and the German artist Georg Nees were retrieved from the archive of the Brno House of Arts. The incorporation of works by the American artist A. Michael Noll was made possible thanks to the Los Angeles County Museum of Art and the Victoria & Albert Museum in London. Archive photographs were then obtained from the Regional Gallery of the Bohemian-Moravian Highlands in Jihlava. All works were at first modified and prepared as 2D source material for the ensuing application into a three-dimensional space of virtual reality.

In the making of a faithful copy of the entrance hall of the Brno House of Arts we drew on period construction plans and photographs which served as the source for creating the space. Based on the accumulated information we began to build the three-dimensional framework in the 3DS Max programme.

A necessary and very important step was creating and preparing UV maps for the inserting of textures. Separate UV maps then served in creating illumination maps, as the calculation of illumination for the static parts of the model has to be undertaken in advance so as to avoid calculating the given process in real time. The maps for textures and illumination work on different principles. These component parts were combined



to make a whole, which forms the framework of the whole model of virtual reality. The completed model was exported in smaller parts by material and imported in the Unreal Engine environment. This software was used to create the different textures for the specific parts of the project. Imitation of daylight is ensured by the correct setting of lights. The environs of the Brno House of Arts, comprising of trees, shrubs, grass and other things which can be seen when looking from the window is also indispensable. The environment is made complete by modified photographs of separate buildings inserted into the space as a separated layer. The exhibition simulation works on gaming principles for which the setting of the gaming elements is essential. In our case it is the movement. The final rendering of the completed project took over seventy hours for the graphics cards to calculate.

After putting on the virtual reality headset the viewer finds him/herself in a space generated in advance by us, which is a realistic simulation of the space of the entrance hall of the Brno House of Arts. Movement inside the virtual world is provided by means of controllers and sensors mounted on columns around the visitor in mutual interaction. The movement of the head then determines the angle of view. The projection of the viewer's image on the opposite wall also takes place in real time. In this way the other visitors may watch part of the exhibition without wearing the goggles. Movement within the delimited space is not restricted in any way and there is therefore an infinite number of combinations of ways of observing the exhibition.

List of artists and their works / 4 artists, 20 images /

Frieder Nake

Walk through Raster 2.5-5

Matrizenmultiplikation Serie 31

Verteilung elementarer Zeichen

Hommage à Paul Klee

Walk through Raster 7.1-6

Rechteckschraffuren

Zufälliger Polygonzug

Zufällige Geradenscharen

Zufälliger Polygonzug C-Zahlen

Walk through Raster 2.1-6, 1, 5, 4

Rechteckschraffuren in Feldern

Lubomír Sochor

three works (the names could not be identified)

Georg Nees

Polygons

Irrweg

The title of the third work is unknown to us

A. Michael Noll

Computer Composition With Lines

Vertical-Horizontal Number Three

Gaussian-Quadratic

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For the financial support and the first impulse to think about a suitable programme for philosophers and historians of computing from around the world who will meet in Brno.

Moravia IT, s. r. o.

For financial support and an enlightened approach as patrons of non-commercial projects which is still rare in this part of the globe.

Brno House of Arts

For the welcoming acceptance, financial and logistical support.

For the possibility to make the reconstruction of Valoch's exhibition directly in the original location.

Frieder Nake

For his generous assistance in the reconstruction of the exhibition, for his time devoted to our correspondence, for the graphic art sent in high resolution. For the fact that this starry legend was the first to submit his contribution to the conference before we could invite him. Yet another first for him!

Redlooks

For the implementation and complete processing of the project

Allcity

For the technical processing of Virtual Reality and the ensuing Rendering.

Our thanks go to all who helped in searching through the archive materials. In particular, the staff of the archives of the Brno House of Arts, the Regional Gallery Jihlava, the Regional Gallery of Fine Arts in Zlín, and the Moravian Gallery which administers the personal archive of Jiří Valoch. Also, to all those who exhibited at Valoch's exhibitions and are still alive and were willing to answer our questions (Frieder Nake and A. Michael Noll). We would like to thank to Los Angeles County Museum of Art, USA, and Victoria & Albert Museum in London, UK, for sending the copies.

Jiří Valoch

Special thanks, admiration and respect go to the art theorist, curator and artist Jiří Valoch, whose life has been firmly connected with Brno. It is thanks to him that Brno, for several weeks in 1968, became an equal part of the global art scene. There are just a few so important events that we can commemorate. In 2018 we will celebrate the 50th anniversary of his Computer Graphic exhibition.



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