The pioneer of computer art Georg Nees passed away on 3 January 2016, at the age of 89. He was the first to exhibit computer-generated drawings, in Stuttgart in February 1965. Influenced by Max Bense's information aesthetics (a rational aesthetics of the object based on Shannon's information theory), Nees completed his PhD thesis in 1968 (in German). Its title, Generative Computergraphik, is an expression of the new movement of generative art and design. Trained as a mathematician, Nees participated in many early, but also recent, displays of computer art. After retiring from his research position at Siemens in Erlangen, he again concentrated on computer-generated art and researched issues of digital coloring but also wrote several novels expressing his philosophy of a nonreligious, human-made culture.

HISTORICAL PERSPECTIVE

The Pioneer of Generative Art

Georg Nees

FRIEDER NAKE

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PIONEERING GENERATIVE ART

On 4 February 1965, the first exhibition of “Generative Art” opened in the seminar rooms of the Institute of Philosophy and Theory of Science at the University of Stuttgart in Germany. The director of the Institute, Professor Max Bense, regularly used those rooms for exhibitions of experimental and concrete art.

About a dozen drawings in small formats were displayed on the walls: black-and-white drawings of a geometric nature, straight lines in appealing arrangements, grids filled by small fanciful polygons. The drawings were not strictly constructed but rather were playful, with apparently random features; the rigor of straight lines, combined with simple random features allowed for never-ending variation and surprise. Georg Nees was the artist—an artist who was not an artist by profession but rather a mathematician. He was a mathematician on his way to becoming an artist, a biography he shared with some others.

Someone had told Bense that there was a mathematician, Nees, working for Siemens in Erlangen, Germany, who had generated drawings by programming a computer. The computer's output in turn controlled a drawing machine. Its final products were drawings on paper. Programmed automatic drawings! A sensation.

Bense had recently published the fourth volume of his rationalist aesthetics, under the title Programming the Beautiful. When he learned that Nees was creating drawings by computer with a high degree of randomness involved, Bense immediately invited Nees to write a short paper, and to exhibit those drawings in Stuttgart. Now those drawings appeared in public space and generated an event of significant impact beyond the local context.

Already, in December 1964, just a bit before the show, Nees's short article “Statistische Grafik” appeared in Bense's avant-garde journal, Grundlagenstudien aus Kybernetik und Geisteswissenschaft [1]. This paper was probably only the third (more or less scientific) publication on algorithmic art (then usually called "computer art"). Before it, an article by Arnold Rockman and Leslie Mezei had appeared in Canadian Art under the title "The Electronic Computer as an Artist" [2]. Mezei had written another note in Computers and Automation [3].

The exhibition in February 1965, however, was the first in the world of computer-generated algorithmic drawings. We do not know whether Nees and Bense were aware of this historic fact when they put up the show.

As he usually did, Bense opened the show with one of his often-provocative short speeches. This one had the title "Projekte generativer Aesthetik" (Projects of generative aesthetics). At the exhibition, it was available in print as issue no. 19 of an avant-garde series of booklets under the title rot. Today, we may consider this short programmatic essay as the first manifesto of computer art.

A sizable group of artists from the Stuttgart Academy of Fine Arts was present when Bense read his essay. They usually followed Bense's activities in the arts that focused mainly on concrete art and poetry. The announcement of this particular event may have aroused their curiosity even more than usual because of the claimed involvement of computers in acts of drawing.

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After Bense’s remarkable presentation, Nees got up to explain in simple and sober words what was required to prepare a digital computer to make drawings. At that time, no one had yet imagined or believed that computers might be programmed for such a purpose. Computers were supposed to calculate and not to draw. Was drawing a kind of computing? Such an idea was hard to grasp for the artists as well as for the rest of the audience.

When Nees ended his largely technical explanations, one of the artists (it was Heinz Trökes) asked him: “This all sounds quite interesting—but tell me, can you also make your machine paint the way I do it by hand?” Comparing the drawings on the walls with the paintings of the artist, any such comparison would appear as nothing but ridiculous.

Trying to give an answer to this obviously provocative question, Nees pondered for a moment, but then said: “Oh yes, of course I can do this—under one condition: you must tell me how you yourself do it, painting!”

In retrospect, this was an absolutely fantastic and deeply insightful reply! At this very first moment of computer art’s appearance in public, Nees’s daring answer summarized in one sentence the problem inherent in all machinic art: No operation can be implemented on a machine unless it has been described explicitly beforehand. Making something explicit is the first and necessary step to formalizing it, which, in turn, is the precondition for turning it into a computable form. Nees had given the answer to all speculations about what computer software could or could not do.

The artists present at the event, however, did not appreciate the intellectual rigor of Nees’s answer. It is, of course, unknown to which extent they understood the depth and impact of the remark. It seems that they found it outrageous, if not an insult, for they left immediately, slamming doors. Bense rushed to hold them back, telling them that it was only “Artificial Art” that they saw here. Was he aware that, in this crisp moment of art history, he was coining another term of, “Artificial Intelligence,” then nine years old? In any case, his attempt failed to bring the artists back to the show. They had disappeared.

Computer art, however, would proceed on its slow but steady and eventually broad path to success. Nees stood in the center of events during its origin. But another first is also connected to his name. In all likelihood, he later presented the first doctoral dissertation on computer art, under the title of Generative Computergrafik. It was accepted by the University of Stuttgart as a doctoral thesis in philosophy in 1968.

GEORG NEES BIOGRAPHY

On 3 January 2016, Georg Nees passed away after a long period of suffering. He had reached an age of almost 90 years. He leaves behind his two sons, grandchildren and great-grandchildren.

Born on 23 June 1926, in Nuremberg, Nees went to school in Schwabach near Nuremberg. He did well in math and music, and he played several musical instruments. During the war, he served as “Luftwaffenhelfer” to protect Nuremberg against bombings. He learned much about physics while he experienced the bombing of the city. He finished high school by the end of World War II and studied mathematics and physics at the University of Erlangen from 1946 to 1951, graduating with the degree of a Diplom-Mathematiker. Nees was married in 1949, and in 1950 and 1955 his two sons were born. The Siemens Schuckertwerke (later Siemens AG) in Erlangen hired him right after graduation.

Until 1959 he calculated the physics of high-voltage transmission lines. Because of his interest in computers, he eventually became the lead specialist on technical problems at the Engineering Computer Center. Siemens was interested in engineering graphics, which, at that time, meant developing every piece of software from scratch. Nees acquired for Siemens one of the first Zuse Graphomat Z64 machines. This flatbed plotter, the last invention of Konrad Zuse, was capable of generating high-quality drawings. For this, Nees created the first library of drawing routines in Algol 60. He and his team had to solve hardware problems, such as balancing out the trembling of pens when they moved too fast and started to deviate from drawing straight lines.

Nees recognized the potential of the new technology not only for technical applications but also for the arts. Because of his position at Siemens, he was allowed to use the Graphomat at night for his artificial art. During such nights, he created the drawings that he later sent to Bense to present at the first exhibition in Stuttgart.

At various occasions in West Germany (as, in parallel, in the United States and elsewhere), a discourse soon emerged about possible future scenarios for the arts and beyond. In the 1960s, Nees discussed with Herbert W. Franke simulated 3D worlds and games. Could this become appealing and engaging entertainment, or would it rather be peril? For automating industrial processes, Nees drafted an early specialized programming language. He saw the necessity for industry standards and was for years engaged in international standards development.

In computer graphics, one of Nees’s main interests was exploration of the creative potentials of randomness. This had to be algorithmic randomness, of course, a contradiction in terms: pseudorandom numbers. For example, he generated orange areas by randomly positioning yellow and red dots. Irregular patterns looked better than regularly placed smooth colors.

In 1977, Nees became an Honorary Professor of applied computer science at the University of Erlangen. He taught there until his retirement, in 1985, from Siemens. He then picked up generative art again, producing hundreds of colorful images on the latest equipment. He continued this work until about 2012.

Nees published on computer graphics and programming languages as well as on issues of aesthetics and semiotics. He was a scientific adviser to the journal Semiosis, International Journal for Semiotics and Aesthetics. His most prominent book, Formel, Farbe, Form (1995), was one of several that he wrote, including Grenzzeichen (2010), Die Gassenhauer-Ontologie (2014) and Design—Menschenwerk (2014). Nees

Nees was a member of the informal Stuttgart School, led by Max Bense, and of the similarly informal group the Algorists—an international group of artists developing algorithms for their works of art.

He contributed to numerous exhibitions of computer art, prominently to the famous *Cybernetic Serendipity*, London, 1968; *Tendencies 4*, Zagreb, 1968; the Nuremberg *Biennale*, 1969; the Venice *Biennale*, 1970; *Die algorithmische Revolution*, ZKM Karlsruhe, 2004–2007; and *Ex Machina*, Kunsthalle Bremen, 2007. His work is also represented in collections at the Victoria & Albert Museum, London; Kunsthalle Bremen; Sammlung Etzold at Museum Abteiberg, Mönchengladbach; and the Anne & Michael Spalter Collection in the U.S.A.

Georg Nees’s impact on computer art and, thereby, on the history of art in general, is not yet fully recognized. We, who he has left behind, are called upon to convey to the younger generations his legacy of modesty, precision, and brilliance.

References


FRIEDER NAKE is a computer scientist, who specialized in computer graphics. He did early work in algorithmic art and has exhibited his works since 1965. He is a professor at the University of Bremen, Germany and a lecturer at the University of the Arts in Bremen.

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