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Armin Medosch,
New Tendencies. Art at the threshold of the
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Figure 4.9

Frieder Nake, *Achsenparalleler Polygonzug*, 25/2/65 Nr. 14 (*Rectangular Random Polygon 25/2/65 No. 14*) (1965): computer-generated drawing, ink on paper, 22.4 × 31.1 cm. Courtesy the artist and Museum of Contemporary Art, Zagreb.

Biasi Complains

The most memorable moment of the *Computers and Visual Research* colloquium came in August 1968, when Alberto Biasi, founding member of group N from Padua, read a statement titled "The Situation of 1967."¹³⁶ The first part of the statement considered the past of New Tendencies as a movement. Biasi criticized its didactic approach and what he called a "neo-metaphysics of the object."¹³⁷ According to Biasi, in 1965 the movement virtually ceased to exist for economic reasons and due to a lack of common goals. Biasi, claiming also to speak for other Western artists who had been part of the movement, said: "Any innovation is used by a well-defined class to continue its exploitation of the working class. Everyone has seen that the consequence of increased mechanization is increased exploitation of man by man. Increased automation has not diminished man's exertion or given him greater freedom at work. On the contrary, it is used to rationalize exploitation."¹³⁸

His colleagues in the West, Biasi claimed, had turned toward revolution, "a root and branch struggle against capitalism at the ideological, political, and cultural levels." According to Biasi, the artists from the first phase of New Tendencies "who were more aware" had not come to Zagreb because they were "engaged in supporting the student struggles in their respective countries."¹³⁹

Nake was so shocked that he could not read his prepared paper. He argued that "we should not demonize automata" and that "as many leftists as possible" should be working with computers, rather than running away from them.¹⁴⁰ Nake suggested that the Zagreb exhibition planned for May 1969 should address "the social consciousness [and] take positions with regard to the problem of the computer and automation."¹⁴¹ Meštrović pointed out that only a small age gap separated New Tendencies from the rebellious youth of 1968. New Tendencies had also been a youthful movement, but it had "intuitively recognized in science the new patterns of behavior," yet without knowing "what really this science is, what's the use of it, and how to make use of it."¹⁴² For Meštrović, the only worthwhile goal was still "the unity of the world as a whole, and if computers can help to achieve that this would be an appropriate technical means."¹⁴³

Denegri thought that both Nake and Meštrović suffered a disconnect with reality. He found it incomprehensible, after the student and youth unrest, that Nake could speak of "rationality in service of humanity" and that Meštrović could see the computer as a technical means to achieve world unity. "Never before had the world been so shaken in its scientifically based rationalism," Denegri summarized.¹⁴⁴

This episode highlights the multifarious ways in which 1968 was a watershed. Biasi's intervention marks the rupture within New Tendencies, between the first and second phase. Although the groups involved in the first phase were sometimes seen as being uncritically affirmative of science,¹⁴⁵ they actually never used high-tech tools and were explicitly against the use of high-tech tools in art.¹⁴⁶ As Biasi mentioned, many of the earlier participants of the movement were directly involved in political projects in one way or another.

In Italy, Biasi himself was involved with the architecture department of Venice University, which was occupied. Other members of N, as well as Davide Boriani from T and Enzo Mari, were involved with the student movement. Munich-based group Effekt dissolved itself in 1968. Two members, Helge Sommerrock and Walter Zehringer, started political work. Sommerrock was involved with SDS (the main leftist German student organization) and later became cofounder of *Arbeiterbund für den Wiederaufbau der KPD* (Workers Association for the Rebuilding of the German Communist Party). Zehringer started to work in a car factory with the idea of infiltrating passive German workers.¹⁴⁷ Dieter Hacker continued as an artist, but by founding the Seventh Producer Gallery in Berlin, shifting his practice away from the constructive paradigm and interpreting the political position of the artist as the main subject of art.¹⁴⁸

The Argentinian members of GRAV, Julio Le Parc, Francisco Sobrino, and Hugo Demarco, acted in solidarity with the radical younger artists who had occupied the *École des Beaux Arts* in Paris. They opened an *Atelier Populaire* (Popular Workshop) in which everybody should have been able to study art.¹⁴⁹ Le Parc and colleagues contributed serigraphed posters, which were sold to help the student occupiers. The regime took revenge by deporting Le Parc, Sobrino, and Demarco; as Argentinian nationals, they did not have permanent residency status in France. In solidarity, ten French artists who had been selected to represent France at the Venice Biennale boycotted the event. "Much of it, however, was already forced to close down under attack by French and Italian students who had come to overthrow what they considered the bourgeois capitalist international art establishment."¹⁵⁰ Students had already shut down the Cannes film festival and Milan Triennial, and what remained of the Venice Biennale that year needed heavy police protection.¹⁵¹

The Year 1968 as a Paradigm-Changing Moment in History

It is quite an irony that although artists of the first phase of New Tendencies helped to revolutionize how people saw the world through art, and despite their personal support during the events of 1968, the art of New Tendencies did not become the art of the revolution.¹⁵² In 1968, simultaneous political, economic, social, and cultural revolutions broke out that all connected and mutually reinforced each other, leading to crises of the overall political systems in East and West. As I argue in this section, this crisis, which may have seemed to erupt spontaneously, was the product of longer-lasting structural tensions within Fordism—also known as the fourth wave of industrial revolutions. The revolts of 1968 took aim at those features of the paradigm deemed unacceptable by the postwar generations in East and West. In the ensuing changes, the positions of New Tendencies became increasingly untenable.

The years 1967 to 1968 came at the end of a long postwar boom and marked the beginning of a deep structural crisis of Keynesian Fordism.¹⁵³ In the 1940s and 1950s, the United States created (and always maintained since) "a permanent arms economy."¹⁵⁴ Funding of expensive research depended on an "acceleration of technological innovation," which necessitated a high level of extraction of surplus value from the economy.¹⁵⁵ This could only be sustained during times of high economic growth. German and Japanese success in copying and improving Fordist production methods meant that competition arose and profits shrank.¹⁵⁶

Furthermore, the United States maintained a national deficit throughout the postwar boom, which was caused by the specific ways in which it sought to maintain hegemony. The Vietnam War served no practical purpose, but it demonstrated the United States' will to defend its hegemony. The deficit became unsustainable, undermining the dollar's capacity to serve as a world reserve currency. A "structural solution" to the

US balance of payment troubles would have had to have been based on political decisions, "a fundamental shift in the military stance" and the positions regarding "overseas political and economic expansion,"¹⁵⁷ but such a shift failed to materialize.

The air war against North Vietnam combined IBM mainframes and B-52 bombers to produce "body counts," daily statistics about enemies killed. The strategy devised jointly by US Defense Secretary Robert McNamara and his security advisor Walt Rostow projected "cybernetic supremacy"¹⁵⁸ and "power from a distance."¹⁵⁹ The project Operation Igloo White was a virtual defense system comprising thousands of sensors, mainframe computers, surveillance by air, and automated bombing, all linked together in an "electronic battlefield."¹⁶⁰ The operation's centerpiece was the Infiltration Surveillance Center at Nakhon Phanom in Thailand, built after the example of the SAGE control room, in which operators stared at screens connected to banks of mainframe computers connected to sensors thousands of miles away.¹⁶¹

The Tet Offensive, a major offensive inside South Vietnamese cities by the North Vietnamese Army (NVA) on the third day of the Vietnamese New Year, became the first televised super-battle.¹⁶² It brought home the point to Western television audiences that the war was not winnable while war crimes were committed. Tet caused a major turnaround of US public opinion about the war and helped catalyze oppositional forces everywhere against fossilized systems.¹⁶³ The protest against the Vietnam War was also strongly linked with the rise of an antitechnological sentiment.¹⁶⁴

The nature of the revolts of 1968 signaled a rejection by a large number of people of the dominant civilization model. A false sense of hegemony had prevailed among the ruling elites, based on a growing gap of perceptions between themselves and the rest of the world.¹⁶⁵ The false consensus started to be undermined from within by the New Left, or by groups whose collaboration had been assumed without their viewpoints having been taken seriously, such as women and ethnic minorities.

A reading of the events of 1968 on the basis of the writings of Herbert Marcuse (in particular, *One-Dimensional Man*¹⁶⁶ and, maybe more importantly, *Eros and Civilization*¹⁶⁷) suggests that this revolution went down different paths than previous ones. Its aim was not to take over the state but to "transform everyday life and to politicize taken-for-granted patterns of interaction"¹⁶⁸ This was a cultural revolution, an "inner reworking of the psyche and human needs," which should lay the groundwork "for a new type of revolution, one which does not culminate in the political sphere, but which would move the realm of politics from the state to everyday life by transforming the notion of politics from administration from above to self-management."¹⁶⁹

In *Eros and Civilization*,¹⁷⁰ Marcuse achieved a synthesis of Freud and Marx. Drawing on Freud's pessimistic social and historical theory in *Civilization and its Discontent*,¹⁷¹ Marcuse arrived at the conclusion that repression of psychic forces was neither natural nor an unchanging reality. Revolution could be achieved by releasing suppressed psychic forces—in particular, the Eros drive. Suddenly, "overthrowing capitalism started

with addressing the ethics of the interior and subjective life and the discovery of a new psyche."¹⁷²

Feminism and the US civil rights movement challenged the sexism and racism of society.¹⁷³ Other groups formed a so-called counterculture and formulated their political dissent as a difference in lifestyle choices and as a desire for transformation of the self. This could take many different forms, from West-Indian Rastafarians and mods in London¹⁷⁴ to the hippie movement in San Francisco and New York, with an emphasis on drugs, mysticism, and ecological ideas.¹⁷⁵

Those shifts in the structure of feelings and the politics of the self coincided with the rise of *new art* forms. Post-non-objective art forms, such as conceptual, performance, body, and video art, engaged with the linguistic, psychological, and semiotic structures that were seen as produced by and *constitutive for* capitalism. The rising significance of those art forms will be reflected in chapter 5.

The universities were at the center of the uprising not only because students tended to be more rebellious, but also because universities were where the development of the latest phase of industrial societies, both in their capitalist and real socialist versions, encountered their strongest contradictions. Societies needed students in ever-greater numbers but did not offer them a place they found to their liking. The path of development to increased automation and the consolidation of consumer society "all converged in the creation of the new working class" consisting of "technicians, employed professionals, off-line office workers, service workers and students."¹⁷⁶ Remember that this was the class the SI accused New Tendencies of addressing primarily with its art.

In Italy, a series of university occupations starting in autumn 1967 formulated the demand for self-management by holding grassroots, democratic open discussions in huge public assemblies. By 1968, the movement triggered the downfall of the government of Aldo Moro and developed ties with workers. Left-wing *workerist groups* such as Potere Operaio and Lotta Continua were almost successful in seizing leadership of the working class from the traditional trade unions in a conflict that escalated in the Italian "hot autumn" of 1969.¹⁷⁷

The influence of 1968 was not just a Western phenomenon but also affected Yugoslavia and the Warsaw Pact states. In 1968 in Warsaw, students protested after a play by the Polish national poet Adam Mickiewicz was banned.¹⁷⁸ Students in Poland had been encouraged by student protests in Prague that went unsuppressed. In January 1968, a reformist government with Alexander Dubček as head of state took over in Czechoslovakia.¹⁷⁹ Over a period from January to August 1968, the so-called Prague Spring added a very specific flavor to the worldwide revolts. Here, change came initially from the top, yet at the very same time, those at the top were driven by an increasingly self-confident civil society of which students were merely a very vocal part.

Events in Prague were closely watched in Yugoslavia, where 1968 had taken a very specific form. After an incident at a student dormitory in New Belgrade,¹⁸⁰ an organized protest movement formed quickly. The University of Belgrade was occupied and renamed Red University Karl Marx, while within a day protests had spread to Zagreb and other regional capitals.¹⁸¹ After seven tense days, Tito made a television speech in which he described students' demands as "justified."¹⁸² The very specificity of 1968 in Yugoslavia was that students' demands were not *against* the official ideology but *for actually realizing* it. Students and professors at the Faculty of Philosophy at the University of Belgrade declared they wanted the "immediate implementation into practice" of the goals of the League of Communists.¹⁸³

Self-management, Yugoslavia's official doctrine, was what students in Paris and Frankfurt in May 1968 made their central demand. Members of the party leadership¹⁸⁴ could claim that the ideas of students in the West showed that Yugoslavia had already been on the right path. Moreover, Tito openly declared his support for the Czech reform experiment under Dubček in Prague.¹⁸⁵ Yugoslavia, it seemed, was on the right side of history.

The reality, however, was not as positive. Yugoslavia had gone through trying times since the early 1960s. The years leading up to 1968 had seen an economic reform program that liberalized the economy to the point of turning it into a form of market socialism.¹⁸⁶ Attempts at active economic modernization had been slowed down by institutional resistance to change.¹⁸⁷ The result was "economic stagnation, growing unemployment and emigration, stagnant or declining real incomes for most people."¹⁸⁸

Those all-too-visible economic realities were exacerbated by political problems.¹⁸⁹ The withering away of the party—as the official doctrine worked out in 1953–1954 had proclaimed—had never happened. Authors of *Praxis* highlighted the widening gap between the theory and practice of self-management.¹⁹⁰ For instance, Svetozar Stojanović pointed out that a "self-governing, self-managing society exists only in ideology, while a vivid dualism exists in practice—self-managing groups at the base and a rather strong statist structure above them."¹⁹¹ A similar critique of statism in Yugoslavia was elaborated by Andrija Krešić, who wrote that "state domination over self-management means its stagnation, degeneration and compromise, so that all the economic, social and political mistakes of the state are loaded on the weak back of self-management."¹⁹²

When Tito declared support for the demands of the students, this was only a tactical move. Soon thereafter, the regime started a low-level but sustained repression campaign against the radical elements among students and their supposed intellectual masters, who were identified as the *Praxis* group in Zagreb and Belgrade.¹⁹³ Any accusations against *Praxis* were largely unjustified, because "the political engagement of the group ... never exceeded the limits of theoretical explanation."¹⁹⁴

Praxis had been allowed to exist in that contradictory way typical of Yugoslavia at the time. Almost from the start, it had been the target of accusations by high-ranking party officials and the popular press. At the same time, it was an official publication of the Croatian Philosophical Society. It was financed by the state, and Tito was among its regular subscribers.¹⁹⁵ After June 1968, however, the student opposition and *Praxis* were slowly ground down. In 1974, both *Praxis* magazine and Korčula Summer School were stopped by the regime through indirect measures, and in the following year eight *Praxis* philosophers lost their jobs as university professors.¹⁹⁶

The year 1968 marked a turning point for Yugoslavia. Although economic and political reforms (which in their basic outline were liberal, leading to the new constitution of 1974) continued, the regime showed an incapacity to reform itself, and power remained centered in the League of Communists of Yugoslavia presided over by Tito. After 1968, slowly (and maybe at first quite invisibly), the Yugoslav Experiment¹⁹⁷ started to fall apart.

Communism at the Crossroads

The problems of stagnation were not entirely unknown in Czechoslovakia either. There, a large group of scientists from different disciplines at the Czech Academy of Science (CAS) worked out ideas for an alternative Socialist-Communist future. The effort began in 1965 under the assumption that the development of science and technology had reached such a speed and momentum that a qualitatively different relationship among science, technology, and society had emerged.

The team, led by Radovan Richta, head of the philosophy department at CAS, and consisting of a further fifty-nine scientists, started from the fundamental assumption that there was indeed a qualitative change in scientific and technological progress, but that Socialist countries were best placed to use this capacity. A first report was published in 1966, but work continued, and a revised edition was finished in 1968 and published in English in 1969 under the title *Civilization at the Crossroads*.¹⁹⁸ This work, an instant bestseller in Czechoslovakia, was an optimistic version of a future shaped by science and technology in all aspects of life, which, in Barbrook's words, constituted *cybernetic communism*.¹⁹⁹

The optimistic aspects came with many *but*s and *caveats*. The team undertook a thorough and comprehensive literature review that brought together literature on automation and cybernetics, on the leisure society and the third sector, including several surveys of the topic undertaken by groups in the West, such as *The Triple Revolution*.²⁰⁰ The team also considered critical strands of Western Marxism, such as Marcuse's critique of the *One-Dimensional Man* (1964), and new strands of Marxism developed in Yugoslavia by *Praxis*. Last but not least, the team also had access to literature on cybernetics and computing from the Soviet Union and neighboring countries, such as the

German Democratic Republic, where philosopher Georg Klaus tried to reconcile cybernetics with dialectical materialism.²⁰¹ This literature review was complemented by a rigorous rereading of Marx.

The gist of the team's findings was that in capitalist systems the potential of science and technology would always be thwarted by capital's inner contradictions, whereas the Eastern Bloc was still too steeped in the traditions of industrial society and in desperate need of cultural change for the forces of renewal to start having an effect. If such a renewal could take place, however, then socialist societies could make much better use of the scientific and technological revolution than capitalist ones.

According to CAS scientists, the ultimate goal of harnessing the scientific and technological revolution was not purely economic but a much more radical transformative process, at the center of which was the "development of man himself, growth of his abilities and creative powers—development of man as an end in itself."²⁰² This idea—in tune with the aspirations of undogmatic Marxism internationally—was the heart and soul of *Civilization at the Crossroads*. The authors thought that the scientific and technological revolution would merge with the cultural revolution by transposing culture from a fringe activity to one right at the center of life. Moreover, if human development was not at the center of the scientific and technological project, then communism would remain a "far off dream."²⁰³

Richta and coauthors imagined that information technologies would have to be greatly expanded, to include databases and computer networks not only to serve industry but "to arrange for a steady *two-way flow of information*—some kind of regular voting and consultation with public opinion, which would be a substitute for Rousseau's ideal of a meeting of all citizens in the Republic."²⁰⁴ Such ideas were interspersed with a lucid, and sometimes harsh, critique of the lack of human and social development in Czechoslovakia.²⁰⁵ Richta's introduction was signed "Prague, Spring 1968."²⁰⁶

At this historic juncture in the summer of 1968, Meštrović attended Korčula Summer School, the annual meeting of critical theory and socialist humanism organized by the *Praxis* group. The topic was *Marx and Revolution*, and high-profile participants included Ernst Bloch and Herbert Marcuse. On the morning of August 21, 1968, summer school co-organizer Vanja Sutlić announced to other participants that "world communism has just ended."²⁰⁷ He had listened to the radio and heard that Warsaw Pact tanks had rattled into Prague and thereby ended the Prague Spring. Although it took a further twenty years for the Soviet empire to collapse, Sutlić was probably right in his assessment that the ending of the Czechoslovakian reform experiment by force was the event that did the most to delegitimize Soviet communism in the East. Only two weeks earlier, Tito had traveled to Prague to personally express his support for the Dubček government. After that, Tito was quoted as saying he would rather send his own troops to quell any unrest in Yugoslavia than give a pretext for Warsaw Pact troops to invade.²⁰⁸

Had the reformist course in Czechoslovakia been allowed to continue, the scientific, technological, and cultural revolution Richta and colleagues had in mind might have become the project for the renewal of Czechoslovak and Yugoslav societies—and maybe the whole realm of real socialism. The crushing of the Prague Spring thus had far greater significance than just the suppression of a cry for freedom from one Soviet satellite state. Czechoslovakia and Yugoslavia may have set an example for a genuine attempt to build communism on the basis of the scientific and technological revolution and a non-Stalinist, critical, and humanist Marxism.

Networking for *Computers and Visual Research*

Recent scholarship has produced a perception of Cybernetic Serendipity as the “technological funfair,”²⁰⁹ whereas tendencies 4 is seen as a more serious, hardworking exhibition and conference in comparison.²¹⁰ Although a simplification, the reports of participants in *New Tendencies* from London contributed to this perception in no small measure. Frieder Nake highlighted the vitality of the event, “so full of sound, people, music, movement, laughter, joy, curiosity, play,” but also complained about the coincidental manner in which everything was arranged.²¹¹ Marc Adrian wrote that “London was interesting,” yet also criticized that there were “a lot of meaningless little machines.”²¹²

Radoslav Putar, a member of the core group in Zagreb, wrote a review of Cybernetic Serendipity for *Bit International*, the new magazine published by the Gallery of Contemporary Art in Zagreb.²¹³ Putar noted that many of the works shown were made not by artists but by scientists. He complained that “there were no obvious ties between certain elements presented within the framework of the exhibition”²¹⁴ and that visitors “were thus subjected to the disorganized influence of certain objects and documents, without any reliable means of orientation between many divergent cases.”²¹⁵ What was missing was “an indication of the potential consequences, modes of exploration and application of most of the examples presented and the new technological possibilities,” so “the average visitor could do no more than suspect the enormous possibilities of methods of computer projecting for the needs of design in industry.”²¹⁶

Although one should not contribute to a false bipolarity between tendencies 4 and Cybernetic Serendipity, it seems that the London exhibition wholeheartedly promoted liberal technological modernism. Cybernetic Serendipity showed work by 325 participants—most of whom were not artists but scientists and engineers²¹⁷—on 6,500 square feet, attracting sixty thousand visitors. It was supported by dozens of multinational corporations, research labs, university institutes, and companies, such as IBM, Boeing, General Motors, Westinghouse, CalComp, Bell Labs, and the US Air Force research labs.²¹⁸ The English press celebrated the event as something guaranteed to fascinate anyone, from toddling age to the grave, from hippies and schoolboys to

computer scientists.²¹⁹ As ICA spokesperson Leslie Stack declared, “Happy accidents can happen between art and technology.”²²⁰ For the English press, Cybernetic Serendipity was understood as “a veritable Luna Park.”²²¹ Jasia Reichardt acknowledged that Cybernetic Serendipity could only happen in London, because the same exhibition “in Paris would have needed police protection.”²²²

Artist Gustav Metzger wrote a damning critique in the course of a two-part series on art and automation in the renowned art magazine *Studio International*. His core concern was that Cybernetic Serendipity presented itself as a “technological fun-fair”²²³ and led artists into a “technological kindergarten,” where, attracted by the “gadgetry of modern life,” they would be completely “overwhelmed by the tremendous opportunity, challenge, excitement and power of the new media.” There was “no end of computers composing haikus, but no hint that computers dominate modern war, that they are becoming the most totalitarian tools ever used in society.”²²⁴

Cybernetic Serendipity was a one-off event, but the organizers of the fourth New Tendencies exhibitions and conferences hoped to initiate an international research network. Putar’s critique of Cybernetic Serendipity appeared in *Bit International*, a new magazine initiated in the context of New Tendencies. Between 1968 and 1972, nine editions of *Bit* appeared, with 5–6 and 8–9 published as double issues. The idea of the editors of *Bit* was “to present the theory of information, exact aesthetics, design, communication mass media, visual and related subjects.”²²⁵ The editors clearly also wanted *Bit International* to be “an instrument of international cooperation,” because they believed “the results of efforts based on an organized division of work on all levels” was superior to “individual and isolated activity.”²²⁶ The editors believed in the “creation of universal platforms for progressively orientated action.”²²⁷

The first issue of *Bit International* was almost completely dedicated to the information aesthetics of Moles and Bense. Meštrović’s introduction to Moles’s work, “L’observateur observé,”²²⁸ quoted extensively from Wiener’s *The Human Use of Human Beings*²²⁹ and hinted at a critique of Moles’s neo-positivism,²³⁰ asking if Moles’s ideas on the socio-dynamics of culture were not “a bit simplistic.”²³¹ Yet on the whole, Moles was accepted as a leading expert on computer art and information aesthetics. *Bit International* 2 and 3 presented material of historical importance on computer art and materials from the colloquium and information exhibition in summer 1968.

Throughout autumn and winter 1968–1969, the organizers in Zagreb tried to give substance to their announcement that their effort was about launching an international research network. While the first issues of *Bit International* were produced, preparations were also underway for the manifestations of tendencies 4 in May 1969, driven forward by new issues of their newsletter called “Programme Information,” issues PI-10²³² and PI-11.²³³ The secretariat of the Gallery of Contemporary Art in Zagreb took on a gigantic workload, communicating in several languages with a by-now fairly global and growing group of participants. Kelemen, as acting secretary of the gallery,

played a central role, but other members of the organizational committee all contributed contacts and correspondence, sharing the workload according to their personal networks and language skills. The growing network comprised existing and new contacts with artists, critics, institutions, and initiatives, such as the Los Angeles County Museum, where Maurice Tuchman organized a large-scale program bringing together artists and corporations;²³⁴ the "International Science–Art Newsletter" edited by John Holloway at Aberdeen University;²³⁵ friendly relations were established with the British Computer Arts Society almost as soon as it had founded itself;²³⁶ and the creation of volume 1, issue 1, of *Leonardo*, which can be found in the archives of the Gallery of Contemporary Art. Even with all of that, the gallery found time to organize a three-day seminar for the Yugoslav members of the International Association of Art Critics (AICA) in January 1969.

Part of Zagreb's agenda was to further artists' access to computers. Nake, who taught as a guest lecturer at the department of computer science of the University of Toronto, wrote to Kelemen that he should "try, and make more artists use the generous offer of computer time in Zagreb." Nake argued that Yugoslav artists "with their background in Concrete Art should have *great potential*" because what was produced in North America, except for the work of Charles Csuri, was "a naïve computer art."²³⁷

However, while New Tendencies used the tools of the future to create art, the future of art was not to be determined by the tools used. Just before tendencies 4 opened, in February 1969, four members of the Slovenian group OHO²³⁸ exhibited at the Gallery of Contemporary Art in Zagreb. The exhibition was called *Great Grandfathers*, and the different rooms of the gallery were turned into installations consisting of hay stacks, piles of corn peelings, soft objects resembling plants or cacti, polyurethane foam, spinning cotton, steel wool, and roof tiles. The works had eccentric titles, such as *Embryo of Albin Gessner's Elephant*.²³⁹ This "first exhibition of *arte povera* in Yugoslavia," according to Slovenian art historian Tomaž Brejc, marked the arrival of what came to be called "new art practices" at the Gallery of Contemporary Art in Zagreb. Miško Šuvaković presents OHO as an alternative to the "elite culture of socialist modernism,"²⁴⁰ whereby New Tendencies would be the "elite culture." According to Šuvaković, New Tendencies was superseded by conceptual art not only as a new art movement or different style but also according to a logic of epochal change. The work of OHO, which was also shown in the *Typoetry* exhibition as part of tendencies 4, expressed the new sensibilities of the 1968 generation.

tendencies 4 (May–August 1969)

On May 5, 1969, many activities began, including several exhibitions at different locations and an international conference: the *Computers and Visual Research* exhibition at

the Gallery of Contemporary Art in Zagreb, from May 5 to August 30 (figure 4.10); the New Tendencies 4 exhibition at the Museum of Arts and Crafts, from May 5 to June 30; the exhibition *Typoetry* at the Students' Center Gallery, from May 6 to May 24; the *Computers and Visual Research* conference on May 5–6 at Moša Pijade Workers' University; an exhibition of books and publications at the Permanent International Exhibition of Publications (ISIP); and film screenings at the Center for Culture and Information on May 5. A significant number of institutions plus an organizational committee of no fewer than sixteen people and an executive committee of seven collaborated to make this possible. Part of the whole festival was the *Pictorial Loop*²⁴¹ by Boris Bućan and Josip Stošić,²⁴² a large-scale inflatable sculpture winding its way through public space. Like OHO, Bućan and Stošić belonged to a younger generation whose work developed in dialectical opposition to New Tendencies.

While the overall theme was computers and visual research, there was a special exhibition, titled New Tendencies 4, which was dedicated to the continuation of the constructive approach in art. New Tendencies 4 was separated into two parts: a retrospective of the first three Zagreb exhibitions of New Tendencies consisting of



Figure 4.10

Exhibition view, *Computers and Visual Research* (1969). Jonathan Benthall studies works by Peter Milojević. Courtesy Museum of Contemporary Art, Zagreb.

thirty-four works the gallery had acquired for its permanent collection, and 141 new works in the "recent examples of visual research" section. This section showed that the field was very much alive. Yugoslav artists such as Koloman Novak and Aleksandar Srnc showed their mature lumino-kinetic work. Srnc's *Lumino Plastika 2 (Light Object 2)*²⁴³ consists of cylindrically arranged rotating metal rods at which light patterns from a film projector are thrown.²⁴⁴ Srnc had been part of Exat 51, the group that blazed the trail for abstract art and neo-Constructivism in Yugoslavia.

At New Tendencies 4, a relatively large number of artists from (former) Czechoslovakia was present, including Milan Dobeš, Štefan Belohradský, Jiří Bielecki, Jarmila Čihánková, Jiří Hilmar, Tamara Klímová, Radoslav Kratina, and Miloš Urbásek; Zdeněk Sýkora showed work in the *Computers and Visual Research* exhibition. The curators made a special effort to intensify collaboration with artists from Czechoslovakia by contacting the artist and curator Jiří Valoch and the curators and art historians Arsen Pohribny and Josef Hlaváček. All three were involved in Klub Koncretistu (Club of Concretists), founded in 1967, which was both the name of an artists' club and that of a major exhibition of neo-Concrete Art held at several venues in 1968.²⁴⁵ The catalog,²⁴⁶ with an introduction by Pohribny, reveals the unconventional openmindedness and sensibility of Czech and Slovak artists who combined influences from Concrete Art with Restany's Nouveau Réalisme and Bense's information aesthetics.²⁴⁷ Another key event was the exhibition *Nová Citlivost (New Sensibility)*, held in Brno and Prague in 1968. This exhibition functioned as a major turning point in Czech and Slovak art, argues Piotr Piotrowski,²⁴⁸ because it brought neo-Constructivist and kinetic artists, such as Milan Dobeš, together with artists who questioned the conventions of modernist painting more radically, such as Stano Filko, who showed the environment *A Room of Love* (1966–1968).²⁴⁹ Jiří Valoch, also a member of the Club of Concretists and a creator of visual poetry, organized the first international group exhibition of computer art in Czechoslovakia, which was shown in Brno and several other cities in 1968.²⁵⁰ The flourishing of those activities was possible during the Prague Spring, but after August 1968 fell victim to so-called normalization, the reintroduction of a Stalinist regime in art.²⁵¹ During preparations for tendencies 4 in spring 1969, Pohribny, writing from exile in Florence, Italy, apologized for being unable to attend the exhibition, because he was "living in poor circumstances."²⁵²

The English art critic Jonathan Benthall did not see why the exhibition *Typoetry* (1969), staged at the Students' Center Gallery, was part of tendencies 4.²⁵³ *Typoetry*, independently curated by Željka Čorak, Biljana Tomić, and Želimir Košćević, showed visual poetry in various media, combined with music and performance (figure 4.11). Denegri observed that visual poetry was the catalyst for the new art practices that emerged in the late 1960s in Yugoslavia. Concrete poetry, such as the *Lettrism* of the Oulipo group and the Wiener Gruppe (Vienna Group), had played an important part in the prehistory of New Tendencies. Artists such as Marc Adrian personified the link among typographic



Figure 4.11

Paolo Scheggi, *Oplà-Stick Spettacolo* (opla stick spectacle; May 6, 1969). Performance, Students' Center Gallery. Courtesy Museum of Contemporary Art, Zagreb.

experiment, Concrete poetry, and computer art. Furthermore, in the double issue 5 and 6 of *Bit International*, Vera Horvat-Pintarić elaborated on the relationship between visual poetry and computer art in the wider sociohistorical context.

Horvat-Pintarić provided a critical introduction to McLuhan's main works, *Understanding Media*²⁵⁴ and *The Gutenberg Galaxy*.²⁵⁵ "McLuhan has radicalized the problem of technology of the new media but he has also drastically simplified the complex problems of the growth, decay, and extinction of traditional media," Horvat-Pintarić argued.²⁵⁶ While keeping to the basis of McLuhan's argument, according to which media have an influence on cognition, Horvat-Pintarić investigated how commercial image culture influenced the innovations of the avant-garde and vice versa, starting with Stéphane Mallarmé. With this background in mind, the *Typoetry* exhibition can be understood as dealing with the changes of visual culture and typography in a world increasingly shaped by electronic media. The intention of the organizers was not a new type of poetry but a focus on the letter as a sign, which broke down all conventional possibilities of meaning to create a "metapoetry," as cocurator Biljana Tomić wrote in the catalog.²⁵⁷ "In that time everything was possible, open, becoming," recalled Tomić.

"It was a very short period of mixed media, open communication, collaboration and inventions," before those new currents were broken down into a "new language definitions, of new disciplines and new media."²⁵⁸ As Horvat-Pintarić argued, "a brief history of modern and contemporary visual arts is in fact the history of a *revolution* in the means and *systems of communications*."²⁵⁹ Taking this further, the real significance of the computer for art does not lie in a narrow definition of art made by computer but in the way art is forced to change when it exists in societies becoming computerized. The computer has a deep and profound effect on art that goes beyond its direct application for the production of visual art. The effect of modern media on cultural production led to the rise of a new visual culture of images, type, and text produced by technical means and disseminated through McLuhan's "magical channels."

Horvat-Pintarić understood the rise of media society as part of a bigger pattern of development "from a closed, aggravated, and in the communications span limited message of abstract art to a new, *open system of communications* which makes a new *participating behavior*, feeling, and thinking possible."²⁶⁰

The Computers and Visual Research Exhibition

The first phase of New Tendencies from 1961 to 1965 had already shown the way to such *open* and *participatory* formats, in which art took on a new meaning within a society shaped by mass production, mass consumption, and new communications media. The main exhibition at tendencies 4 did not continue such an approach. Most of the 177 works by forty-six artists shown in *Computers and Visual Research* (1969) were computer graphics—that is, flat works on paper produced by plotter or microfilm or photographed from a screen. There was maybe a pragmatic reason for that, as the gallery did not have the funds to show live computer art. Yet even if that is taken into account, a different interpretation could have been presented through other means, such as models or documentations. Margit Rosen rightly criticized this, writing that "the perception of the computer as a picture or painting machine which dominated the perception of 'computer art' in the 1960s was a great hindrance to the inclusion of the new medium into artistic discourse."²⁶¹

There were two 3-D works in this exhibition: one by Robert Mallary, which was based on computation but then carried out by hand; and work attributed to Charles Csuri, but behind which actually stood the billion dollars of investments into computerized automation developed at MIT. Csuri showed an illustration of a computer sculpture made with a three-axis continuous path milling machine,²⁶² an approach that was technically advanced but culturally conservative. *Computers and Visual Research* could not fulfill the curator's promise that "this exhibition should not be understood as the supremacy of technology, but as an endeavor to overcome the new technology and use it for new results in the visual field."²⁶³ Many of the works had already been shown at

the information exhibition alongside the colloquium in August 1968 and thus merit no further discussion here.

In *Programme Information 13* (PI-13) from May 1969, the jury of the competition *Computers and Visual Research* announced its decisions. The works of William Allen Fetter from Boeing Computer Graphic Lab were ranked first, and the works of Bell Labs researchers Leon D. Harmon, Kenneth C. Knowlton, Michael A. Noll, Manfred R. Schroeder were ranked second. The jury, consisting of Umberto Eco, Karl Gerstner, Vera Horvat-Pintarić, Boris Kelemen, and Martin Krampen, argued that the works of those US-based corporate research labs showed “the best developed techniques and programming of visual phenomena.”²⁶⁴

In the introduction to their judgment, the jurors (figure 4.12) argued that “due to the experimental nature and completely open domain” of the works entered, they felt unable to formulate any criteria such as “aesthetic quality, complexity of programming or mathematical ingenuity.”²⁶⁵ Moreover, it would have been “authoritarian” to formulate any such criteria due to the newness of the field, which was expected to “suggest new aesthetic parameters in the future.”²⁶⁶



Figure 4.12

Božo Bek and Umberto Eco at *Computers and Visual Research* conference (1969). Courtesy Museum of Contemporary Art, Zagreb.

By awarding first and second prize to the corporate artists of Boeing and Bell Labs, the jury recognized the collective authorship of the corporation as the best artist. The event set a precedent for the future of media art not only by handing awards to corporations but also by excusing jurors from formulating qualitative criteria to differentiate between corporate research and art. The jury ignored the contextual relationships—what I call the *technological unconscious* of the works. The term *technological unconscious* refers to the complex ensemble of social relationships that are part and parcel of the technology.²⁶⁷ The meaning of the term is not identical with and not derived from *technological subconscious* as defined by Nigel Thrift.²⁶⁸ For Thrift, the technological subconscious is constituted by actor-network relations between humans and such artifacts that work discreetly in the background, such as large infrastructural technology, so that we tend to forget their existence.

This is a valid but limited part of my understanding of the technological unconscious. According to Thrift, the technological subconscious postulates that the technological as part of an actor-network can be forgotten. The technological unconscious, in my own reading, is the sum of the social relations that are mystified through the fetishization of technologies. This is much closer to the notion of the political unconscious by Frederic Jameson.²⁶⁹ Once a fetishized understanding of technologies prevails—when the social relations involved in their production are obscured—a technological unconscious comes into existence, a repressed reality. A criterion for the progressive nature of media art thus could be how it relates to the technological unconscious: Is it aware of this baggage? Does it further or prevent a mystified understanding of technology?

When the jury awarded the first prize to *Seven-System Human Figures in Cockpit*²⁷⁰ by W. A. Fetter in collaboration with Kenneth Frank and Robert Fee, it ignored the reality that those graphics were created in a defense-related research project by Boeing. Far from being merely a neutral form of "visual research," Fetter's team provided cutting-edge computer-based design and ergonomic studies.

The work of Fetter produced the iconic image of two humans in an aircraft cockpit, shown not only in the Zagreb exhibition but at Cybernetic Serendipity, and discussed in Jasia Reichardt's book *The Computer in Art*.²⁷¹ The image has been used in many other publications, from Reichardt's *Cybernetics, Art and Ideas*²⁷² and *The Story of Cybernetics*²⁷³ to Franke's *Computer Graphics: Computer Art*.²⁷⁴ The explanation of the image is that the human figures were not just drawings but digital models of the two pilots. The digital drawings were used in design simulations of aircraft cockpits to optimize the location and design of instruments. According to Franke, this was the first instance of a realistic digital graphical simulation of a human body.²⁷⁵ In issue 4 of *Bit International*, in the article "Science and Design," Bonsiepe and Maldonado argued that it was "hard to distinguish between ergonomics and military psychology" in this type of ergonomic research; the "central task of this discipline" was not only "to adapt weapons to

soldiers” but even more often to “adapt the soldiers to the weapons.”²⁷⁶ Reichardt’s description of the work vaguely but unapologetically refers to “Air Force data.”²⁷⁷

The creation of a virtual human figure constituted an important step in the creation of the cyborg. As science studies author Donna Haraway wrote, the cyborg is “the awful apocalyptic telos of the ‘West’s’ escalating dominations of abstract individuation, an ultimate self untied at last from all dependency, a man in space.”²⁷⁸ Behind the cyborg stands the image of the self-replicating machine and the god-like capacity of science and technology to become truly “creative,” to create artificial life. The imaginary cyborg reflected the military’s power fantasy of being able to control production and human action on the macroscale of the social as well as on the individual level. This analysis only serves to give an example of the technological unconscious behind *Seven-System Human Figures in Cockpit* (1968).

Similar things with a different accent can be said about the works with scanned images by Manfred R. Schroeder, Leon D. Harmon, and Kenneth C. Knowlton. In *Mural*,²⁷⁹ the scanned image of a lying nude was transformed into 16,384 picture points, each of which was filled by different micropatterns with the right brightness levels to make up the image (figure 4.13). The image, when looked at up close, falls apart into many separate pattern images but results in the metapattern of the lying nude when looked at from a distance.²⁸⁰ Bell Labs was the research facility of AT&T, the United States’ largest telephone carrier company. Today, it is obvious that those experiments were about splitting up images into discrete signs suitable for transmission via electronic networks. The transmission of images had to be optimized for the use of scarce bandwidth.

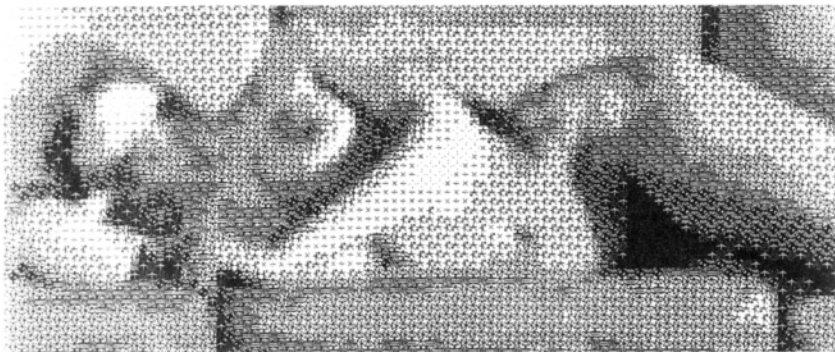


Figure 4.13

Leon D. Harmon and Kenneth C. Knowlton, *Mural* (1966). Computer-processed photograph, photo print from microfilm, 21.9 × 18.3 cm (image 10.9 × 26.2 cm). Courtesy Kenneth C. Knowlton and Museum of Contemporary Art, Zagreb.

However, the experiment also served another purpose. It showed that images could be composed of bits—that the classic subject of painting, the female nude, could be “drawn” by a computer. The inventor of cybernetics, Norbert Wiener, expressed the idea that humans were nothing but patterns of information and that those patterns may eventually be “transmitted as a message.”²⁸¹ Works such as *Mural* provided illustrations of those ideas. The work insinuates that the human image, and thus humans as a whole, can be “communicated” via digital electronic networks once technology improves. The essence of what it means to be human becomes accessible to computers. *Mural* was shown at Cybernetic Serendipity and at another key exhibition, *The Machine as Seen at the End of the Mechanical Age*.²⁸²

Gustav Metzger

The exhibition *Computers and Visual Research* in 1969 had constructed a master narrative around the computer as superior artist. But the exhibition also contained some examples of computer art outside this master narrative. Zagreb was the first place in the world where Gustav Metzger's *Five Screens with Computer*²⁸³ was shown (figure 4.14). It seems that Metzger's initial proposal was rejected, and only by protesting did he manage to get his work into the exhibition. In his letter, Metzger complained that “it strikes me as being very sad that you should limit your program to what is already a

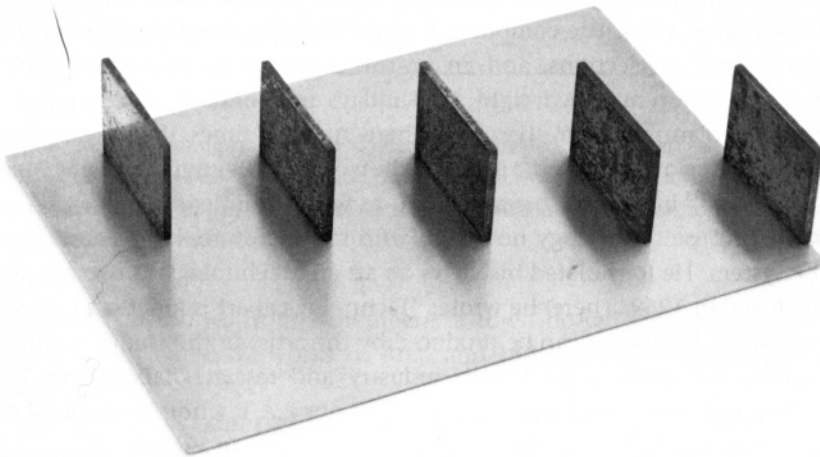


Figure 4.14

Gustav Metzger, *Five Screens with Computer*, model (1969). 7.2 × 44.4 × 30.9 cm. Donation by Alan Sutcliffe and Gustav Metzger in context of Event One, Computer Arts Society, Royal College of Art, 1969. © Generali Foundation Collection, on permanent loan to the Museum der Moderne Salzburg.

fairly well established, and relatively easy application of computers to art, i.e. *computer graphics*.²⁸⁴

It is little-known that Metzger considers *Five Screens with Computer* (1963–1972) “his most important work.”²⁸⁵ This is because it was “the most elaborate project that has emerged from the theory of Auto-Destructive Art.”²⁸⁶ The concepts of autodestructive and autogenerative art, formulated in a number of manifestos starting in 1959,²⁸⁷ contained the essence of Metzger’s ideas about the role of art in an advanced industrial society. Metzger understood modernism’s emphasis on a break with the past as an “auto-destructive impulse.”²⁸⁸ Metzger’s theory of autodestructive art (ADA) defined it as “a coherent, a necessary phase in the development of modern art.”²⁸⁹

Metzger’s work as an artist was, and is, driven by his critique of capitalism and a deeply felt anger about the destruction capitalism causes.²⁹⁰ The most destructive technology for Metzger was the computer: “Today, death is fed into, processed and administered by computers.”²⁹¹ It was thus logical for him that the computer should be at the heart of a large-scale public sculpture that embodied all his ideas about ADA.²⁹²

The plans for the sculpture, which was never built, foresaw the building of five large walls or screens, each consisting of 1,200 uniform steel elements about two feet long, and were to be positioned twenty-five feet apart. Using computer-controlled timing, the steel elements were supposed to get ejected. With each ejection, the sculpture would not only slowly disintegrate but also create different views, different plays of light and shadow (figure 4.15). The computer, Metzger thought, was necessary for the design and the control of ejections, and an on-site computer control room could become a visitor’s attraction in its own right. On Sundays and holidays, more spectacular ejections could be planned in a festive atmosphere. At other times, the pace of ejections could be extremely slow. In Zagreb, a model of the work and the computer-generated graphics of the screens²⁹³ in various stages of ejections were exhibited.²⁹⁴

Metzger wanted to use technology not as an affirmative gesture, but as a critique from inside the system. He formulated his views on art and technology in two articles in *Studio International* in 1969. There, he wrote: “Technological art is kinetic art plus a lot of money. Whereas kinetic art can be produced by the artist in the studio, technological art depends on direct contact with industry and research laboratories.”²⁹⁵ Metzger’s relentless criticism spared neither Bauhaus²⁹⁶ nor E.A.T, whom he accused of complicity with firms producing napalm and bombs for the war in Vietnam.²⁹⁷

Metzger also critiqued Cybernetic Serendipity in the same article as a “technological kindergarten.” However, Metzger also saw other, positive perspectives in art and technology. He thought artists should connect with those scientists who were “fighting the system from within,”²⁹⁸ such as the British Society for Social Responsibility in Science and the Union of Concerned Scientists, a US initiative. In his second article in *Studio International*, Metzger dreamed of “technologies of paradise,” referring to

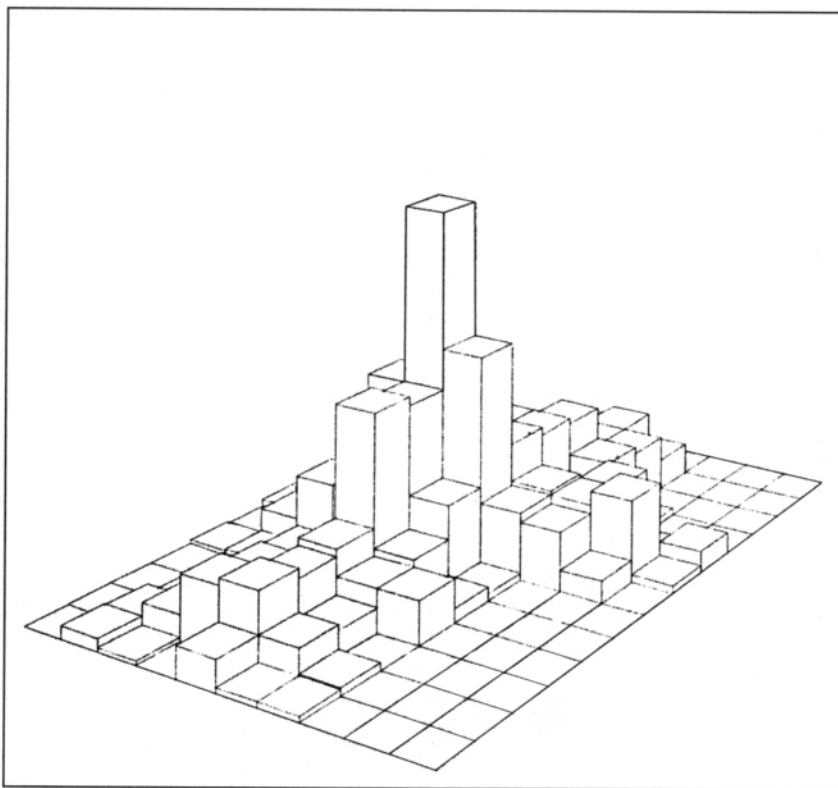


Figure 4.15

Gustav Metzger, design study for computer-controlled monument *Five Screens with Computer* (1969). Computer-generated drawing, in cooperation with A. W. Nuthbourne. Computer: Titan, reproduction of computer print. © Generali Foundation Collection, on permanent loan to the Museum der Moderne Salzburg.

childhood memories from Nuremberg, a town dotted with medieval fountains. He was also fascinated by works of Arab and Indian garden designers and Ptolemean automata.²⁹⁹

In his role as editor of the information newsletter of the British Computer Art Society from 1969 to 1972, Metzger pursued both lines: a relentless critique of the capitalist development of technology and sketches of the possibility of an alternative technological art as a kind of critique from within. Metzger did not travel to Zagreb, but his computer-generated plans and sketches of *Five Screens* were shown, and a text he coauthored for the conference was read by Benthall at the conference accompanying tendencies 4.³⁰⁰

Otto Beckmann and ars intermedia

For the *Computers and Visual Research* exhibition, the artist Otto Beckmann and the engineer Alfred Graß submitted work under the identity *Experimentalarbeitsgruppe Ars Intermedia* (experimental working group ars intermedia).³⁰¹ Beckmann and Graß used special noise generators from the Institute of Low Frequency Technics at the Technical College Vienna, which were capable of producing real randomness—signals with completely unforeseeable changes on an atomic level.³⁰² The artist and the engineer at first used those noise generators to create soundtracks for Beckmann's *Cinematic Films*.³⁰³ In 1968, Beckmann and Graß started to use the noise generators to produce graphics on an oscillograph, which could be influenced in real time through switches and potentiometers. Beckmann made screenshots with a photographic camera and printed them on aluminum.³⁰⁴ The electronically produced images allowed the creation of a magical, enchanting image world of electromagnetic ghosts: human-like shapes, but also line graphics that resembled a totemic virtual architecture. A selection of these works was shown at the *Computers and Visual Research* exhibition (figure 4.16).

Otto Beckmann was already sixty years old when he started to produce computer art in 1966 after reading the publication “PI-21” of the German Center for Computation.³⁰⁵ Beckmann combined interests in modern art, mathematics, mysticism, and occultism.

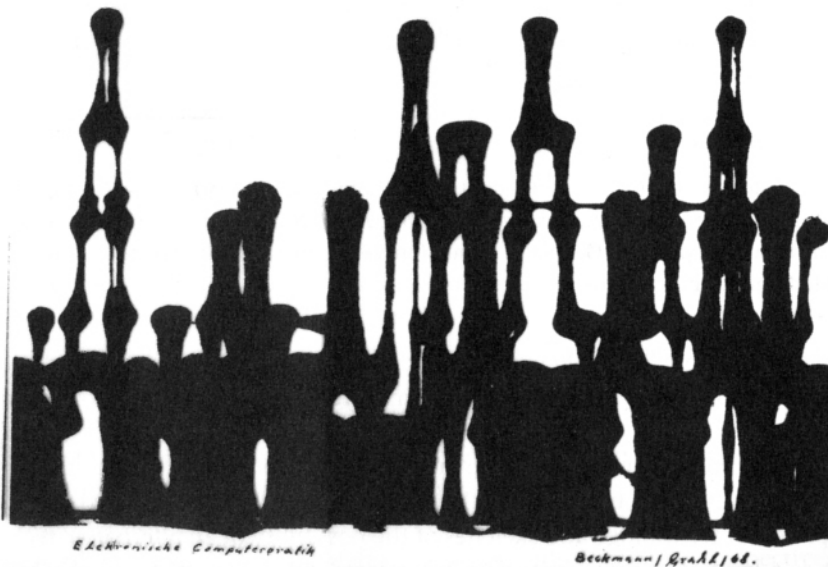


Figure 4.16

Otto Beckmann and ars intermedia, *Imaginary Architecture* (1971). Realized on *Ateliercomputer* (Studio computer) a.i.70, screenshot from oscilloscope. Collection Richard Beckmann.

In this tradition, science and art are part of a larger, mystical unity. The most rational methods are part of a search for a universal code, a kind of key to the secrets of the universe.³⁰⁶

In 1968, Otto Beckmann and his son Oskar Beckmann started working on an *Ateliercomputer* (Studio computer), a special-purpose machine for artistic use that was finished in 1970 and thus became called *a.i.70* (ars intermedia 1970) (figure 4.17). In a 1973 conference paper for the fifth New Tendencies exhibition and conference, Oskar Beckmann argued that commercially available computers were not really suited for the production of art.³⁰⁷ The studio computer was optimized for the aesthetic requirements of Beckmann senior.

The work of ars intermedia opens up interesting discussions about art's relation to technology. Otto Beckmann was not only interested in making work but wanted to create a valid model situation of artistic work with computers (in German, *Schaffensmodell*). The studio computer was not built according to John von Neumann architecture but was a special-purpose instrument with analog and digital components designed to create images on the basis of simple archetypes—which is closer to the way the brain works than to how computers calculate bitmap graphics.³⁰⁸ The artist-engineer team created a technological system designed to respond to artistic needs. The studio computer could thus be seen as an authentic artwork in its own right. In the 1970s, the ars

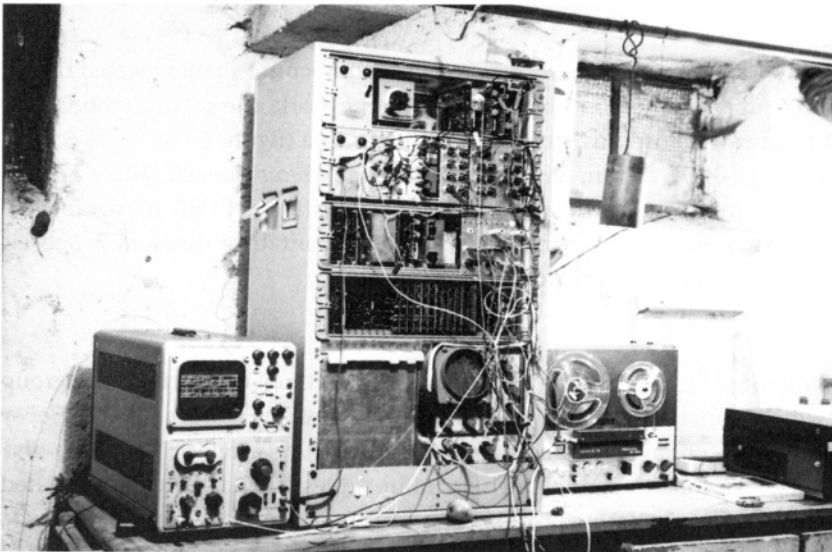


Figure 4.17 Otto Beckmann and ars intermedia, *Ateliercomputer* (Studio computer) *a.i.70*. Otto Beckmann Archive.

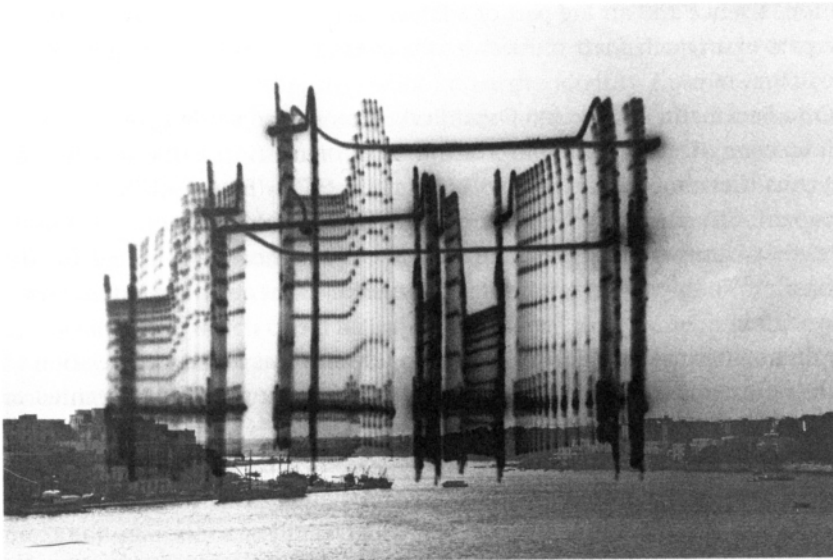


Figure 4.18

Otto Beckmann, *Metropolis 2080 "Urban Bridge."* Photomontage: computer graphics made with *Ateliercomputer* (Studio computer) *a.i.70* integrated into landscape, 200 × 300 mm. Collection Richard Beckmann.

intermedia group focused on *imaginary architecture*, architectural shapes created by the studio computer superimposed on photographs. In one work, the group symbolically created a bridge over the Bosphorus, linking Europe and Asia (figure 4.18).

The jury awarded third, fourth, and fifth places to Vladimir Bonačić, Marc Adrian, and Compos 68, respectively. Those works presented alternatives to the narrow definition of visual research as computer graphics. Each work contained different proposals for where digital art could go, away from the flat print.

Compos 68

The artists Jan Baptist Bedaux, Jeroen Clausman, and Arthur Veen formed the group Compos 68, which worked in Utrecht. The group's award-winning work *Compos Hobby Box*³⁰⁹ points to the potential of the computer for participatory artwork. The *Hobby Box* was a do-it-yourself kit for art making in which unique rules for each set were generated by a computer.³¹⁰ The box contained cardboard sheets in the primary colors and black, the coordinates of a unique pattern calculated by a computer, and a stylus. The user of the box had to cut out the cardboard and fix it on the surface according to the instructions. The artists expected viewers to be able to contemplate connections between their aesthetic theory and its visual expression.³¹¹

Marc Adrian

Marc Adrian was one of the few artists involved in New Tendencies from the very start who carried over his precomputer concerns into work with computers.³¹² Adrian's three key concerns were an interest in movement, the time factor, and the deindividualization of the artistic process.³¹³ He developed those themes in the 1950s, the formative period of his career, when he was close to Wiener Gruppe. With the help of the Institute for Advanced Studies in Vienna, starting in 1966 or 1967, Adrian created works such as *ct/2-66*,³¹⁴ which belonged to a series of similar works exhibited at tendencies 4. The work was calculated by a computer but created using Letraset (figure 4.19). Adrian thought that computers were particularly useful in art for *assemblage* in the broadest sense of the word. He envisaged a montage of worldviews aimed at the deconstruction of existing intellectual and ideological heritage.³¹⁵ In this spirit, Adrian also submitted the play *Syspot* (1968/1969), one of the first theater plays written by computer. *Syspot* was the command used for printing at the Institute for Advanced Studies.³¹⁶ The play was created by computerized montages of text from popular magazines and characters taken from partner adverts in newspapers, using the computer to

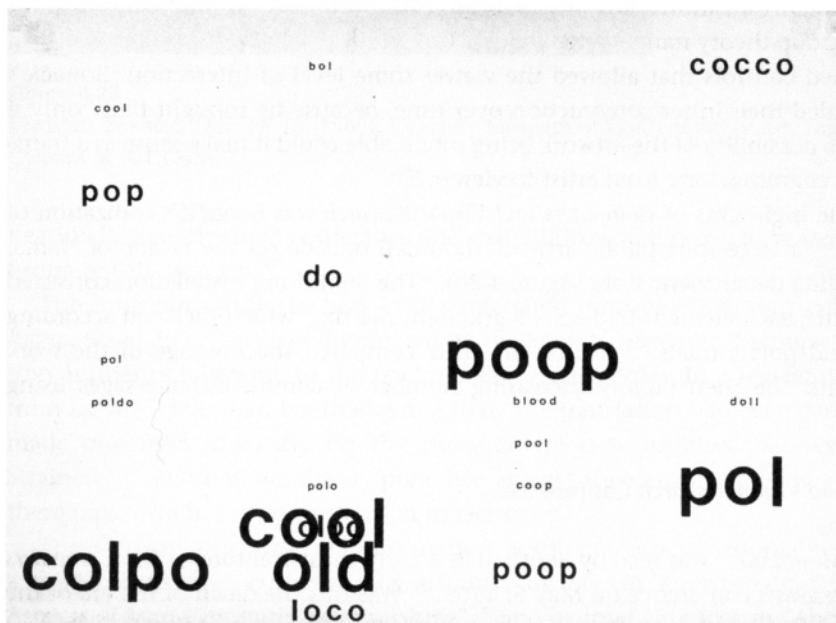


Figure 4.19

Marc Adrian, *2/66* (1966). Computer-generated visual poetry, Letraset on paper, 29.7 × 40.2 cm. Courtesy Museum of Contemporary Art, Zagreb; copyright © Bildrecht.

remix the stereotypical language, which is characteristic of advertisement and mass media. The resulting play was not intended to offer any aesthetic pleasure but only mirrored the irrationality of society and its structure of consumption.³¹⁷

Vladimir Bonačić

When Putar wrote that with the advent of machines in art a new type of people also arrived, he may have had Vladimir Bonačić in mind. For Bonačić, whose work as a scientist had already contained a visual aspect, tendencies 4 became a career-changing experience. Shortly before the series of events began, Bonačić was visited by Ivan Picelj, founding member of Exat 51 and New Tendencies' primary graphic designer at Ruđer Bošković Institute, and they started to collaborate on a light object.³¹⁸ During tendencies 4, no fewer than seventeen works by Bonačić were shown, consisting of animated light patterns either displayed on screen and photographed or of various display units that gave Bonačić's work their distinct character.

Bonačić was strongly critical of the use of randomness in computer art, stating that works using random numbers had "neither value nor importance for a human being."³¹⁹ Bonačić used Galois-field polynomials to determine the different states of the light objects and their transitions. Galois fields are part of a branch of mathematical field theory and group theory named after Évariste Galois (1811–1832). Some of the devices also contained controls that allowed the viewer some level of interaction. Bonačić's objects revealed their inner construction over time, because he thought that "only if there was the possibility of the artwork being intelligible could it make sense as a transmission of a cognitive state from artist to viewer."³²⁰

One of the highlights of *Computers and Visual Research* was Bonačić's realization of *DIN. PR 18*,³²¹ a large-scale public artwork mounted outside on the facade of Nama, Zagreb's leading department store (figure 4.20). "The 36-m-long installation consisted of 18 elements; each element had a 3 × 5 grid light matrix," which flickered according to Galois-field polynomials.³²² A local art critic compared the message of the work favorably with the then rapidly increasing number of commercial messages using light.³²³

Computers and Visual Research Conference

The *Zagreb Manifesto*³²⁴ was read by Benthall in a fairly theatrical tone at the *Computers and Visual Research* conference on May 5, 1969.³²⁵ Was this the dawn of the era of the computer in art or, as Charlie Gere has remarked, its early peak and decline?³²⁶ In an article about the exhibition and conference, artist Otto Beckmann wrote that this was still a moment before the fall of man. The exhibition had shown an overview of computer art to date. It would be difficult, Beckmann concluded, to show this exhibition again and have the same talks again. As the pioneering age of computer art was



Figure 4.20

Vladimir Bonačić, *DIN. PR 18* (1969). Courtesy Museum of Contemporary Art, Zagreb, and BCD Cybernetic Art Team.

nearing its end, the next conference and exhibition would prove to be decisive for the future of this art form.³²⁷

The contributions to the May 1969 conference, most of which were collected in *Bit International 7* (1972), were dominated by the Franco-Germanic discourse on information aesthetics following in the tracks of Bense and Moles. In a review titled "Report from Zagreb," Jonathan Benthall wrote that "the translation had been garbled [which] made one feel constantly on the threshold of new insights that were seldomly attained."³²⁸ Benthall admitted "prejudice against theoretical aestheticians of whom there must be a heavy concentration in Germany."³²⁹

The German discourse on information aesthetics was occasionally subjected to a mild constructive criticism—for instance, by Martin Krampen in "Psychological Aspects of Man-Computer Relationships"³³⁰ and by Josef Hlaváček in "About the Interpretation of Programmed Art."³³¹ According to Hlaváček, information aesthetics' emphasis on the "aesthetic measure" had put "too much accent" on "the presence of the computer in the creative process. ... As if the computer would symbolize that

incorruptible fidelity to the order which is the heritage of the first generation of pioneers of geometrical art."³³²

Hlaváček argued that Umberto Eco continued where Bense had stopped, with a structuralist semiotics of art.³³³ True, between 1962 and 1969 Eco had increasingly turned to semiotics,³³⁴ and thus it may not be wrong to see that continuity. Yet Eco had well understood that 1968 "outflanked" his own position on the political aspects of formal innovation by demanding that art become directly political.³³⁵ Eco's own conference contribution was very different from that of the Franco-German school of aesthetic semioticians. He addressed the political responsibility of art directly and warned of any linear interpolation of what the computer in art would lead to. Eco suggested that activities like those of New Tendencies should completely shift their focus. Rather than organizing exhibitions of computer art, such movements should "call upon artists and researchers to promote collective activities involving participation. ... Speaking out is the planetary problem today." Eco claimed that direct democracy and discussions, like those students and staff had had at universities during protests and occupations in Italy, were the way forward. Eco wanted the next New Tendencies exhibition to be a "true happening" that was not playful, but "a critical happening in which each person says what they want" so that people would take their destiny into their own hands.³³⁶ Eco, it seems, gave clear priority to the social and political events of the era, distancing himself from computer art.

Another memorable contribution came from the Art Research Center (ARC) group from Kansas City, Missouri, which added another interpretation of the role of the computer in art by presenting a groupware, a proposal for a software for cybernetically molding relations among members of a group. In its own words, ARC applied a "wholistic, gestaltic" approach to the understanding of the life of the group itself.³³⁷

ARC was founded in 1964 by Thomas Michael Stephens as a follow-up to a communitarian gallery project and made its first exhibition in 1966. At tendencies 4, the group³³⁸ showed work in the exhibition in a group room, in which the individual contributions remained recognizable but together formed a whole. In a large diagram drawn on the blackboard at the conference and later reproduced in print, the group described itself as an "independent, autonomous collective ... of artists, architects, designers and scientific, technical and social professionals." Their top priority was to address socially relevant problems through aesthetic systems and processes involving feedback (figure 4.21).³³⁹

The group's unique contribution was to merge a Constructivist interest in new media and artistic collectivism with cybernetics and the computer. ARC's work provides a different nuance to what Fred Turner³⁴⁰ investigated with regard to Stuart Brand and the *Whole Earth Catalog*. In the late 1960s, computers (which for a long time had been perceived as part of the military-industrial complex) suddenly became "cool" and "countercultural." This became possible through the merging of the collaborative

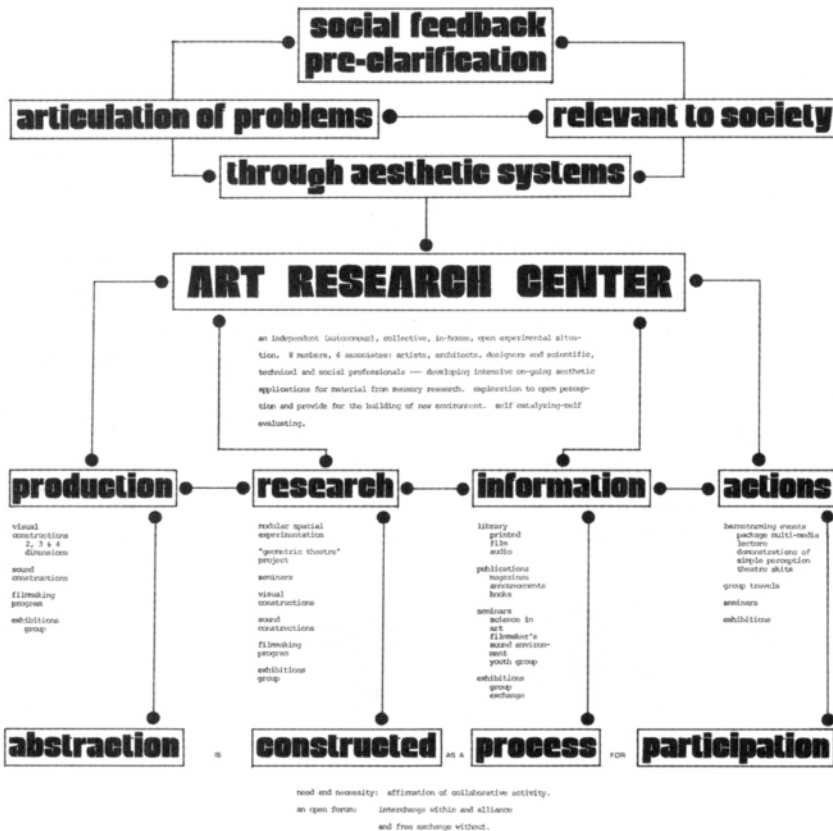


Figure 4.21

Art Research Center group; graphic design by Jon B. Thogmartin with input by Gary Rice, Norton Nelkin, and T. Michael Stephens; *The A.R.C. Flow Chart* (1969), black-and-white Prestype IBM Selectric on paper, A3. Courtesy Museum of Contemporary Art, Zagreb, and A.R.C. Group.

culture of the *closed worlds*³⁴¹ with the communitarian spirit of the late 1960s and with psychedelic experiences with drugs and light shows, such as those made by New York-based group USCO.³⁴² ARC demonstrated that, although considered unlikely, there existed unconventional, leftist, and collectivist art practices in the United States that combined computing, creativity, community, and Constructivism. ARC members T. Michael Stephens, Nancy A. Stephens, and Jon B. Thogmartin presented a cybernetic proposal for the programming of group activity at the *Computers and Visual Research* conference, later followed by a text by Gary Rice in their magazine.³⁴³ A few years later, ARC member Joseph Ziegler published a number of graphical subroutines with the intention of making life easier for artists whose grasp of programming was maybe not

as advanced as his own.³⁴⁴ ARC's communitarian spirit anticipated the open-source movement and was an early example of bringing together collaborative practices and creative computing outside the organizational complex.

At the conference (figure 4.22), Horvat-Pintarić—after addressing funding problems and complaining about a backward mentality of bureaucrats—³⁴⁵ opened a discourse on epochal change toward a “technetronic” era. She advanced the view that “crucial transformations” would soon take place “in all walks of life, in all the aspects of man's activity, in his work and his creativity, in his moral norms and his social conduct.”³⁴⁶ She saw the reason for this in the rise of the *technetronic era*, a term coined by Zbigniew Brzezinski,³⁴⁷ who later became President Carter's national security advisor. Brzezinski's term and book belonged to a wave of conservative prophecies of an electronic, post-industrial society, the most well-known of which was Daniel Bell's 1973 book, *The Coming of Post-Industrial Society*.³⁴⁸

Zagreb-based artists and intellectuals who formed the circle around the Gallery of Contemporary Art combined unorthodox humanist socialism with inquiries in cybernetics, computer art, advanced environmental design, and mass communication. This



Figure 4.22

Computers and Visual Research conference, Moša Pijade Workers' University, Zagreb, May 5–7, 1969. Courtesy Museum of Contemporary Art, Zagreb.

effort was an attempt to formulate ways in which art could adequately respond to a world experiencing a qualitative transformation through computers and media technologies. The curatorial team and associates in Zagreb continued with the modernizing impulse that had informed New Tendencies from the start, but this impulse found expression on a different level. Initially, New Tendencies had been an avant-garde movement in which, in the tradition of the historic avant-gardes, art was leading the effort to transform all aspects of life through an alliance of art and science and under the banner of progressive political goals.

From 1968 to 1969 there was no longer a movement. On the contrary, one member of the original group, Alberto Biasi, had opted to complain. There was a clear break between the first and the second phases of New Tendencies. With the coming of the computer, new people had entered the field, most of whom were not artists and did not have radical political ideas. The curators in Zagreb, however, pursued what could still be considered cybernetic socialism. They wanted to stay abreast of the latest developments, and they rightly identified the increasing technological mediation of the world as an important aspect of that. In this sense, in Zagreb an alternative nonaligned modernity was experienced that could have sprouted many new meanings if experiments such as the Prague Spring were allowed to continue. After the violent suppression of 1968, this possibility of an alternative path to cybernetic socialism was closed off. This must be seen within the wider context of the death of communism as a state ideology. Although not apparent to people at the time, this period marked the beginning of the end for the Soviet Union and for Yugoslavian Third Way socialism.³⁴⁹

The modernizing impulse of curators drove them to suggest continuities from the work that had characterized the earlier New Tendencies movement and visual research by computer, but even curator Boris Kelemen admitted that "however justified and logical it might have been, the discussion did not offer the results anticipated."³⁵⁰

In the short run, tendencies 4 was seen as a great success both by its organizers and visitors. Kelemen reported to those participants who had only sent work and not traveled to Zagreb that "our symposium and the exhibition were a great success, 200 people came from all around the world."³⁵¹ Ten thousand visitors saw the exhibition, and many reviews appeared in the daily press and electronic news media of Yugoslavia.³⁵² Media in the German-speaking nations of Austria, Germany, and Switzerland responded very positively, with a number of reports in print and on radio. Internationally, the response was more thinly spread across specialized media, such as art magazines and newsletters. Benthall wrote to Kelemen, "I very much enjoyed the symposium last week," and announced that he would write articles for *Studio International*, the *Times Literary Supplement*, and *Computers Weekly*.³⁵³

However, what looked like a beginning—the period from summer 1968 to summer 1969—turned out to be a rather brief summer of early digital art. After 1968, the

Zeitgeist changed dramatically and permanently, moving toward a critique of technological rationality. New Tendencies' curators, intent on problem solving, missed the changing orientation. As new art practices developed, artists started to criticize social formations of bureaucratic management and technological domination, as exemplified by the use of computers and high-tech weapons in the Vietnam War.

In New Tendencies, the transition from the first analog phase to the second computerized phase led to a remarkable contraction of the range of artistic expression. If the first phase tried to involve and agitate the viewer, during this new phase the viewer was expected to contemplate printed, nonparticipatory computer art. The aesthetic possibilities of the computer were discussed at the conference, but the social relations surrounding this technology were neglected, forming a *technological unconscious*, an invisible layer of meaning that affects a work's reception even if the artist tries to ignore it.

The development of computer technology had been dominated by the military's quest for high-layer, centralized control and domination from a distance and by businesses' antagonism toward labor. Rather than addressing those topics, the treatment of computer art in New Tendencies set an unfortunate precedent by presenting art awards to high-tech corporations. The high-level jury found itself incapable of formulating aesthetic criteria for computer art and left this to a later date. With the inclusion of the computer, nonart by nonartists entered the discourse on art. Some may even have seen this at the time as a way of making an antibourgeois, antiart statement. This would not have been a problem; the evolution of art has often been driven forward by the inclusion of antiart and nonart. In this case, however, it opened an ever-growing chasm between computer art and the fine arts scene, the consequences of which we still suffer today. Furthermore, as I have argued, the discourse on the computer as the soulless usurper was a pseudodiscourse that only masked more important consequences of computerization, such as displacement of labor by automation and outsourcing. Although a number of alternative approaches to computer art were presented in the exhibition, as for instance, by Compos 68, Marc Adrian, ars intermedia, ARC, and Gustav Metzger—those new paths were largely left unexplored in subsequent events.

That said, this information does not diminish the overall achievement. New Tendencies launched a discourse on computers and visual research on the highest possible artistic and intellectual level in a semiperipheral nation between the large power blocs. *Bit International*, with its broad range of topics—from information aesthetics to design and television—generated a discourse on the future of postindustrial or “techne-tronic” society that was markedly different from the ideas of conservative thinkers such as Daniel Bell or Zbigniew Brzezinski. In Zagreb, foundational work for an alternative socialist vision of information society was developed. When I write *socialism* with a lowercase s, this is always a nonstate, nonparty type of socialism of the New Left. This grassroots, cybernetic socialist discourse with its roots in the experimental practices of

the early 1960s may have sprouted an alternative branch in digital arts, but subsequent historical events have closed off such a possibility. The year 1968 marks the beginning of a social crisis and rupture in the West, at the end of which the information society emerges. With Prague 1968, Soviet communism lost the last bits of credibility among the intelligentsia it might have retained after Hungary 1956. When it came, however, the digital revolution turned out to be socially conservative. As the critical computer scientist Joseph Weizenbaum recognized, the introduction of computer technology in the 1970s helped to overcome the crisis of Fordism and had stabilizing effects on conservative social structures in America.³⁵⁴

By the end of 1969, things should have looked good for a continuation of New Tendencies. Kelemen sent a volley of letters to artists from whom the Gallery of Contemporary Art wanted to buy work. In one such letter, Kelemen told Nake that he had an interest in continuing talks with him about a fifth New Tendencies event, since the gallery had in principle already agreed to hold such an event.³⁵⁵ Thereafter, however, plans must have gone off track; the fifth large exhibition and conference did not take place until 1973.