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Automation, Cybernation and the Art of New Tendencies (1961-1973)

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The work presented in this thesis is the candidate's own.

Armin Medosch

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Abstract

My research investigates exhibitions as sites of research and appraises the possibilities and contradictions of a progressive and socially engaged media art practice. The international art movement New Tendencies (NT) (1961-1973) provides the material evidence through its exhibitions, symposia, artworks, catalogues, newsletters and artist's statements. The basic methodological assumption behind my research is that new insights are gained by questioning the various interdependencies between NT and historical change.

NT was searching for a synthesis between socialist emancipation and artistic modernism by proposing to replace the notion of art with visual research. The project emerged in Zagreb, capital of Croatia which was then part of Yugoslavia, a Socialist nation which did not belong to the Eastern bloc and experimented with market Socialism combined with social self-management and self-government. Yugoslavia's unique role between the hegemonic power blocs made it possible that an international, humanistic, and progressive art movement could emerge from its territory.

With every exhibition and conference NT articulated its artistic position and set itself into relation with the respective techno-economic paradigm. NT began during the height of Fordism, continued during Fordism's moment of crisis in 1968, and ended when a new paradigm – informational capitalism – started to develop from within the old one. In this historical context, my hypothesis is that NT's exploration of participatory art stands in direct relation to the rise of automation and cybernation in society. A further layer of inquiry is the historically changing relationship between manual and intellectual labour and how art addresses it.

By contextualising NT my research contributes a new dimension to the history of media art. Through the chosen methodology, a new understanding is gained not only of this important art movement but of the general dynamics of media art in the second half of the 20th century.

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Introduction and Methodology

Introduction

My research argues that *New Tendencies* (1961-1973) provides a concrete body of evidence for an investigation into the possibility and possibilities of socially progressive media arts. Possibility in the singular, because the possibility of a socially progressive media art is a question in itself; the plural, because once it is stated that such a possibility exists, there are multiple ways of realising those potentials. The term 'socially progressive' was inspired by a seminal text by the artist François Morellet and the researcher François Molnar published in 1963 on the occasion of the second *New Tendencies* exhibition in Zagreb (Morellet & Molnár 1963; 2010).

The exhibitions and events under the title *New Tendencies*¹ (1961 - 1973), which began in Zagreb in Croatia (then Yugoslavia) with an exhibition in 1961 and ended with the fifth exhibition in 1973, can be regarded as socially progressive, and as a predecessor of media art. The term 'media art' is used 'as an umbrella term' (Paul 2003) for other terms such as 'art and technology' (Shanken 2001, pp.1–18) 'electronic arts' (Popper 1993), 'virtual art' (Popper 2007; Grau 2004) or 'new media arts' (Graham & Cook 2010). I am avoiding any narrow definition of media art precisely because this work as a whole intervenes in the history of that genre and seeks to give it a different meaning. The term media art was not in use at the time when NT began. In the early 1960s, NT did not exist in a category of its own, as media art does today. By claiming NT for the history of media art, my research makes visible the possibilities and contradictions of socially progressive media art.

I am of course aware that the notion of 'progress' in art is almost a provocation. Jean-François Lyotard in 1979 maintained that an 'incredulity towards meta-narratives' was a defining characteristic of postmodern theory, and that the legitimization of

¹ From now on I am using the abbreviation NT when I refer to *New Tendencies* as a whole, and more specific names - since the title of the events changed over the years - when referring to specific events.

knowledge or art through a historical meta-narrative had become suspect to many (Lyotard 2005, p.xxiv). Such an incredulity has undoubtedly been useful to a necessary process of debunking falsely universalistic narratives. The earlier attack against the implied unity between science, history and progress was *The Dialectic of Enlightenment* (Adorno & Horkheimer 1997). Yet, as Jürgen Habermas pointed out, Theodor Adorno and Max Horkheimer's turn against the Enlightenment followed in the footsteps of Friedrich Nietzsche and used critical rationality against its own foundations. By questioning science's legitimation as contributing to universal human emancipation, the validity of emancipation as a goal was being abandoned. Habermas accused all those with similar positions of having performed a 'regressive turn' (Habermas 1982, p.29). Gilles Deleuze, Michel Foucault, and without naming him, Lyotard, were accused of being 'neoconservative' thinkers, since they offered 'no theoretical reason to move in one social direction rather than another' (Rorty 1984, p.40).

Ten years after the Habermas-versus-postmodernists debate, the French sociologist of science Bruno Latour wrote *We Have Never Been Modern* (1993). Latour argued that 'postmodernism was a symptom, not a solution' (Ibid., p. 46). Modernism had been based on a double contradiction, where on the one hand science was creating hybrids between humans and non-humans, while at the same time an artificial separation between nature and culture, between science and politics was upheld. Postmodernists, Latour argued, still lived within the modernist framework but didn't believe in it anymore. Thereby they removed the mainspring of the productive tension which had arisen from modernism's double contradiction (Ibid., p 46; p. 62).

Although debates about postmodernism have peaked and since ebbed away, the 'incredulity towards meta-narratives' still prevails, thereby making it difficult to raise the question of what progress could mean (cf. Groys et al. 2003). This research is motivated by the search for the meaning of progressive and socially engaged practices in media art. The history of NT provides an example of a progressive media arts practice in the past, thereby also giving clues as how to understand the potential of progressive media art today.

The Link Between Theory and Practice

My research is undertaken in the context of a practice-based PhD in Arts and Computational Technologies (which I consider another synonym for media arts). My own practice comprises writing, curating and making media art works, often in collaboration with others, and in projects where the boundaries between those types of activities are fluid. Over the duration of my career I have witnessed two related developments: the rise of the information society from a prophecy to a reality; and the institutionalisation of media art. When I started to be involved in media art during the mid-1980s I experienced it initially as a diverse field with no fixed boundaries, often motivated by a strong critical stance vis-à-vis the dominant forces in society. During media art's institutionalisation in the 1990s its progressive aspects were, as I saw it, increasingly sidelined, whilst it became more narrowly associated with interactive computer art (Grau 2007; 2004; Brower & Mulder 2007).

Media art's institutionalisation occurred during a specific techno-historical transformation which saw the internet opening up to the wider public accompanied by the growing perception that the rules of economics had been changed (Kelly 1995). In the 1990s key terms used to describe media art such as 'interactive', 'immaterial' and 'virtual', gained plausibility when even the economy was supposed to have become 'weightless' (Quah 1999). Media art's phase of institutionalisation coincided with the establishment of a new paradigm, that of informational capitalism. During this era immateriality emerged as a category which appeared to describe what happened in the economy and in media art equally well. A one-sided priority was attributed to information, while physical, material and social aspects of media art were neglected. In my MA dissertation thesis 'Technological Determinism in Media Art' (Medosch 2005) I discussed some of the problems of an affirmative discourse of media art.

The exhibition *Waves* (2006/2008) was conceived to drive this critique further by means of an exhibition as research project. *Waves* was based on the thesis that electromagnetic waves are to be understood as both a principle medium, and material of arts. This shift away from immateriality to a *different* type of *materiality* was understood as one step in a long-term project of developing a materialist theory of

media art under the working title *Waves, Code and Voices*. Although this larger conception is still valid, I settled for *Waves* as the practical aspect of my thesis.

Waves, the exhibition, was conceived as action research. Through making the exhibition my theoretical long-term project was to be advanced. Based on an initial concept by me, *Waves* was curated and produced in collaboration with RIXC, an independent media arts organisation in Riga, Latvia (Medosch et al. 2006). It was produced again, with considerable modifications, in Dortmund by HMKV in 2008 (Arns et al. 2008).²

In 2014 Riga will become a European Cultural Capital and RIXC, and I, are planning a new exhibition under the working title *Fields*. Just like *Waves*, *Fields* is designed to become a large scale exhibition carried out as a research project, a survey of specific historic, geographic and contemporary issues. Consider *Waves* and *Fields* to be part of one stretched-out-in time action research project with the theoretical part - the thesis presented here - in the middle.

When this research project began, the task was to turn those 'subjective perceptions' about the de-politicisation of media art into something more scientifically valid. I conducted a literature review and developed the idea to contextualise *Waves* by looking at a number of seminal media art exhibitions such as NT (1961-1973), *Cybernetic Serendipity (CS)* (1968), *Software* (1970), and *Ars Electronica* (1989-1995). Finally, I decided to focus on NT as the main case study, dropping *Ars Electronica*, and with it the 1980s and 1990s.

Overview

I first heard of NT through the Amsterdam-based Croatian media artist Darko Fritz, who in 2000, curated the exhibition *I am Still Alive* (2000b) in Zagreb. Fritz made the title of On Kawara's work *I am Still Alive* (1973), shown at *t-5* in Zagreb in 1973, the title of his exhibition at the Multimedia Institute. Kawara's work consisted of four telegrams sent to the exhibition with the text 'I am still alive'. Fritz highlighted the

² The documentation of *Waves* is contained in Appendix A. My professional practice during my phase of study is listed in Appendix B.

relationship between NT and late 1990s net art by showing works of NT together with works of the Ascii Art Ensemble, a group of artists who made text based movies on the web. With the title and content of the catalogue text for the exhibition, *Amnesia International* (2000a), Fritz pointed at two overlapping cases of amnesia: media art's lack of awareness of its own history; and specifically that Zagreb had almost forgotten NT.

NT emerged from a first exhibition held in 1961 in Zagreb at Galerija suvremene umjetnosti (Gallery of contemporary arts - GSU). Although there were significant exhibitions and events in other places, NT's organisational centre was Zagreb, capital of Croatia, one of six republics which together formed the Federal Socialist Republic of Yugoslavia. Yugoslavia officially carried the word Socialist in its name, but was not part of the Soviet bloc. In 1948 the Yugoslav leader Tito had fallen out with Joseph Stalin over issues of national sovereignty, and Yugoslavia was trying to find its 'own path to Socialism' based on the notion of self-management and self-government. The arts enjoyed considerable freedom and were not under the yoke of any doctrine such as Socialist Realism. During the height of the Cold War, this made Yugoslavia an attractive country for non-conformist leftist artists and intellectuals from East and West. Artists who were critical of the function of the Western art market found congenial partners in Zagreb to explore a new role for art as *visual research*.

In a first phase, from 1961 to 1965, NT considered itself a progressive art movement which made a transition 'from painting to objects' (Mavignier 1970; 2010a). This phrase, used in a retrospective text by one of the movement's founders, sums up one potential meaning of the word progressive as formal innovation in art. The internal dynamic of NT as a movement had exhausted itself by 1965. Yet, a number of individuals based in Zagreb around GSU continued and relaunched NT in 1968/1969, this time around the notion of *Computers and Visual Research*. In 1973 an attempt was made to combine the previous kinds of expression, constructive and computer research, with conceptual art. Yet the historical circumstances were no longer favourable to NT and a further attempt at making another event in 1978 under the title *Art and Society* could only be realised as a symposium.

New Tendencies 1961 - 1973

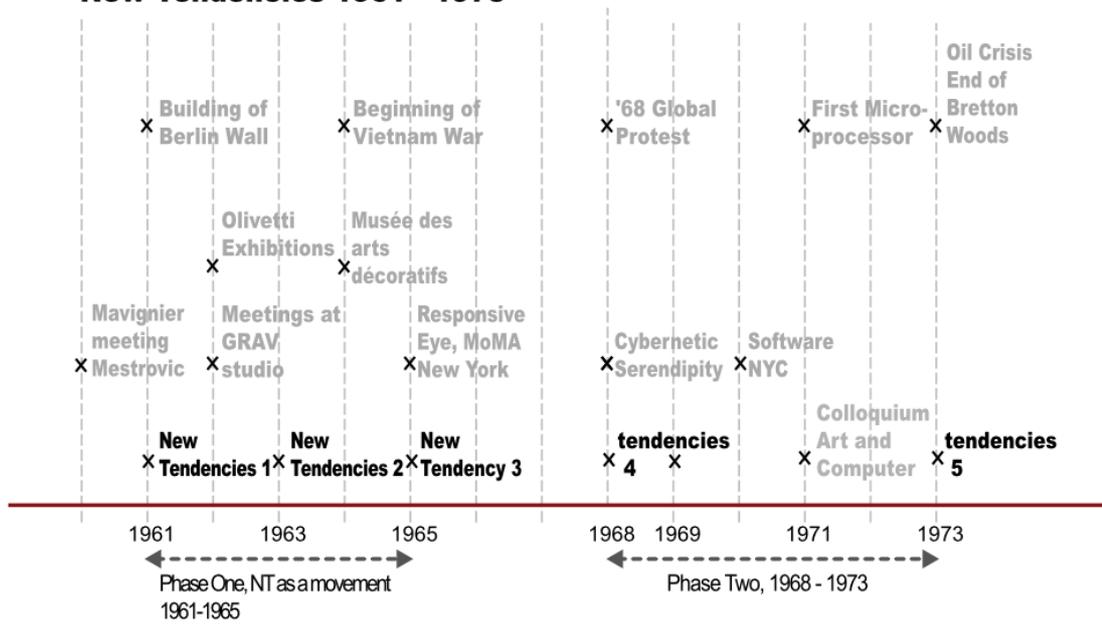


Illustration 1: Timeline New Tendencies 1961 - 1973

Research Context

The prevailing memories of NT in Zagreb usually identified it only with the first phase of the movement and a kind of neo-Constructivist aesthetics. Only after Fritz found issues of *Bit International*, a magazine produced by GSU between 1968 and 1972, did he understand how important the computer had been to NT. Further investigations revealed the existence of a fairly well preserved archive (Fritz 2009b). After the exhibition *I Am Still Alive* (2000) Fritz curated a large retrospective exhibition of NT titled *Bit International* (Neue Galerie (Graz) 2007) at Neue Galerie, Graz, which I had the opportunity to visit. *Bit International* (2008) was shown again, with some modifications, at ZKM, Karlsruhe, in the following year. Based on the research undertaken in the context of those exhibitions, a document sourcebook has been produced (Rosen et al. 2010).

That Zagreb forgot NT was not an accident. NT took place when Zagreb belonged to the Federal Socialist Republic of Yugoslavia. In 1991 that nation had violently fallen apart, including nearly all-out war between Croatia and Serbia, the two most populous republics of former Yugoslavia. In the years after the end of the war anything to do with Yugoslavia and Socialism was out of favour with the political and cultural mainstream. Everything that had been part of Yugoslavian art history became Croatian art history, or was overlooked. Fritz's re-activation of NT was one of the first steps in a struggle to recover the Socialist art of the past.

Art historians such as Ljiljana Kolečnik, and the independent curators collective *What, How and For Whom (WHW)* in Croatia, as well as colleagues in Serbia, Slovenia and the autonomous region Vojvodina, organise research and exhibition projects which continue this process. The sculptor Vojin Bakić and the group Exat 51 shaped the modernistic paradigm in art in Yugoslavia in the 1950s and 1960s. Their work has been thematised by *WHW* in two recent projects (WHW 2009; 2008; Dojić & Vesić 2010). Other recent projects were *The Ideology of Design* (Ćurčić 2009), an exhibition and book about industrial design; and the project *Omitted History* (New Media Center_kuda.org 2006) which rescued the conceptual 1970s avant-gardes of Vojvodina from being forgotten, through an exhibition, book and conference.

These projects feed into my own work because the artists they are dealing with also participated in NT and the catalogues, with texts in English, provide useful material. The emotional and intellectual intensity with which my post-Yugoslav colleagues recover the past in order to fight for their own position in the present is an inspiration. As *WHW* said in a recent radio interview, "when we woke up one day in a nation called Croatia we felt cultural claustrophobia" (Zwerger 2011; WHW 2011). The internationalism and un-orthodox leftism of the Yugoslav postwar avant-gardes is being used to throw into contrast today's cultural provincialism and neoliberalism. Through research projects involving participants from several former republics the 'Yugoslav cultural space' gets reconstituted.

Contemporary art historians from former Yugoslavia such as Miko Šuvaković and Ješa Denegri agree that a Yugoslav cultural space still exists despite the political divisions (Šuvaković 2003b; Denegri 2003). There also seems to be a consensus among them that NT belongs to a 'neo-avantgarde' in a three-stages periodisation: historical (interwar) avant-gardes (1910s-1930s); neo-avant-gardes (1950s-1970s); and retro-avant-gardes (1980s and 1990s) (Erjavec 2003; Djurić & Šuvaković 2003; Šuvaković 2003b). In a similar way to my Yugoslav colleagues, my thesis speaks up for the necessity of progressive media arts practices today, while exclusively dealing with NT and not its legacy, or its connections with contemporary practice.

Relationship with Science and Technology

NT emerged in the late 1950s and early 1960s when the reconstruction effort after the Second World War in Europe had been largely finished, and the postwar economic order consolidated itself, set on growth (Lieberman 1977). In the industrially most highly developed nations a new push for increased automation in industry was under way (Duménil & Lévy 2004, p.44). The new production methods in industry subsumed under the term automation actually cover a number of quite distinct technological systems. So called 'Detroit automation' only automated the transport of materials through transfer machines. More advanced, were assembly lines which used sensors, cameras and other electronic devices to achieve some level

of self-management through feedback. The petrochemical industry provided an example of 'flow process' automation which needed almost no human intervention except for control of instruments and repairs. The fully automated factory with industrial robots did not yet exist, but was already on the horizon (Pollock et al. 1964; Friedmann 1964; D. F. Noble 1986).

In the first half of the 1960s the computer started to come out of the *Closed World* (Edwards 1996) of research funded mostly by the military, and was increasingly used for civilian applications. The term 'cybernetics' was coined by Norbert Wiener in the mid 1940s in the USA and popularised by the successful books *Cybernetics* (Wiener 1948) and *The Human Use of Human Beings* (Wiener 1988) (first published in 1950). While a fully cybernetic society was still more prophecy than reality, the process of the world becoming ever more cybernetic was conceptualised under the term 'cybernation' or 'cyberneticization' (Huhtamo 2000). Both cybernation and automation caused an intense debate at the time.

In this thesis, automation and cybernation are not understood just as new industrial or scientific paradigms, but as articulations of a historically specific socio-economic system. Automation and cybernation have a multiplicity of implications for the lives of people with regard to working practices, the social relations they produce, and as determining influences on the rise of media and new forms of macro-economic governance. New technologies, political and economic formations and new cultural forms such as NT are not thought of as categorically separate objects in dualistic relations. To speak with Latour, the task is to inhabit what he calls the middle kingdom, the sphere of mediation (Latour 1993, p. 89), and to expose the web of relationships between things and people, and thereby produce new knowledge.

One key characteristic of the time when NT emerged in the late 1950s was that the influence of science and technology on industry became increasingly recognised. Science and technology were used by nation states and corporations in concerted and systematic efforts to trigger innovation (Freeman & Soete 1997). It was widely believed that this was leading to a substantial qualitative change in the relation between science and society. Several terms were used synonymously, such as 'new industrial revolution' or 'technological society' (Ellul 1967). Whereas the mainstream

of the art world rejected science and technology as alien to art and threatening its autonomy, NT tried to embrace it. The French artist and key participant in NT, François Morellet expected 'a revolution in art, similar to that in science' (Morellet 1961; 2010a).

The 1950s and early 1960s are often perceived as an age of conformism in the shadow of the Cold War. Recent work on the history of technology suggests that the speed and depth of change was even greater than today (Edgerton 2008, p.52). NT chose *visual research* as its particular point of intervention during an era when modernisation was advancing very fast, thereby also quite visibly changing the world and creating effects on the senses, bodies and minds which people were unprepared for.

Relationship with Art History

NT followed a 'constructive approach', as Ješa Denegri called it in the first monograph written on NT (Denegri 2004). In the first phase of NT from 1961 to 1965, when it tried to formulate itself as a movement, the idea was pursued that art had a role in shaping the modernisation process, and that it should engage with the latest production techniques. NT participated in a dialectics which involved both, the 'humanisation of science' and the 'scientification of the arts,' as one critic and theorist wrote (Meštrović 1963; 2010a).

As mentioned above, post-Yugoslav art historians would classify NT as an international neo-avantgarde (Erjavec 2003; Denegri 2003). The catalogue of the second exhibition places NT in a timeline that starts with Futurism, Constructivism, Bauhaus and De Stijl (GSU 1963). NT echoed ideas of the historic avant-gardes insofar as it wanted to break down the barrier between art and life (Bürger 1984). The self-understanding of some of the participants was close to the notion of the Constructivist, revolutionary, artist-engineer who engaged with 'transforming the technical apparatus itself' (Krysa & Cox 2005).

At the time when the artists, who were soon to form NT, went through their formative period in the late 1950s, the leading styles in painting were Abstract Expressionism in the USA and Informel in Europe. As Catherine Millet pointed out, the specifics of the Parisian art scene meant that by the end of the 1950s, few knew Marcel Duchamp, nor much of Bauhaus (Millet 2006, p.17). NT together with a group called Nouveau Réalisme, sometimes also called neo-Dada, were the first to turn against 'bowdlerized modernism' and 'shattered the cocoon of the School of Paris' (Ibid, p. 16).

NT was innovative and anticipatory. It explored the notion of art as visual research and made the participation of the viewer a central concern. When writing about its works I am constantly tempted to write 'user' instead of 'viewer' because many works asked for a type of involvement which went beyond mere viewing. But formal innovation was not a goal in itself. NT's anticipatory treatment of important themes of media art was closely linked with its political vision. This link between work and world-view, however, is rarely that obvious in the works themselves. It became a major task to find out in which ways exactly the political engagement of the art of NT was conceived by the artists.

By the mid 1960s NT was widely known and exerted considerable influence in the art world. It became synonymous with an international movement, decoupled from Zagreb (sometimes spelled in French *Nouvelle Tendence* or in German, *Neue Tendenzen*), and used in a way other terms such as Abstract Expressionism had become generic. NT artists received prizes and awards and their works were shown at the most prestigious international exhibitions and museums. Yet by the end of the 1970s NT was almost forgotten. For example *Art Since 1900* (Foster et al. 2004), written by influential art critics of *October* magazine, features Morellet, but downplays his links with Group d'Recherche d'Art Visuel (GRAV) who were very important in NT. As reference works such as this one make no mention of NT, the possibility of a progressive media art practice gets undermined.

In NT artists such as Piero Manzoni, Dieter Rot, and Gustav Metzger participated. Artists involved in NT had close relationships with their contemporaries such as Yves Klein, Daniel Spoerri, Lygia Clarke, and Helio Oiticicia. All those artists have

become canonised as highly important proto-conceptualists. NT did not exist in a niche as media art does today. By rediscovering the dynamic links NT had with other artists and trends, a different perspective on media art's past gets developed.

Over this period from the late 1950s to the early 1970s NT produced not only art and exhibitions, but also public symposia, catalogues and nine issues of *Bit International*, a journal published between 1968 and 1972. NT articulated itself also through closed meetings, small publications, so called programme informations, newsletters and internal documents such as private letters and concept papers. Not only the artworks and exhibitions but all this taken together produced NT. Access to the archives of former GSU, now Museum of Contemporary Arts (MSU), Zagreb, inaugurated my research and provided me with rich material evidence.

While I am resisting a narrow focus on curatorial practice, the exhibitions do occupy an important place, and I have therefore chosen to use the five main exhibitions of NT (1961, 1963, 1965, 1968/69, 1973) to structure my chapters.

I am using exhibitions as sites of research to investigate the possibilities of progressive and socially engaged media arts. NT provides concrete examples through which to gain insight into the changing relationships between art, technology and society. NT's development is studied in relation to the social and technological context. To conceptualise the relationship between science, technology, society and historical change I am introducing the notion of techno-economic paradigms.

Techno-economic Paradigms

For the periodisation of postwar history I am relying on the concept of *techno-economic paradigms* which has been developed by the innovation school in economics. Their key works such as *The Economics of Industrial Innovation* (Freeman & Soete 1997) and *Technological Revolutions and Financial Capital* (Perez 2002) deal with clusters of innovations which are considered to 'create a new "leading sector" in the economy which drives economic growth' (Goldstein 1988, p.24). Those 'leading technologies' often come in a combination of a heavy technology in energy or raw material production and a new communication technology. Examples are the combination of steam, the railway and telegraphy; electricity, steel and the radio; the mass production of cars, oil and television; and now PCs and the internet (Freeman & Soete 1997, pp.65–70 Table 3.5).

Leading technologies differ from other technologies by having the ability to reshape and remodel not only a specific branch of industry but all industries. The power that accrues to the paradigm is the result of the combination of a technological advantage with new ways of organisation and new ways of thinking. Carlota Perez describes it as a 'mental map of best-practice options' (Perez 2002, p.16). Techno-economic paradigms usually form within the hegemonic centre of the political world system and are then picked up and imitated by subordinate states and rivals. According to this scheme there have been five paradigms so far since the beginning of the Industrial Revolution (Freeman & Soete, op.cit. Table 3.5).

The introduction of a new paradigm depends not only on clusters of technological innovation but also on a new infrastructure, and organisational, political and cultural changes (Freeman & Soete 1997, p.36). This means that despite the speeding up of technological innovation in recent decades, the average life-span of paradigms remains about 50 years because generational change is necessary for their implementation.

Techno-economic paradigms appear to obey a regularity of growth and stagnation of economic development which have been called 'Kondratieff waves' after the Russian economist Nikolai Kondratieff who first discovered such patterns in the 1920s (Kondratieff & Stolper 1935). 'Kondratieff waves' or 'long cycles' are alternating economic phases of upswings and downswings which on average last 25 years each. Such long waves, which repeat every 50 years (sometimes 40, sometimes 60), have been discovered in a range of economic indicators over the past 500 years (Goldstein 1988, p.7).

Josef Schumpeter (2009) argued that the Kondratieff-cycles are superimposed accumulations of the 10-year business cycle based on fixed capital investments studied by Marx. The launch of new industries or product lines usually triggers a rush of imitators who copy the new production method. As the capacity to produce the new goods quickly builds up the initial economic advantage wanes. At some point output can no longer be absorbed by consumers, 'the markets are glutted, products accumulate, [...] hard cash disappears, credit vanishes, factories are closed, the mass of the workers are in want of the means of subsistence ...,' as Friedrich Engels wrote in the late 1880s (Engels 1972, pp.630–1). After a period of stagnation, a new cycle starts. Schumpeter recognised that this was not automatic, that it needed a specific type of person – the inventor-entrepreneur – to kickstart a new economic cycle. The whole process Schumpeter called 'creative destruction' (2009, pp.38–47).

The last two techno-economic paradigms converge with another framework for the periodisation of economic and political history which some scholars have divided into Fordism (Aglietta 1979; Lipietz 1987) and the *Information Society* (Castells 2010). While building on Manuel Castells' notion of the Information Society, this work uses a slightly different term, *informational capitalism*, for the current paradigm in order to emphasise the strong influence of neoliberalism and the financial markets.

The life-span of NT began at the apex of Fordism in 1961, and it exhausted itself after 1973 during a period of crisis. In between were the events of 1968³ which highlighted the internal contradictions of Fordism and symbolised the beginning of

3 When I refer to the global revolts of 1968, I will from here on use the short form '68.

its decline. '68 was a watershed moment after which things started to move in a different direction, and a deeper transformation began. My research investigates in which way NT related to this rupture. Since most of NT occurred during Fordism, it is necessary to take a closer look at it.

Fordism

The Italian Communist Antonio Gramsci's use of the term Fordism (Gramsci 1971, pp.277–318) was picked up by the French economist Michel Aglietta in the 1970s (1979). Aglietta, together with Alain Lipietz, was one of the founders of the Regulation School in economics. Through their influence the usage of the term Fordism became widely established.

Henry Ford's assembly line combined older forms of labour organisation such as the American system of manufacture and Taylorism, and embodied those in machinery. Taylorism, after Frederick Taylor, was a method of organising work by splitting it up into separate tasks and trying to optimise their performance through elaborate time and movement studies. Taylor himself called it 'scientific management' (F. W. Taylor 1967), but the scientific character has been disputed (Doray 1988; Braverman 1974).

The implementation of Taylorist principles into machines at Ford's factory at Highland Park in 1913 was met with strong worker resistance and a high turnover of labour. Famously, Ford reacted by more than doubling the daily wage to five dollars (Batchelor 1994, p.47). Higher wages did not only have the effect of making workers more compliant with near-intolerable working conditions, it also enabled them to buy the cars they were producing. Fordism denotes an economic system where the producers earn enough to buy the goods they produce. It is therefore necessary to distinguish between a proto-Fordism in the 1920s, when the production system was in place in the USA and some other industrial countries, but not the social systems which guaranteed that enough people could buy the products of mass production. Fordism proper in most countries only began during and after the Second World War.

The English economist John Maynard Keynes, building on earlier work by the Polish economist Michal Kalecki, recognised that there needed to be 'effective demand' in

order to achieve a stable economy in an age of mass production (Keynes 2008). For Fordism to function, not just a small minority but the mass of workers needed to have enough money to buy the products of industrial capitalism. The Roosevelt administration introduced Keynesian policies during the era of the New Deal in the 1930s. Also in that era, policies and legislation more friendly to trade unions were implemented. In particular, industry-wide collective bargaining became the norm. By 1938 the US had a Keynesian-Fordist system in place. Other nations followed after 1945 and the new paradigm reached a phase of stability and prolonged growth during the first 25 years after the Second World War.

Keynesian-Fordism was based on a class compromise. Employers respected the right of workers to organise in unions and the principle of collective bargaining, mediated by the state. Workers abandoned revolutionary struggle and settled for a system that gave them regular year-on-year wage increases, holidays, sick pay and improvements of status such as seniority rights. However, by following the model of American Fordism a system was adopted which institutionalised the particularly antagonistic labour relations of the USA (Piore & Sabel 1984, pp.63–65). At the heart of the Fordist class-compromise was the acceptance of the heightened alienation of labour in the automated factory.

Caveat

It is important to note that the theories which I have just introduced are not fully compatible with each other. For instance, Freeman and Soete date the beginning of a paradigm at the moment when it becomes relevant for broad social groups, while Perez highlights the game-changing innovation or Big Bang as she calls it. The innovation school in economics is primarily invested in making technology an endogenous component of economics while Regulation School economists accord technology no such preferential role. Such inconsistencies between theories are not germane to my research, I simply use those aspects of each of them which appear productive in providing richly contextualised cultural critique.

Science Studies

Another important body of theoretical work which informs my research is provided by different strands in science studies, such as: *The Social Shaping of Technology* (MacKenzie & Wajcman 1999); *The Social Construction of Scientific and Technological Systems* (Bijker et al. 1987); Actor-Network-Theory (Callon 1987; Latour 1999; 1993); and feminist science studies (Haraway 1991b).

The methodological approaches regarding case studies developed by scholars of science studies (cf. Pickering 1992) provided examples of how to engage with relationships between artefacts and people, between cultural practices and the trajectories of techno-economic systems. My work on NT traces how artists were struggling with what Andrew Pickering (1995) calls 'the mangle of practice'; how they were not just passively responding to a new paradigm, but with their works provided models through which people could engage with it; how they actively provided the visual and aesthetic component of the new era. Artworks, and the approach that artists bring to their creation, make visible the simultaneous occurrence of new processual, temporal, spatial and socio-psychological patterns.

Art's Relation With Paradigms

In order for a paradigm to become established it needs to have a certain *persuasive power*. People need to believe or be made to believe that this or that specific technology, connected with organisational ways and worldviews, represents the future.

This is an important entry-point for art which can, consciously or not, help to prepare people for the introduction of a new paradigm. The media theorist Marshall McLuhan understood art as a kind of early warning system that is able to tell of future changes (McLuhan 1964, p.65). Charlie Gere (2006) has expanded this notion into a thesis that relates the emergence of real-time technologies to new forms of art, such as the work of John Cage. The artist, writer and curator Jack Burnham believed

that art, by anticipating the future on an intuitive level, provided a way of adapting to change (Burnham 1968). Burnham was influenced by Sigfried Giedion who, in *Mechanization Takes Command* (1948), elaborated the central thesis that technological progress had destroyed the natural balance between humans and their environment, and that it was art's role to restore it. But art can also provide a way of resistance to change forced from outside, a view to which Burnham came towards the end of his active participation in the discourse on art and technology (Burnham 1980).

There is a multiplicity of ways in which art can relate to the dominant techno-economic paradigm of a specific era. My research tries to identify observable relationships between cultural expressions and their changes, and techno-economic paradigm change. In the field of media art this relationship can sometimes be more obvious because its means of production and objects of inquiry are provided by science and technology.

The relationship between art and paradigm can also be addressed through the way in which the role of the artist is conceived. Artists involved in NT were close relatives of Schumpeter's 'inventor-entrepreneurs.' They belonged, as Barbrook formulates it, to *The Class of the New* (2006). Their specific innovation was to focus on the artist as an experimental visual researcher.

Art and Informational Capitalism

In Freeman and Soete's periodisation Fordism was the 4th, and informational capitalism the 5th techno-economic paradigm (Freeman & Soete 1997, p.19 Table 1.3). One problem with this periodisation is that it assumes a regularity, a smoothness of the succession of cycles, whereby each represents an evolutionary higher stage. Yet as Thomas Kuhn's usage of the term, to which they refer, suggests, a paradigm is also a rupture, a discontinuity (Kuhn 1996). Schumpeter's term 'creative destruction' also emphasises such discontinuity. And as I have already highlighted '68 was such an important turning point.

Carlota Perez has developed a model of the double paradigm. According to Perez, the new paradigm develops inside the old one. As the fourth Kondratieff of oil and mass production lost its power to innovate and reached its maturity phase, the new paradigm of informational capitalism was already developing (Perez 2002, pp.30–31). For Perez the 'Big Bang' of the new informational paradigm was the production of the first micro-processor in 1971 (Ibid., p. 14 Table 2.2). This made computing a cheap and game-changing technology. Yet it took further 20 years to allow informational capitalism to become a fully developed paradigm.

NT created an *information aesthetics* (my emphasis) without computers in the early 1960s, when Fordism was still going strong. The last NT exhibition in 1973 already fell into that period of emerging informational capitalism. I am investigating in which ways NT contributed to the concrete building of the informational paradigm, and to the production of some of its main myths.

Double Paradigm: Fordism and informational capitalism

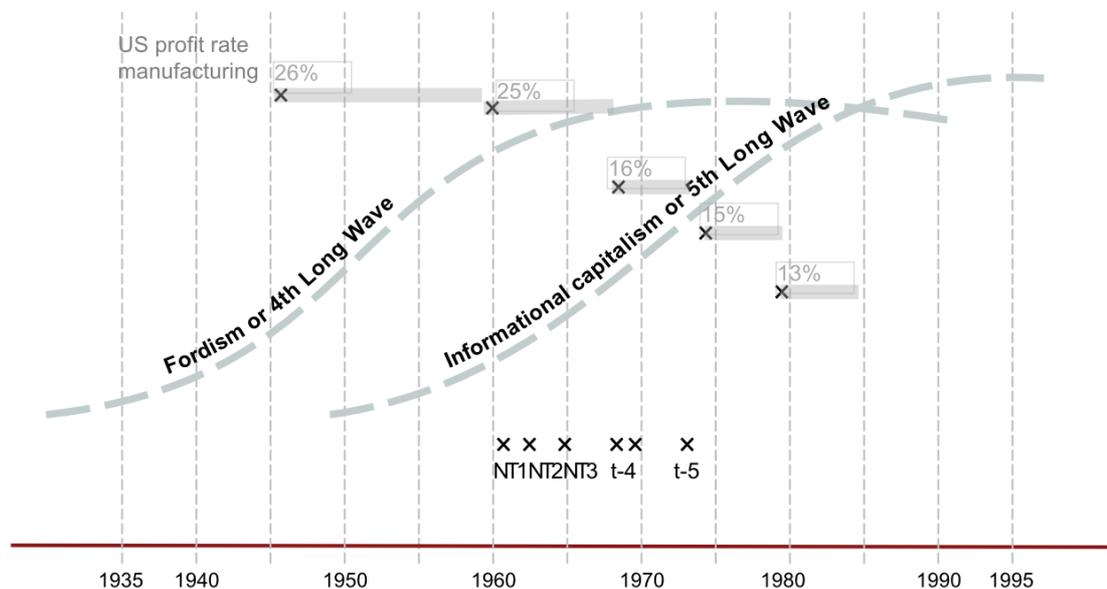


Illustration 2: Double Paradigm after Perez (2002); time series US manufacturing after Brenner (2002)

The promise of informational capitalism was a historical myth according to which it would be able to overcome the contradictions of industrial society (Woodward 1980). 'A myth is a construct we invent to explain the unknown world to ourselves,' explains Kathleen Woodward, 'myth is a reading of history in which is implicit the shape of things to come' (Woodward 1980, p.xiv).

Informational capitalism's core myths were developed by ideologists such as Daniel Bell. He argued as early as the late 1950s that the *The End of Ideology* (1988) had arrived. Capitalism and technological progress inaugurated a new society whose affluence made the traditional antagonistic politics of class struggle unnecessary. Bell was chairing the Commission of the Year 2000 which was giving recommendations about America's future to the president. In 1973 Bell announced *The Coming of Post-Industrial Society* (Bell 1973). The post-industrial society would also be a post-ideological one. In this new world media would replace class-struggle as the subject of history. This idea, central to the theses of Marshall McLuhan in *Understanding Media* (1964), was picked up by Bell and used to build a sanitised version of a utopian future based on new communication technologies. This blueprint for a future, into which the USA would lead the world, became the model for various *Imaginary Futures* (Barbrook 2007) which always relied on the same ideological twist: media replaced class struggle as the agents of history.

This basic turn to media as agents-of-change furthered the de-politicisation of media art in the context of the rise of informational capitalism. The de-politicisation of media art could only happen because progressive precursors of media art such as NT were sidelined. By the time of media art's institutionalisation in the 1990s NT was nearly completely forgotten and with it the lessons that could have been learned from the past.

The De-politicisation of Art

The de-politicisation of media art has only been one case of a general tendency of the de-politicisation of art since 1945. As Raymond Williams has argued in *The Politics of Modernism* (1989), what is called Modernism in art is the result of a selective

history. Artists and writers at the height of modernity could not but be affected by strong working class movements whose trajectory was on an upward curve during late 19th century. The historic avant-gardes, as Peter Bürger (1984) calls the radical art movements of the early 20th century, had the working class movements, whether they were socialist, communist or communist-anarchist, literally breathing down their necks. Bürger's influential theory of the avant-garde starts with the late 19th, early 20th century. Donald D. Egbert in his study into *Social Radicalism and the Arts* (1970) shows that the origins of radicalism in art and politics go back much further.

Throughout the 19th century there existed small, revolutionary secret societies who combined ideas about new art with ideas about science and a new kind of society. The belief in art and science as forces for progressive social change were often conflated with religious sectarianism and millenarian beliefs. Those characteristics put those groups into proximity with what Hobsbawm has called *Primitive Rebels* (1971). Many of those characteristics were shared by the Saint-Simonists, founded by Henry de Saint-Simon (1760 - 1825) who believed that artists and scientists would 'ensure the transition from the feudal theological age to the industrial, scientific age' (A. Mattelart 2003, p.28). The Saint-Simonists were also responsible for the first use of the term avant-garde in the modern, non-militaristic sense (Egbert op.cit., p. 121-2). NT can be seen as the great-grandchild of the Saint-Simonists.

Informational capitalism has not only been a myth it has also become a *reality*. It has been foreseen, prophesied, anticipated; it has been feared by some and been proclaimed as a salvation story by others. But it also has been built, step by step, component by component and protocol by protocol, and this relationship between myth and reality is what I am particularly interested in. Media art became institutionalised in the 1990s, exactly at the same time when the paradigm of informational capitalism came of age. Informational capitalism is the combination of information technologies with a neoliberal ideology and cultural postmodernism. As a result of this long transition from Fordism to informational capitalism, media such as the computer and the net became seen as the main agents of history. This anti-progressive turn could only work because of commodity fetishism and the way it became applied to the tools of informational capitalism and information as such. In order to explain this I need to come to the core of my methodology.

Marx as Method

My approach can be summarised in the phrase 'Marx as method.' Rather than considering anything that Marx wrote 150 years ago as a definitive truth, it is a basic outlook on the conception of history and the activity of forming theoretical ideas which I try to make mine (cf. Linden & Roth 2009). This basic outlook is contained in a specific understanding of historical and dialectical materialism, based on Marx and Engels, strongly shaped through Henri Lefebvre's reading in *Dialectical Materialism* (2009).

This book, written just before the Second World War, defended Marx against the deformations caused by Stalinism. The basis for Lefebvre's argument was provided by the rediscovery of unpublished or long lost texts such as *The German Ideology* (Marx & Engels 1972) and *The Economic and Philosophic Manuscripts of 1844* (Marx 1972b). Those writings, often put together with other early writings in the category 'young Marx', formed the foundation for the resurgence of an anti-orthodox Marxism of the so-called New Left after the Second World War. This type of 'revisionist' Marxism, as followers of the official Soviet party line denounced it, had particular strong repercussions in Yugoslavia through the *Praxis* group.

Praxis was simultaneously the name of an international journal and that of a group of philosophers and sociologists from Zagreb and Belgrade who founded said journal and organised the Korčula Summer School, an annual conference of intellectuals of the New Left from all over the world. The philosophical and political ideas of the New Left in general, and the particular kind of *Socialist Humanism* (Fromm 1965a) of the Praxis group, were similar to those of many participants of NT. To have a good understanding of Marx' and Engels' ideas and of leading strands of Marxism is thus not only important as a methodological choice but also because the people involved in NT were, broadly speaking, socialist humanists⁴.

In the jointly written *The German Ideology* Marx and Engels (1972)⁵ criticised the

4 I spell socialism and communism in lower case if I refer to the broad sweep of leftist ideas, and in upper case if I refer to an official state or party ideology.

5 Written between 1845 and 1846, the work was not first published in full before the 1930s.

notion that ideas, theories, and philosophies exist separated from people, quasi independently, in a 'realm of pure thought' (Ibid., p. 111). In a polemic against their former friends, the Young Hegelians such as Bruno Baur, Max Stirner and others, Marx and Engels argued that they were quite mistaken in believing that 'thoughts, ideas, in fact all the products of consciousness to which they attributed an independent existence [were] the real chains of man' (Ibid., p. 113). Marx and Engels alleged that the Young Hegelians believed it was enough to change consciousness to change the world, or to interpret the world in a different way. This, Marx and Engels criticised, amounted to believing that it was enough to fight phrases with other phrases (Ibid.). 'Not once did those philosophers inquire into the connection of German philosophy with German reality' (Ibid. p. 113).

We have arrived at a quite similar point today. Many theorists stress the power of discourse (cf. Laclau & Mouffe 1985). Whilst the importance of ideas, discourses, narratives, should not be denied, my research engages with concepts and texts as statements of 'real active men [and women], as they are conditioned by a definite development of their productive forces and the intercourse corresponding to these' as Marx and Engels put it (1972, p. 118). The task is to understand the concrete historical situation which motivated NT and within which they were acting. Marx and Engels wrote that 'in all ideology man and their circumstances appear upside down as in a camera obscura.' What they wanted was to put philosophy back on its feet, to proceed 'from earth to heaven' (Ibid.). I want to do the same for media art's history.

Dialectical materialism, Lefebvre explained, 'determines the practical relations inherent in every organised human existence and studies them inasmuch as they are concrete conditions of existence for cultures or ways of life. [...] Dialectical materialism analyses relations and then reintegrates them into the total movement' (Lefebvre 2009, pp. 72-73). Lefebvre understood history as 'this total movement.' The attempt to understand history does not necessarily lead to 'totalising thought' as is so often claimed today. Lefebvre imagined the possibility of different strands of thought being integrated into an 'open totality' which was 'perpetually in the process of being transcended' (Ibid., p. 99).

This concept of the 'open totality' strongly inspired my own methodology. The thrust of Marx' and Engels' argument against their peers was not against ideas, but rather for restoring a balance. 'Dialectical materialism rescues the human mind from falling back into confusion and one-sidedness,' wrote Lefebvre (Ibid., p. 96). The conditions of capitalist societies are such, that 'around and above' us 'the abstractions acquire a strange existence and a mysterious efficacy; Fetishes reign over [us]' (Ibid., p. 85).

Commodity Fetishism and the Computer

What Lefebvre refers to here is *commodity fetishism applied to the world of ideas* (my emphasis). For Marx, the structural form of capitalist societies was based on the production and exchange of commodities. A commodity, Marx explained in Capital, Vol I, 'appears at first sight an extremely obvious, trivial thing. But its analysis brings out that it is a very strange thing, abounding in metaphysical subtleties and theological niceties' (Marx 1976, p.163). According to Marx, the 'mysterious character of the commodity form consists [...] in the fact that the commodity reflects the social characteristics of man's own labour as objective characteristics of the products of labour themselves.' Through an act of substitution, 'social relations of producers' become seen as 'a social relation between objects, a relation that exists apart from and outside the producers.' This gives the commodity its 'suprasensible or social' character (Ibid., pp 164-165).

The private labour of the producer becomes visible as 'an element of the total labour of society only through the relations which the act of exchange established between the products, and their mediations, the producers' (Ibid., p. 165). In other words, social relations become mediated between things. But in the process, their social character becomes obfuscated and things become persons, persons become things; that is the process called 'reification' (becoming thing) (Ibid. p. 209). The individual, confronted with the products of social labour - machinery, workshops, tools, and even 'the use of the forces of nature and of sciences' – experiences those things as something 'alien, objective, readymade,' existing outside him and threatening to 'dominate' him (Ibid. p. 1054).

Commodity fetishism inscribed itself into the practical⁶ invention of the computer by Alan Turing (Hodges 1983, pp.46–110). Turing's wartime decryption work at Bletchley Park opened his eyes to the efficiency of a giant machinery involving both machines and hierarchically organised human labour, high-flying mathematical geniuses such as himself and 'human computers' (Ibid., p. 203). Such a concerted effort could be realised only through a level of planning and social mobilisation that was justified by the war and would have been unthinkable in laissez-faire Britain. The effectiveness of harnessing human and (intelligent) machine labour planned by a central administration through a Taylorist and Fordist organisation of labour, appears to have inspired Turing's invention. 'Political fetishism [of the British war-time government machine] had inspired technological fetishism,' argues Barbrook (2007, p.50).

Shortly after the war, Turing started to create plans for a real 'computer' and formulated controversial theses on machine intelligence⁷, including the so-called Turing Test. This was an experiment where a person should try to find out, through written communication only, if the person she communicated with was either a man, a woman or a computer (Hodges op.cit., p. 415). As we shall see, in the late 1960s the Turing Test found an application in the arts.

Commodity fetishism was also involved in the invention of the concept of *information* as a disembodied pattern. The concept of information as it is used today did not exist before the 1930s-40s. The mathematician Norbert Wiener defined information statistically as that which was 'transmitted as a single decision between equally probable alternatives' (Wiener 1961, p.10). Claude Shannon put information at the centre of his *Mathematical Theory of Communication* (Shannon & Weaver 1949), better known as *Information Theory*. Shannon conceptualised communication, in a now very well-known model, as the transmission of messages between a sender and receiver through a communication channel. It was a mechanical model following a machine, not human logic of communication and understanding. Shannon clearly stated that his understanding of information had no relationship to semantics.

6 Turing invented the computer twice, once as a concept, once as a real thing. The relationship with commodity fetishism applies only to this second time. Cf. Hodges op.cit.

7 Turing liked to make analogies between computers and brains. The idea of an 'electronic brain' was popularised by an interview of Louis Mountbatten in 1946 who had it from Turing, Hodges pp. 347-349

Nevertheless, his information theory became the main model of communications in the 20th century. It was integrated into cybernetics, the name which Wiener gave to a new orientation in various sciences towards an organic meta-science.

Both Wiener and Shannon defined information statistically and linked it to the concept of entropy. Wiener explained that the amount of information in a system was a measure of its degree of organisation, while the entropy of a system was a measure of its degree of disorganisation' (Wiener, op.cit.). In physics, entropy is the tendency of systems to reach a lower stage of equilibrium. While the First Law of Thermodynamics states that energy can never be lost, the second law states that it dissipates into a lesser form of organisation. There is nothing that necessarily links entropy and information. Wiener and Shannon took a key concept known by every natural scientist to give the new concept of information more plausibility.

Wiener kept emphasising the understanding of information as 'negentropy' (negative entropy), the tendency of intelligent life to reverse entropic processes temporarily. 'Information' and 'life' became understood to be intrinsically related with an explanation that drew heavily on Erwin Schrödinger's series of Dublin lectures of 1943 published as *What is Life?* (Schrödinger 1992). As Wiener explained, in the natural physicist's universe 'order is least probable, chaos most probable. But while the universe as a whole [...] tends to run down, there are local enclaves [...] in which there is a limited and temporal tendency for organisation to increase. Life finds its home in some of those enclaves' (Wiener 1988, p.12).

Katherine Hayles (1999) has pointed out that the concept of life based on 'information' has become disembodied. For Wiener, humans were 'patterns maintained by this homeostasis, which is the touchstone of our personal identity' (Wiener 1988, p. 96). In his second book, directed at a general audience, he allowed himself to become poetical. 'We are but whirlpools in a river of ever flowing water' (Ibid.) As information is understood as pattern, it is not only free from any material carrier but can also be transmitted. Wiener wrote, 'a pattern is a message and may be transmitted as a message' from which it follows that 'it would be amusing as well as instructive to consider what would happen if we were to transmit the whole pattern of the human body' (Ibid., p.96).

Hayles' critique is that a hierarchy becomes established where information gets mystified as a near magical substance. She does not, however, carry this to its conclusion, that is, to understand 'disembodied information' as a fetishised concept. Information, even if produced and transmitted by machines, is always the product of human labour. By allowing this connection to become obscured, information becomes one of those things which we perceive as 'alien, objective, readymade,' existing outside us and threatening to 'dominate' us (Marx 1976, p.1054).

Art as Intellectual and Manual Labour

'Man forms things in accordance with the laws of beauty.' (Marx 1972b, p.62)

Applying the methodology of 'Marx as a method' means to ask which social mechanisms lie behind certain forms of thought. Marx understood that the capitalist division of labour was first the result of a specific class structure but then also produced class structures. This means that technology is not simply a tool but vital for the reproduction of class structures; and secondly that specific forms of thought are conditioned by the societies which produce them. For instance, certain forms of 'pure' theory or philosophy are only possible when society allows a class of leisurley philosophers to emerge (Marx & Engels 1972, p.123). Building on Marx, Alfred Sohn-Rethel has worked on the relations between economic structures and forms of thought. A member of the first generation of the Frankfurt School, he condensed this life-long work into a relatively short book, *Geistige und Körperliche Arbeit (Intellectual and Manual Labour)* (1972).

Sohn-Rethel tries to look at the deeper laws of the formation of ideas in relation to the commodity-form. The separation of manual and intellectual labour is constitutive for capitalism, but it is also generative of the dichotomies of Western thought, claims Sohn-Rethel (1972, p. 121). 'The autonomous intellect in its separation from manual labour, is born blind in relation to its own conditions' (Ibid.). Thus for instance, Kant's transcendentalism and his problem with the thing-in-itself are, for Sohn-

Rethel, the product of a society based on the separation of manual and intellectual labour (Ibid., pp. 89-91). He argued that the exchange-form was based on abstractions which people living in societies based on exchange had already internalised, as a condition sine-qua-non for the emergence of certain forms of thought such as mathematics (p. 102) or natural science (p. 108).

This line of investigation, initiated by Marx, taken further by Sohn-Rethel, yet in different forms also pursued by Lukács (1971), and Lefebvre (Lefebvre 2009), enabled an epistemological critique of what those thinkers called 'bourgeois science.' According to them, the established academic system in both the natural and social sciences furthered the reification tendencies of thought and by definition produced fragmentary knowledge which could easily become instrumentalised.

My research looks at the art of NT with regard to changes in working practices brought about by automation and cybernation. The research maps out those changes from the early phase of NT, when artists were working without computers, to the emergence of computer art and conceptual art in the late 1960s and early 1970s. At each step the relationship between manual and intellectual labour underwent qualitative change. It is art's privileged position that in principle it has the chance to overcome the separation of manual and intellectual labour, as an activity that is self-directed and involves both the hand and the head. The way in which art handles this balance, in a society which is tilted overall towards the domination of manual by intellectual labour, became a way of assessing an artform's relation with the dominant political economy.

The 1940s Cyber-Matrix

There seems to be an enormously powerful constellation of ideas which had their origins in the 1930s, 1920s, or even further back, but which came together in the early 1940s, during the Second World War, and immediately afterwards. In serendipitous meetings on railway platforms and elite clubs, the ideas were first discussed which then shaped the second half of the 20th century. What was common

to those (mostly male) thinkers was a predisposition for a high level of abstraction and pure logic, self contained, and inhuman in its serenity and ubiquity.

The German mathematician David Hilbert wanted to lay the foundations of mathematics as a perfectly logical, self-contained science. Three postulates had to be true if mathematics was to be self-contained: it had to be complete, consistent, and decidable (cf. Mancosu 2010). '[Kurt] Gödel showed that arithmetic was neither consistent nor complete [but the] third question remained open (Hodges 1983, p.92). Turing's discovery of the existence of uncomputable numbers (Turing 1937) showed that the answer to Hilbert's third question was also 'no'. 'There could exist no 'definite method' for solving all mathematical questions. For an uncomputable number would be an example of an unsolvable problem' (Hodges op.cit., p. 102).

Turing had formulated his proof through the positing of a universal symbol processing machine, a 'computer'. Turing's finding produced a paradox for the world as his argument showed 'how the rational could give rise to the irrational [...] In exactly the same way, the computable could give rise to the uncomputable, by means of a diagonal argument' (Hodges, p. 102). Acknowledging this, opens up a fundamental paradox at the heart of the history of the computer. Gödel and Turing had shown together that mathematics was not a self-contained, i.e. perfectly rational system. While this should have signalled the *end* of the dream of rational mastery of the universe (Castoriadis 1997a, pp.236–7), it triggered a race to render ever more domains of science and of the social life of humans as *computable*.

Thus, philosophically, Turing's discovery pointed away from mastery. But practically, it responded to all the problems of coordinating multi-theatre warfare during the Second World War. And afterwards it proposed itself as the solution to all the problems of the Cold War: developing nuclear weapon systems for attack and defence (Edwards 1996) and winning the 'war' on the homefront against labour by automating production (D. F. Noble 1986).

According to James Beniger (1989) the invention of the computer had become a historical necessity for coping with the increase in material flows unleashed by assembly-line mass production. The investment necessary for automation also made

it necessary for companies to guarantee that their products found buyers. The rise of electronic communications stood in a direct relationship with Norbert Wiener's concept of *Cybernetics* (1961), which got defined as an inquiry into self-regulating systems which use information about their environment to correct their behaviour through feedback loops. Such a definition could be applied to animals, humans and machines. As Wiener wrote, 'the physical functioning of the living individual and the operation of some of the newer communication machines are precisely parallel in their analogous attempts to control entropy through feedback' (Ibid., p. 26).

Cybernetics offered itself as a kind of universal science of control. Wiener's idea of society was essentially a communication theory where feedback loops of disembodied information guaranteed the stability of the system (Ibid., p. 16). At the centre of this system was the computer conceived as a kind of electronic brain. 'It has long been clear to me that the modern ultra-rapid computing machine was in principle an ideal central nervous system to an apparatus for automatic control; and that its input and output need not be in the form of numbers or diagrams but might very well be, respectively, the readings of artificial sense organs, such as photoelectric cells or thermometers, and the performance of motors or solenoids. [...] and to report, to "feed back" to the central control system as an artificial kinesthaetic sense' (Ibid., pp.26-7).

The fetishistic concept of information became the glue of a fetishistic concept of society in which human agency was subsumed under a system of top-down cybernetic control. Humans were conceived of as what was called at the time a 'servo-mechanism', an element in the system capable of adding information. But Wiener was torn by inner contradictions. On the one hand he had invented and made popular this new science of cybernetics; on the other, he was a socialist humanist and clearly recognised the dangers his inventions would bring, when he for instance wrote that 'the automatic machine is the precise economic equivalent of slave labour. Any labour which competes with slave labour must accept the economic conditions of slave labour' (Ibid., p. 162).

Wiener 'felt it [his] duty to pass on this information to C.I.O' (Wiener 1961., p. 28). The C.I.O was America's biggest trade federation. Wiener also recognised that

cybernetics would lead to the replacement not only of manual but also of intellectual labour writing, 'the machine plays no favorites between manual labour and white-collar labour' (Ibid., p. 159).

Summary

Constructivism, de Stijl, and Bauhaus, the acknowledged predecessors of NT, in the 1920s had found a variety of different strategies to deal with science and technology. They did so under conditions of proto-Fordism and during a hegemonic crisis of the world system. Rather than constructing linear histories which would see a progression from those historic avant-gardes to NT, techno-economic paradigms provide a framework for non-linear progression. NT are posing similar questions under the new conditions of automation and cybernation.

The extended time period of this research allows seeing the history of NT unfold against the background of changing socio-economic conditions. NT began at the peak of the Fordist growth period, and then experienced its crisis moment in 1968, and the start of the paradigm shift to informational capitalism. The artists and theorists involved in NT did not just react in a spontaneous or subconscious way to the world they lived in but engaged 'constructively' with technology and science. Every step of the development of this movement such as each major exhibition and adjoining events entails a specific configuration of foreground – the steps of development of NT – and historical background. The exhibitions and symposia are condensations of different trajectories, meeting points of people, ideas, and things. This thesis will not necessarily provide a simple answer to the question what constitutes a progressive practice. It will, however, through its specific methodological approach combined with original research and archival work, throw a new light on NT, and thereby produce new knowledge and a distinctive contribution to the field of media arts.

CHAPTER 1: Beginnings of a Movement (NT1, 1961)

NT was the product of a meeting between the Brazilian painter Almir Mavignier and the Croatian art critic Matko Meštrović in Zagreb in the early autumn of 1960. Mavignier was passing through Zagreb on his way from the Biennale of Venice to Egypt. The Brazilian lived at the time in Ulm, Germany, where he had studied at HfG Ulm, the famous college of design. Mavignier had been part of a neo-Constructivist movement in Brazil in the late 1940s. In Brazil he had met the Swiss artist Max Bill whose exhibitions in Latin America at the time inspired many young artists to become interested in Concrete Art⁸ (Rickey 1967, p.62). There, Mavignier had also met François Morellet, with whom he struck a friendship (Mavignier 1970 n.p. Rosen et al. 2010, p.344).

After arriving in Paris in 1951, Mavignier went to see Max Bill in Zürich, who had just become director of the newly established college of design at Ulm in Southern Germany. Mavignier enrolled there as one of the first students in 1953 (Hoffmann & Schmidt 2002). Meštrović had taken a degree in art history and culture at the University of Zagreb in 1958 and was working as an art critic for Radio Zagreb since 1956. His job at the radio gave Meštrović the freedom to travel. He had access to the leading international art journals and would regularly go to major art events such as the Biennale of Venice and the Triennale of Milan. Meštrović thinks he was the first Yugoslav art critic who visited *Documenta II* in 1959 in Kassel (Meštrović 2009).

Both Mavignier and Meštrović had, independently of each other, visited the Venice Biennale of 1960 which provided the starting point for their conversation. They moved from GSU, where they had first met, to a restaurant at the top of Zagreb Tower, the most modern tall building in the centre of town. There they talked well into the night (Fritz 2009a). Mavignier and Meštrović had both been very dissatisfied with what they had seen in Venice. They agreed that the only interesting work at the Biennale had been by Piero Dorazio (Meštrović 2009; Mavignier 2010a). In the rapport created between the artist and critic two ideas emerged. Meštrović was to

⁸ The term Concrete Art was coined by de Stijl founder Theo van Doesburg in 1930 (Weinberg-Staber 2001, p.25).

curate an exhibition of Yugoslav artists at Gallery F in Ulm in spring 1961, while Mavignier was going to curate an exhibition of works by young artists 'like Dorazio' from different countries for GSU, Zagreb. Shortly after his discussion with Mavignier, Meštrović went to see Božo Bek, director of GSU, to tell him about the Brazilian's proposal (Meštrović 2009; Denegri 2010, p.20).

GSU was an interesting place. It was located in a baroque town house on Katherine's Square in the historic centre of Zagreb next to a Jesuit church, monastery and school. GSU had been founded in 1954 under the name of Gradska galerija suvremene umjetnosti⁹ (City gallery of contemporary art) with the goal of exhibiting and collecting the work of younger artists. In the course of the 1950s it became a hotspot for artists, critics and audiences interested in new artistic expressions. It was from here that struggles for artistic freedom emanated, where geometric abstraction and Informel painting had a home. GSU was also meeting point for members of Gorgona, a loose group of artists who, almost like a secret society, engaged in 'absurdist' practices that preceded conceptual art by 10 years. Gorgona broke through art historical categorisations and developed practices which were more about freedom of the mind than artistic production (Gattin 2002; N. Dimitrijević 2002). They held 'private' meetings where the emphasis was on 'existing' rather than 'acting'; the group cultivated a 'Gorgonesque behaviour' rather than making works, and published the 'anti-magazine' Gorgona (Denegri 2003, p.202). It is important to note that key participants in NT such as Meštrović and Radoslav Putar were also members of Gorgona.

When Meštrović contacted Bek the latter had only just been made director of GSU. Božo Bek, had been sent to study art history in Leningrad in 1946 when Yugoslavia was still on good terms with the Soviet Union. He had to leave quickly when relationships came to a breaking point in 1948 and returned to Zagreb to finish his study of art history in 1952. During the 1950s he had worked as a curator for the graphics cabinet of the Academy of Arts and Science and in 1960 he was made director of GSU. In the orbit of the gallery were also the critic Radoslav Putar and

9 At the beginning of 1960s it was renamed into Galerija suvremene umjetnosti and became part of a number of art institutions under the umbrella of Galerije grada Zagreba (Galleries of the City of Zagreb). In the 1990s it was renamed Museum of Contemporary Art (MSU) which got a new building in 2009.

the art historian Boris Kelemen, as well as a number of artists such as Ivan Picelj and the artist and architect Vjenceslav Richter. It was this context which allowed Mavignier later to write that he had been happy to meet 'such a well informed group of people' in Zagreb (Mavignier 2010a, p.344; Mavignier 1970). Bek accepted Mavignier's proposal to have such an exhibition and Mavignier kept his part of the promise and invited Meštrović to curate an exhibition of Yugoslav artists in Ulm (Meštrović 2009).



Illustration 3: Members and friends of the Gorgona group salute the arrival of the New Tendencies (August 1961), photo Branko Balić, Collection Marinko Sudac; (from left, back row) Boris Kelemen, Ivo Steiner, Đuro Seder; (from left, middle row) Josip Vaništa, Radoslav Putar, Slobodan Vuličević, Julije Knifer, (centre, front) Matko Meštrović.

Why Zagreb?

What were the conditions and circumstances which made it possible that Zagreb could host an exhibition from which an international art movement was to emerge? Key factors coming together were Zagreb's geographical position, its modernist tradition in art and architecture, and the fact that as the capital of Croatia it belonged to the Federal People's Republic of Yugoslavia (FPRY) which was pursuing its 'own path to Socialism' (Kolešnik 2009). Within the bipolar logic of the Cold War, Yugoslavia occupied a unique position which forced it to constantly improvise and reform itself so that one of the best books on Yugoslavia of that era is called *The Yugoslav Experiment 1948 -1974* (Rusinow 1977).

The FPRY was formed at the end of Second World War as a result of a successful liberation struggle against German occupation and the fascist puppet regimes which the Nazis had installed on its territory. The war of liberation had been led by the Partisans, a liberation army under the leadership of Marshal Josip Broz Tito and the Communist party (Rusinow 1977b, p.12). The Yugoslav regime admired the Bolshevik revolution of 1917 and initially, from 1945 to 1948, was 'more Stalinist than Stalin' (Ibid.). Yugoslavia's condition after the war was similar to Russia's after the 1917 revolution and ensuing civil war. Both countries had suffered immensely during the respective wars. In Yugoslavia 11 per cent of the total prewar population died, losses that were second only to Poland (Ibid., p.19). Like Russia in the early 1920s, Yugoslavia in 1946 was largely a peasant nation, with 80-90% of the population living in the country-side in pre-modern circumstances. What had existed of an industrial infrastructure, had been destroyed (Hobsbawm 1994c, p.379).

Stalin's economic policy after 1929 had caused huge suffering among the peasant population but was successful insofar as it managed to industrialise the country within a decade (Kotkin 1995) and enabled it to resist the assault of Hitler's high-tech army (Hobsbawm 1994c, pp.380–82). Stalin's style of industrialisation organised by a centralised party was admired by many Communists from poor, underdeveloped countries around the world. Yugoslavia initially copied the Soviet economic policy of rapid electrification and industrialisation. In 1947 the relationship between war allies

the Soviet Union and USA deteriorated. Nations such as Poland and Czechoslovakia which had been liberated by the Red Army had at first been allowed to experiment with limited forms of parliamentary democracy (Staar 1958; Mosely 1948). Now, Stalin decided to impose one-party 'dictatorships of the proletariat' more or less directly run from Moscow (Linden 2007, pp.100–103). According to Soviet ideology dictatorships of the proletariat or people's democracies were transitional stages to Socialism (Lane 1976, p.23). But Socialism itself was only the first stage of the development of Communism, a goal on which hinged the whole legitimacy of government and party in the Soviet Union (Ibid., p. 26).

After the successful October Revolution in 1917 the Soviets had hoped that soon other nations would follow their example. When it turned out this was not the case, Stalin's policy favoured 'Socialism in a single country' rather than adventurist foreign policies (Zinner 1952). After the Second World War large parts of Eastern Europe were suddenly under the direct influence of Moscow. To give a legitimising structure to the newly emerging Eastern bloc, Moscow founded the Communist Information Bureau (COMINFORM), an entity which contained besides the Soviet Union and Eastern European states, the Communist Parties of France and Italy (Hobsbawm 1994d; 1994b).

When Stalin made advances to gain direct influence on the governance of Yugoslavia, Tito and vice-president Edvard Kardelj wrote to Stalin that 'no matter how much each of us loves the land of Socialism, the USSR, he can in no case love his country less, when it is also developing Socialism' (Ulam 1949, p.417; Royal Institute of International Affairs 1948). An increasingly angry exchange of letters between Belgrade and the Kremlin in spring 1948 led to an irreparable final break in the summer of that year. Yugoslavia was excluded from COMINFORM, suddenly found itself 'friendless in a hostile world' (Rusinow 1977b, pp.28–31), and attacked by 'increasingly bitter polemic' from the Soviet bloc, as well as being put under economic blockade (Rusinow 1977b, p.33).

Yugoslavia needed a new orientation, ideologically, and also in terms of sources of investment and new knowledge. In 1949 and 1950 Tito and his core team embarked on an 'amazing voyage of exploration, of critical thought and of institutional

innovation' (Rusinow 1977b, p.47). The leadership, after going back to reading the Marxist-Leninist classics such as Engels' *Anti-Düring* (Engels 1947) and Lenin's *The State and Revolution* (V Lenin 1992), developed a new doctrine of decentralisation, de-bureaucratisation and, above all, workers' self-management (Rusinow 1977b, p.51). New legislation gave workers' councils extensive rights to 'supervise the work of the management board of companies and make decisions about the distribution of funds that were freely disposable by the firm' (Ward 1957, pp.374–375).

Self-management, however, did not stop with organisational issues at the level of the firm. Increasingly, 'direct social self-management and free association of producers in all public affairs' became the official rhetoric (Rusinow 1977b, pp.54–57). Self-management understood as 'free association of producers' was not only a decidedly anti-Stalinist ideology, it could even lay claim to ideological superiority since the producers themselves could decide about the allocation of surplus value. The theory of surplus value is the central plank of Marx's critique of the capitalist political economy. The capitalist class exploits the workers by appropriating the surplus value produced by them (Marx 1976, chap.6–12). The new ideology of self-management established a vital link with Marx' theory as the workers could decide themselves about the use of surplus value.

In the long run, self-management would even see 'the withering away of the party.' After the successful October revolution, the 'withering away of the state' had been a common slogan. Only in Yugoslavia the party was also supposed to wither away. The notions of self-management and self-governance were hotly debated in Yugoslavia, for instance, by the Praxis group. The question was, how far self-management really went, how much of the powers accorded to the new workers' councils were 'merely formal powers, largely devoid of meaningful content' (Rusinow 1977b, p.59).

The withering away of the party became soon exposed as a myth when one member of the leadership, Milovan Djilas, demanded a switch to multi-party democracy in 1953. He was removed from his post but not imprisoned or killed as certainly would have been the case in Russia, but could continue writing and publishing. In 1957 Djilas published *The New Class* (1957) in English. The book - an ideological reckoning with Socialism - provided Western Cold War warriors with welcome

ammunition since its central thesis was that the party apparatus and bureaucracy had formed a new class which replaced the capitalist class as exploiters of the proletariat. A similar critique had already been levelled against the Soviet leadership by the Mensheviks and Austrian and German Social Democrats in the 1920s and 1930s (Lane 1976, p.30; Linden 2007, pp.45–98).

After 1950 Yugoslavia started to receive economic aid from the USA and its Western allies Britain and France (Rusinow 1977b, pp.44–47). The combination of 'self-management' with state planning and elements of a market economy made Yugoslavia in the 1950s one of the fastest growing economies with an average annual growth rate of GNP of 9.8 per cent from 1952 to 1960 (Horvat 1971, p.94). After initially favouring investment in heavy industries, Yugoslavia started to produce consumer goods and initiated new institutions concerned with design, media, architecture and popular culture. A licence agreement with FIAT opened the path to car production in 1955; in the same year TV Zagreb started to broadcast and Studio industrijskog oblikovanja (Studio for industrial design - SIO) was formed. In 1956 the first federal exhibition of applied arts was held in Belgrade; the record company Jugoton started to produce long playing records; and in 1957 the first exhibition *Family and Household* was shown at the Zagreb Fair (Kršić & centar_kuda.org 2009). Yugoslavia was in a catch-up process of modernisation, implementing a social system which would eventually resemble Fordism yet was still far behind Western European countries.

Yugoslavia's breaking away from the Soviet zone of influence in 1948 made 'a reorientation of cultural policy' necessary, explains art critic and historian Ješa Denegri. He emphasises that change was not coming from the top but because of the 'decisive role by the art production which filled the vacuum of the scene with different substance and means of expression'(Denegri 2003, pp.172–3). During its Stalinist phase from 1945 to 1948 the Yugoslav regime had tried to impose the doctrine of Socialist Realism which had been introduced by Stalin in the Soviet union in 1932 (Lodder 1983, p.186) and had been extended to the nations under Soviet influence after WWII. During the 'stormy fifties' an intense debate took place which slowly made abstract art - initially denounced as 'bourgeois decadence' - acceptable in Yugoslavia (Kolešnik & Društvo povjesničara umjetnosti 1999, p.280).

A key moment in this debate was when on December 7th 1951 members of the group Exat 51 (Experimentalni ateljer - Experimental Studio) 'publicly and ritualistically' read their first manifesto at the yearly plenum of the Croatian Association of Artists of Applied Arts (Denegri 2003, p.178; WHW 2009, p.211). Exat 51¹⁰ was a group of artists, architects and designers who re-discovered the ideas of Russian Constructivism. They stated in their manifesto that they saw 'no difference between so-called pure and so-called applied art;' and that they understood their task to be to 'enrich the sphere of visual communication in our country [...] by understanding our reality as an aspiration for progress in all forms of human activity' (Exat 51 1951). While Exat 51 dissolved as a group in 1955 after only one exhibition in Yugoslavia, their works and manifesto triggered an important debate which gradually made abstract art acceptable.

Moreover, as Denegri pointed out, although Exat 51 initially found it difficult to find their work accepted, they were not dissidents in the way the Soviet union produced artist outcasts. Members of Exat 51 contributed to a modern image of Yugoslavia abroad as they designed state commissioned exhibitions and buildings for trade fairs. This is actually how they first met and started to collaborate in 1947-48 (Denegri 2004, p. 14). Exat 51's exhibition designs were influenced by El Lissitzky's solutions for the Soviet Pavilion at the International Press Exhibition in Cologne in 1928. Designing trade pavilions, moreover, gave them the opportunity to travel, get in contact with other artists and find access to information about Constructivist art. On a trip to Chicago in 1950 they met German architect Konrad Wachsmann and visited the Illinois Institute of Technology which had resulted from a merger of the Institute of Design, founded by László Moholy-Nagy, with other institutions in 1949. In New York at MoMA they studied the paintings of Kandinsky, Mondrian and Malevich (Ibid., p. 15).

Exat 51 were also behind setting up SIO inside the Association of Artists of Applied Arts (Meštrović 2009). Like the Constructivists, Exat 51 established a link between abstract art and the tasks of designing for mass production. Constructivists had gone

¹⁰ Members were the painter and designer Ivan Picelj, the painter and film maker Vlado Kristl, artist Aleksandar Srnec, and the architects Božidar Rašica, Vjenceslav Richter, Bernardo Bernardi, Zdravko Bregovac, Zvonimir Radić, and Vladimir Zarahovic

through a laboratory phase during which they found the basic laws of composition which could then be transposed into the functional aesthetic of industrial design to achieve 'a maximum of cultural values with the minimum expenditure of energy' (Lodder 1983, p.2).

There had existed in Zagreb specific predispositions towards a Constructivist approach stemming from before the Second World War. The re-emergence of Constructivism in Yugoslavia was not merely a result of influences from the West but had developed along an axis from Leningrad to Zagreb - via Brno, Berlin and Budapest - through the activities of the Zenit group in the 1920s argues Irina Subotić (1990). Croatia architects in the 1920s had embraced Modernism 'without reservation,' 'to a degree unseen in other European cities' (Krečić 2003, p.341). A key protagonist in this regard was Drago Ibler (1894 - 1964) who had studied in Dresden, Germany and joined Le Corbusier's Congrès Internationaux d'Architecture Moderne (CIAM). Ibler had not only been a protagonist of the social ideals of modern architecture but also founder of the art group Zemlja (Earth) (Ibler 2003; Briski Uzelac 2003, pp.161–3).

As Yugoslavia opened up to the world and after the Yugoslav leadership had proclaimed withdrawal of the Communist Party from cultural affairs, Yugoslavia took part in the XXVth Venice Biennale of 1950, an event which had been criticised as an example of 'decadent' Western art only two years earlier by influential critic Grgo Gamulin (Denegri 2004, p.38). Yugoslavia also became included in the international circuit of travelling exhibitions with the state taking a 'key role by the logistical support of cultural and political institutions that mediated during the touring exhibitions of foreign art in Yugoslavia after 1950, and when Yugoslavian selections were presented on the international scene'(Denegri 2003, p.173). The capitals of the major federal republics hosted exhibitions of Contemporary French Art in 1952; a selection of Dutch Paintings, with strong participation of De Stijl, in 1953; a one man show of Henry Moore in 1955; contemporary German graphics and Italian art; and 'the now famous *Contemporary Art of the United States of America* in Belgrade in 1956, selected from the collection of the Museum of Modern Art in New York, with, among others, the entire generation of Abstract Expressionists' (Denegri 2003, p.174).



Illustration 4: Alexander Snec, Title page Fashion Magazine Svijet (World) (date unknown); Collection Marinko Sudac.

Art in the Cold War

The end of the Second World War marked the final step of the transition from British to American hegemony. The notion of 'hegemony' had been adopted from Lenin by the Italian Marxist-Leninist Antonio Gramsci (1971, pp.12–13), and has been refined by Giovanni Arrighi and Beverly Silver into a model of the 'dynamics of hegemonic transitions' on the world scale (1999, p.29). In accordance with Gramsci, Arrighi and Silver argue that hegemony is 'something more and different than domination pure and simple: it is the additional power that accrues to a dominant group by virtue of its capacity to lead society in a direction that not only serves the dominant group's interests, but is also perceived by subordinate groups as serving a more general interest' (1999, p.26). Hegemony on the world scale means that 'the dominant state becomes the model for other states to emulate and thereby draws them into its own path of development.'

At the end of the Second World War the USA consciously stepped into the role of the new hegemonic power of the capitalist West. The USA created the international institutions of the postwar geopolitical and economic order, the United Nations and the Bretton Woods institutions, the International Monetary Fund and the World Bank, to secure political and economic superiority (Block 1977, pp.32–69). To secure this position in the long run it was not enough to contain the USSR militarily and to be economically superior, the USA also needed to provide evidence that it had the better ideology. It needed to create an 'imaginary future' that other nations and especially their elites could subscribe to (Barbrook 2007). Art became a tool for the USA in her struggle against the rival superpower, the USSR.

This was given added urgency by the fact that at the end of the Second World War a significant rise in labour militancy had occurred internationally. For a while in Italy and France even a Communist putsch seemed possible (Silver 2003, p.148). In the so-called Third World a wave of successful revolutions, usually under some leftist nationalist banner, was perceived to threaten US hegemony (Hobsbawm 1994d).

The USA officially had no state-imposed line on art. Yet as the Cold War began it set up a front organisation, the Congress for Cultural Freedom (CCF) staffed with

former Trotskyites with an intricate knowledge of Soviet ideology and Modern art. In collaboration with institutions such as the Museum of Modern Art (MoMA), New York, the CCF promoted Abstract Expressionism as a symbol of Western freedom of thought (Saunders 2001).

Art in general and the activities of the CCF became a weapon in the Cold War which was aimed at weaning intellectuals and artists off radical socialist and communist ideas. Avant-garde art heavily funded with secret slush funds from the CIA became a legitimate area of activity where a certain radicalism could be demonstrated without seriously endangering American hegemony. Conveniently, by 'tolerating' such activities the US and their allies demonstrated that liberalism made in USA was inherently more humanistic than Soviet Communism.

Abstract Expressionism's instrumentalisation in the Cold War struggle for hegemony has been shown by Serge Guilbaut's detailed study on *Abstract Expressionism, Freedom and the Cold War* (Guilbaut 1985). The leftist orientation of artists and intellectuals during the 1930s in the context of the cultural policies of the New Deal and the broad Popular Front movement against fascism gave way to a much less politicised stance. Former Trotskyites such as art critic and theorist Clement Greenberg saw themselves drawn towards a new centre-leftist liberalism as articulated by Arthur M. Schlesinger in the *The Vital Center* (1949). The ideologically trained ex-Marxists at the CCF used the construction of totalitarianism to equate fascism and Stalinism, so that US-style free market democracy could present itself as the 'only' alternative to totalitarianism. Greenberg's writing tried to maintain the avant-garde's revolutionary tone yet shifted the content of the revolution from the political and social to the formal and stylistic. This tendency was already inherent in 'Avant-garde and Kitsch' (Greenberg 2003a), written in 1939, where Greenberg created a false dichotomy between the avant-garde and mass produced popular culture which he denounced as kitsch. In 'Modernist Painting', first published in 1960, the exclusive focus on formal properties of painting became a dogma (Harrison & Wood 2003, pp.773–4). Here Greenberg identified Modernism in art with painting which in search of purity cleansed itself, in a process of self-criticism, of every external influence by emphasising the flatness of the pictorial surface (Greenberg 2003b).

As the new abstraction won the approval of the liberal upper middle class in the USA, the centre of Modern art gradually shifted from Paris to New York (Guilbaut 1985). In Western Europe after 1945 a different type of non-figurative gestural painting emerged called Informel. It gained increasing recognition after 1950 through exhibitions such as 'Signifiants de l'informel' theoretically supported by the writing of Michel Tapié in *Un Art Autre* (1952) (Harrison & Wood 2003, p.629). In Paris in the 1950s gallery Denise René was one of the few places holding out against the boom in gestural painting by coherently supporting Constructivism and Concrete Art (Redfern Gallery 1968).

Yugoslavia's political position between East and West and the unique system it created allowed the arts to develop more freely than in the nations of the Soviet bloc. As I have shown, there existed a local modernist legacy which included a certain predisposition towards Constructivist attitudes. Those Russian Constructivists who put their artistic skills at the service of 'the renewal of the material' called themselves Productivists (Kiaer 2008a). In Yugoslavia, a young nation seeking its own path to Socialism, it was possible to assume a Productivist position. This contradicted the bipolar cultural logic of the Cold War which equated abstract Modern art with Western liberalism and democracy. The Croatian curator's collective WHW underlines the fact that in the Yugoslavia of the 1950s parts of the Communist political and cultural elite recognised the correspondence between the *universalism* of modernist art and the *universalism* of socialist emancipation (WHW 2009, p.215 my emphasis). 'There are many indications,' write WHW, 'that Yugoslavia had clear cultural politics in which the separation from the USSR and Eastern bloc supplemented strong modernising impulses with modernism in culture' (Ibid.). This viewpoint was confirmed by Meštrović who recalled that the younger party cadres especially had a strong interest in Modern art in the context of a general interest in new information of any kind coming to the country (Meštrović 2009).

Piotr Piotrowski identified a number of reasons why people subscribed to different versions of universalism. On one hand everything that was not Socialist Realist signified association with 'universal European culture' (Piotrowski 2009, p.142). On the other hand, Piotrowski claims that in Yugoslavia after 1948 neo-Constructivism

had been openly endorsed by the authorities (Ibid., p. 142) and that 'the mythology of geometric purity not only did not pose a threat to the post-Stalinist regimes, but, in fact, participated in their legitimization' (Ibid., p.144).

In the year 1960, when Mavignier and Meštrović met in Zagreb, Yugoslavia was a particularly interesting place to be. Politically, there was a 'somewhat brighter outlook on [the] future' (Meštrović 1965b). The foreign policies of Tito contributed to this picture. After an initial meeting in 1955 in Bandung between Asian and African nations the Indian prime minister Jawaharal Nehru, Egyptian president Gamal Abdel Nasser and Tito met on July 18 and 19 1956 on the island of Brioni to seal the decision to form a movement of non-aligned nations (Hobsbawm 1994a, pp.357–8; Kršić & centar_kuda.org 2009). The non-aligned nations movement was formally set up at the Belgrade conference of September 1961 where a declaration affirmed the right of independence from the dominant military blocs. By helping to create the non-alignment movement Tito opened up economic and cultural ties with Asian and African nations.

After Stalin's death the extremes of Stalinism were denounced by the new leader Krushchev. In 1956 the violent repression of reforms in Hungary brought home the point that the USSR remained a dictatorship which tolerated no dissent among its own citizens and satellite states. Recent scholarship has begun to show that, firstly, there were significant differences in cultural policy between the nations behind the iron curtain; secondly, that the doctrine of Socialist Realism was not that dominant at all in nations such as Poland and Czechoslovakia; and last but not least that the idea, long nurtured by Western art historians, was simply false that those nations were somehow behind and everything that was interesting was a result of soaking up influences from the West with a few years delay (Piotrowski 2009; IRWIN 2006; Kolečnik 2010).

Having said that, politically Yugoslavia remained the only different system, a difference marked for instance by the fact that Yugoslavia first opened its borders for visitors from abroad and soon also allowed its citizens Visa-free travel. 'Self-managed' Yugoslav Socialism made the country an interesting proposition for many Western leftists and newly independent Third World nations. The support for

Modernism in art by a state sponsored institutional art system was one of the key features of Yugoslavia at the time. Piotrowski argues that in 'Yugoslavia, just as in any other country of post-war Communist Europe, regardless of its distance from Moscow, culture functioned as a kind of substitute for a political life' (Ibid., p. 106).

In Yugoslavia during the 1950s a type of art developed which Ješa Denegri calls 'socialist modernism' or also 'moderate modernism'. It was not an official state and party line but 'one that was favored by the powers that governed social promotion (benefits for exhibiting in the country, selections for abroad, purchasing committees, appointment of professors at art academies)' (Denegri 2003, p.175). 'When socialist modernism lost its edge it became renamed by a circle of theorists and critics as socialist aestheticism' (Ibid., p. 175). Meštrović has consistently objected to this terminology in interviews. Meštrović argues that after the end of Socialist Realism in Yugoslavia there was no officially sanctioned line on the arts. Apart from that, NT, like other Yugoslav neo-avant-gardes, such as Informel and Gorgona, developed out of *opposition* towards that kind of socialist aestheticism.

The Postwar Technology and Design Discourse

As Mavignier wrote in a letter to Meštrović, 'one of the most important facts about this exhibition [in Zagreb] is that it will enable one of the young critics, like yourself, to come to Germany and have contact with people, artists and ideas that might help give impulse to some new force among you' (Mavignier 1961b; 2010b, p.59). In February 1961 Meštrović travelled to Ulm to present the exhibition of young Yugoslav artists. The exhibition *Jugoslawische Maler (Yugoslav Painters)*, February 7 to March 6, 1961, was shown at Studio F, a private gallery founded by Kurt Fried, publisher of a local newspaper. A small gallery in a provincial town, Studio F was nevertheless an important place for contemporary art. In the same year, 1961, an exhibition brought together François Morellet and the Austrian artist Marc Adrian, both of whom would play an important role in NT.

For *Yugoslav Painters* Meštrović curated artists who would all become very important but most of whom had very little in common, while few of them showed

any affinity with neo-Constructivist tendencies. Shown were works by Radomir Damnjanović-Damnjan, Ivo Gattin, Ljubo Ivančić, Julije Knifer, Vlado Kristl, Ferdinand Kulmer, Ivan Rabuzin, Đuro Seder, Matija Skurjene, Izidor Urbančić, and Josip Vaništa. The introduction written by Meštrović was a searching and poetic text which used none of the vocabulary that would become recognised as belonging to NT a few years later (Meštrović 1961).

Ulm was a special place because it was home of Hochschule für Gestaltung (HfG - College of Design) Ulm, a unique postwar experiment in design education (Betts 1998, p.67). The design college at Ulm 'marked modernism's last real attempt to unite industrial design and genuine social reform, to preserve in particular the redemptive pathos of the design object from the corrosive effects of Nazi irrationalism and American commercialism' (Ibid.). HfG Ulm was founded in the immediate postwar period and its first director, Max Bill, held a strong belief that 'genuine social and cultural reform began not with forced political training, but rather with reconstituting the very forms of the social environment, i .e., city planning, architecture and the design of everyday objects' (Betts 1998, p.68). Almir Mavignier who studied visual communication there from 1953 to 1958, "would always say that his diploma was signed by two Maxes, Max Bill and Max Bense," recalls Meštrović, "Bill was known to me but Bense not" (Meštrović 2009).

The German philosopher of science, literary critic and 'aesthete' Max Bense (1910 - 1990) led the Information course at HfG Ulm from 1953 to 1957. His ideas were a key influence on some of the artists involved in NT. Bense confronted students of the design institute with an aesthetic theory which combined philosophy - Hegel's aesthetics, traces of Existentialism and Heideggerian thought - with modern semiotics, information theory and cybernetics. Bense's *Aesthetica*, published from 1954 onward in four parts, and republished in 1965 in one volume (Bense 1965), was an attempt to develop an aesthetic theory for the works of artists such as Max Bill or Georges Vantongerloo without using traditional categories of art discourse. Bense wanted to base aesthetics on a rigorous mathematical and formal basis which produced an ambitious *tour de force* through semiotics, information theory and German philosophy.

The 'Ulm idea' initially contained strong echoes of the Bauhaus programme with former Bauhaus teachers and graduates such as Johannes Itten, Josef Albers, Helene Nonne-Schmidt teaching there (Spitz 2002). Bill thought that 'only the engaged artist as "true creator" could properly address the complex technical, cultural, and moral issues inherent in modern design' (Betts 1998, p.73). In 1956 Bill was relieved of his role as director by the board of governors and in 1957 left altogether in an acrimonious split (Spitz 2002, pp.186–7). Ulm's new line was developed by younger teachers such as the Argentinian Tomás Maldonado. He clearly differentiated between Bauhaus as a whole and its most radical phase from 1928 to 1930 when the architect and communist Hannes Meyer had been its director (Maldonado 1969). Maldonado initiated a new curriculum for HfG Ulm which his teacher colleague Gui Bonsiepe called 'militant rationalism in the laboratory of innovation' (2009b, pp.179–198). Ulm experimented with 'programmed learning' and mathematically based analytic models in a curriculum oriented toward developing a scientific design methodology (Bonsiepe & Maldonado 1969). The school regularly invited guest teachers who came to Ulm for a semester or just a one-off lecture. A list of these invitees reads like a *Who's Who* of the most advanced positions in art, design, architecture, cybernetics, semiotics and other fields in the late 1950s and 1960s, including, but not restricted to, Josef Albers, Charles and Ray Eames, Norbert Wiener, Reyner Banham, Bruce Archer, Käte Hamburger, and Buckminster Fuller (Bonsiepe 2009b, p.197).

Ulm's model, which regarded 'industrial technology and mass-produced goods as the very site of cultural intervention and reform,' ran counter to the post-war Zeitgeist, claims Betts (1998, p.70). 'The Nazi legacy of industrialized death and destruction' had united the political left and right in disavowing 'the potentially redemptive powers of science and industrial technology' (Ibid.). The technophobe Zeitgeist was expressed by Jaques Ellul, a French Catholic and resistance fighter in *Technological Society* (Ellul 1967) (first published in French as *La Technique* (Ellul 1954). Ellul's notion of 'technique' went beyond the conventional understanding of technology and demonised it as a kind of generalised machinic thinking, an anti-human utilitarianism aided by machines which had invaded all human areas of activity and had become part of what it meant to be human. 'But when technique enters into every area of life,

including the human,' wrote Ellul, 'it ceases to be external to man and becomes his very substance' (1967, p.6).

Closer to NT's agenda was Giedion's *Mechanization Takes Command* (1948). The Swiss historian, theorist of architecture and secretary of CIAM, conducted a deep study of the evolution of technology. He tried to show how automation in production affected nearly every aspect of the environment and how this also, over time, changed people's behaviour, their posture, even their sense of comfort. Giedion's fundamental worry was the growing 'gap between our mode of thinking and our mode of feeling' as the ultimate result of mechanisation. He thought it was 'time of reorganisation in the broadest sense, a time that must find its way to universalism. The coming period must bring order to our minds, our production, our feeling, our economic and social development.' (Giedion 1948, p.v). A key phrase which Giedion repeatedly used was that a new '*dynamic equilibrium*' between humans and their environment had to be found (my emphasis).

Richard Martin has thrown light on the fact that at the time when Giedion conducted his studies he was part of a web of relationships which included László Moholy-Nagy, Gyorgy Kepes, Norbert Wiener, and Marshall McLuhan (R. Martin 2005). Giedion wrote a preface to Kepes' *Language of Vision* (Kepes 1944), a richly illustrated book which tried to make the visual knowledge developed by the avant-gardes productive for advertisement and design. Kepes' aim, which Giedion approved, was to bring order and 'formal coherence into the images saturating everyday life' (Martin op.cit.,p. 22).

In the postwar cyber-matrix (see my Introduction, pp. 37-9) an important nexus arose between artists and theorists who were keenly aware of the influence of technologies on the environment and human psyche, and scientists of a liberal, humanist orientation such as Wiener. The overarching theme was the 'restoration of balance in an environment overrun by machines' (Martin., p. 20). Many of those intellectuals found themselves in the publication *The New Landscape in Art and Science* edited by Gyorgy Kepes (1956).

Kepes saw the book, which followed an exhibition held at MIT in 1951, as a 'new

form of communication,' where the 'texts are the illustration, and the images provide the narrative' (Ibid., p. 17). Kepes' thesis was that science provided new views of nature and was 'the most confident unifying force' but that it also could not solve all problems alone. Moholy-Nagy had hoped that in 'America [as] the bearer of a new civilization,' socially transformative ideas could be introduced through the back door of design (1947, p.10). Moholy-Nagy's and Giedion's theme of finding a lost harmony between 'the inner and outer wealth' was promoted energetically by Kepes. Images in *The New Landscape* came from prehistoric drawings, Lissajous figures, cave paintings, child drawings, lines of forces of electromagnetic fields, Naum Gabo, photographs from space and deep sea, and much more. In the text section, Giedion was upbraiding the 'fraudulent rhetoric of Sartre and Heidegger' (Ibid., p. 92), while Wiener expressed his intuition that the same mathematics which made abstract art 'beautiful,' was also at work in the patterns observed in nature by the new scientific instruments (Ibid., p. 274).

The innovations of the 1920s Constructivist and Bauhaus avant-garde reached the USA through emigrès such as Moholy-Nagy and Kepes. As 'Bauhaus' became absorbed into the generalised design knowledge in postwar USA, at places like the Chicago Institute of Design and MIT, it got depoliticised but technologically upgraded. Those technologically upgraded Bauhaus ideas then got re-imported into Europe through HfG Ulm¹¹ and later NT, where the political side of that discourse gained fresh valency, especially in the context of the 'Yugoslav experiment'.

In spring 1961 after opening the exhibition of Yugoslav painters in Ulm, Meštrović travelled around Europe, visiting addresses Mavignier had provided. 'Mavignier asked me to go to Düsseldorf, to bring some photographs from Egypt that he made that same last summer, that will be published in the last number of the review Zero in Dusseldorf,' recalls Meštrović (2009). After Düsseldorf, Meštrović went to Munich, where students of the class of Ernst Geitlinger developed new ways of working; where one of them, Gerhard von Graevenitz, was running a small gallery and produced a magazine; to Switzerland, where he was supposed to meet Max Bill, which for some reason did not work out, so instead he met the artist and designer

¹¹ For instance, Norbert Wiener gave a guest lecture at Ulm in July 1955 (Spitz 2002, p.172); there were several lines of transmission between HfG Ulm and Zagreb through Mavignier, Meštrović and others.

Karl Gerstner, who had written an influential book titled *Kalte Kunst (Cold Art)* (1957). Other important flashpoints for the emerging new art were Milan, where Enrico Castellani and Piero Manzoni had started the magazine *Azimuth* and *Azimuth* gallery; and of course Paris, where Group d'Recherche d'Art Visuel (GRAV) was founded in 1960¹². While still in Munich, Meštrović sent a telegram to Božo Bek in Zagreb: 'We should make every possible effort to show these things in Zagreb' (Ibid.).

The network of emerging artists described above was located in a specific area: between Paris, the northern Rhine valley, Munich, Switzerland and the industrialised north of Italy. This area forms what the English historian Eric Hobsbawm called the 'main mountain-range or crest of European economic and cultural dynamism' (Hobsbawm 1998, p.3). This zone of dense network connections of history, trade and culture 'can be traced in the medieval trade routes and the distribution map of gothic architecture, as well as in the figures for the regional GDP within the European Community' (Ibid.). Zagreb is firmly part of this area, although located slightly off-centre. It was in this region that the modernisation process accelerated and the most advanced methods of mass production were implemented first at companies such as FIAT, Olivetti, Siemens, BMW, Mercedes, Renault and Citroen. It is more than just coincidence that new artistic tendencies emerged in the centres of industrial innovation which were also nodes of dense network connections through traffic, communication, intellectual movements, exhibitions, and trade fairs.

12 Fixed members were the Argentinians Horacio Garcia Rossi and Julio Le Parc; the French artists Yvaral, François Morellet and Jöel Stein; and Francisco Sobrino from Spain.

NT1: The Exhibition

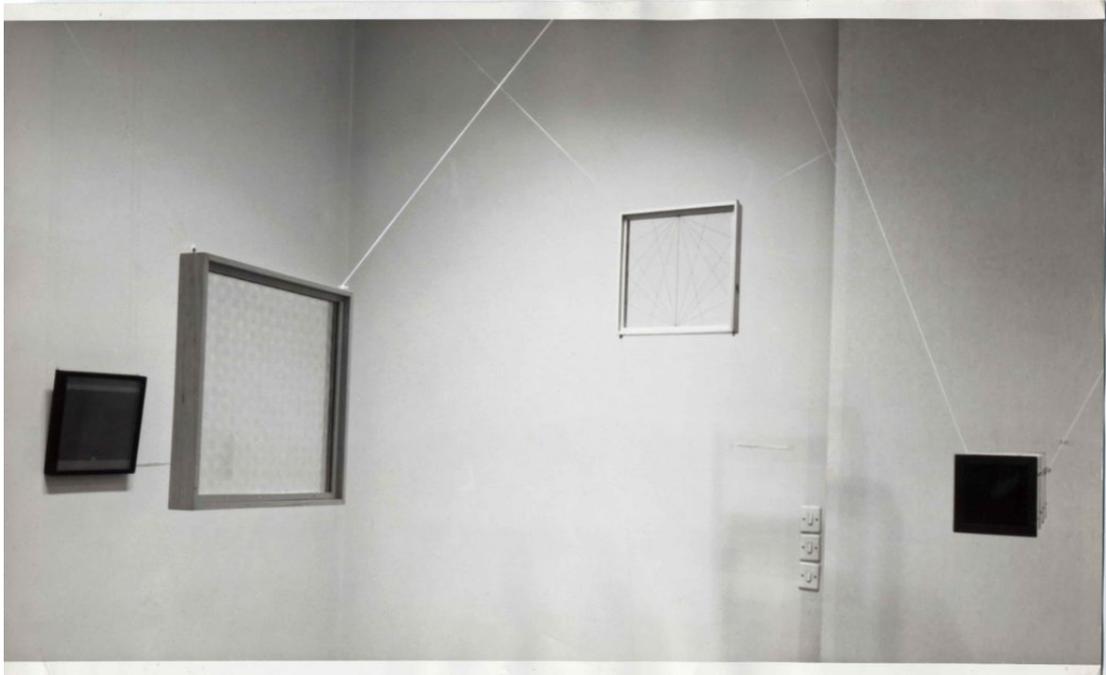


Illustration 5: NT1, 1961, Exhibition view: works by Group N; photo MSU Zagreb

On the 3rd of August 1961 the exhibition *Nove Tendencije (New Tendencies)* was opened at GSU, Zagreb. *NT1* brought together artists and works to make visible that which had previously not been acknowledged. For the artists involved a new pattern of art making became evident. The art of NT re-formulated some of the basic problems of art. It did not just create a new style but tried to re-define what art was about.

The exhibition showed works by 29 artists from Argentina, Austria, Brazil, France, Germany, Italy, Switzerland and Yugoslavia. The Croatian artist and former Exat 51 member Ivan Picelj had designed the poster and catalogue and was also showing work in the exhibition. The only other Yugoslav artist was Julje Knifer whose work was open to a range of interpretations. Knifer painted the same motif all his life, a meander in black and white. His work was as easily but wrongly associated with the neo-Constructivism of Exat 51, with the art of NT, and with the Dada inspired anti-art of the Gorgona group (Irwin 2006, pp.176–77). His inclusion was a sign of the pluralism of this first exhibition of *New Tendencies*.

In the weeks leading up to the exhibition, Mavignier faced 'the difficulty to discover participants beyond the circle of my acquaintances, and then to persuade them to send their works to Yugoslavia for an "information exhibition"' (Mavignier 1970, n.p.). The details regarding the exhibition - issues such as 'ownership' of the exhibition, text contributions to the catalogue and the design of poster and catalogue - were worked out in an exchange of letters between Mavignier, Bek and Meštrović. Mavignier acknowledged that his Yugoslavian colleagues had been 'indefatigable in clarifying details' (Ibid.). Initially Mavignier had put great emphasis on his power of curatorial decision making. Only he should have the right to decide about the final list of participants (Mavignier 1961b; Mavignier 2010b). Eventually he conceded that the three people responsible for the exhibition were Bek, Meštrović and himself (Mavignier 1961c; Mavignier 2010c).

What this acknowledgement shows is that the 'curation' of the exhibition could not be cleanly separated from its production. Mavignier had been responsible for the selection of artists. He had drawn up an initial list. The artists were then officially invited by Bek to send works of their own selection, plus a statement for the catalogue, via normal postal service (Scholl 2006, p.279). Mavignier had also proposed a number of Brazilian artists - among them Lygia Clarke, Lygia Pape, Aluiso Carvão, Waldemar Cordeiro, Franz Weissmann (1961b; 2010b, p.60) - none of whom participated in NT1 in 1961 for reasons of a practical nature. Some of the factors which contributed to the final result were purely coincidental. Other factors depended on social mechanisms, such as the personal motivation, or the specific networks of affinities between artists, curators and critics. For instance, the Italian participants were – behind the scenes rather than overtly – selected by Manzoni who, through his role at Azimuth and Azimut¹³, was very influential among the young Italian art scene (Denegri 2004, p.264). Yves Klein presumably would have participated but was in America at the time and difficult to reach (Mavignier 1961a).

Those circumstances subvert the idea of curatorship as an entirely rational process where a person or team takes decisions based on a complete knowledge of a field of

13 Azimuth was the name of the gallery founded by Manzoni and Castellani, while Azimut was the name of the magazine edited by the same artists.

artistic activity. In emerging fields with a precarious institutional and financial basis, the results are rarely based on 'decisions,' but stem from a multiplicity of factors. Despite the precarious way in which results were achieved, Mavignier thought that *NTI* 'might represent today what we will tomorrow call the avant-garde' (1961b; Ibid 2010b, p.60).

The name *New Tendencies* was only chosen in the last weeks before the exhibition. According to Meštrović Mavignier had initially suggested 'Konkret' after the exhibition *Konkrete Kunst* (1960) curated by Max Bill. Then Mavignier had suggested '1961 - avant-garde?' 'Finally Bek accepted my proposal,' wrote Meštrović in a letter to the US art historian Donald Egbert (Meštrović 1968a, p.2). According to Mavignier's version the title was chosen after an exhibition in Milan called *Stringenz - nuove tendenze tedesche* (*Stringent - new German tendencies*) (1959) held at gallery Pagani del Grattacielo where group Zero and Mavignier participated (Mavignier 1970; 2010a).

The exhibition was dominated by sculptures 'that possessed none of the traditional characteristics of sculpture and had more the character of an object'. The character of these 'objects' inspired Mavignier to arrange the exhibition, '*from painting to object*' (Mavignier 2010a, p.345). This transition 'from painting to object' can be understood to signify a paradigmatic shift in society. Eilean Hooper-Greenhill has proposed the thesis, based on Foucault, that there is a correspondence between ordering systems and arrangements for the re-presentation of knowledge and the overall historical development (Hooper-Greenhill 1992, p.9). Are there any parallels to be drawn between epistemes and representational regimes in art in general, or between the presentation of art in NT and the advance of a paradigm shift in society?

As photographs of the exhibition show (see Illustrations 5 and 6), works were hung from the ceilings using wires, leaving a gap between artwork and wall. The works were distributed, not just on the walls but also in actual space itself. For example, a combination of works by Gruppo N from Padua, were suspended freely in space hung by very light strings. *Oggeto (Object)* (Massironi 1961b) was hung in such a way that the wire construction of lines appeared to leave the frame and continue in space.

This work - like many other works in the exhibition - implied a new image of reality. Space was pervaded by invisible forces which could only be understood either mathematically, on the grounds of new physics, or by perceptive artists. The suggestion is not that the artists were illustrating scientific findings, but rather that through a process of formal deduction based on previous work, they achieved results similar to that of contemporary science. The idea behind the hanging of the work accentuated a new relationship with space which was also expressed by the objects themselves - the exhibition architecture was designed to correlate with the content of the works.



Illustration 6: NT1, 1961, Exhibition view: b 256 and k 36 by Paul Talman (1961) (floor and wall); and Julio Le Parc, Probabilité du noir égal au blanc n° 4 (Probability of Black Being Equal to White No. 4) (1961) (wall, right side); photo MSU Zagreb

Paul Talman's works *K-100 b* (1961) and *b 256* (1960) consisted of plastic spheres inserted into square objects. The spheres were painted half black, half white (or red and white in another instance). Reminiscent of the Japanese board game Go, the

work allowed the viewer to create a multiplicity of relationships between order and chaos. One of Talman's objects was situated horizontally on a pedestal on the floor in the centre of the space inviting visitors to actively engage with it. *Probability of Black Being Equal to White No. 4* by Julio Le Parc (1961b) consists of white squares suspended on very thin threads in front of a black background. A movement of air, maybe caused by the viewer's movement or a breeze, will start turning the squares to create ever changing patterns through the background-foreground relationship.

NT never had a unified programme, particularly not during this early phase. There were, however, certain shared elements many of which came together in the work, writing and development of Gruppo N from Padua. Gruppo N had been founded by Alberto Biasi, Edoardo Landi, Toni Costa, Ennio Chiggio, and Manfredo Massironi in 1959. In their first manifesto they called themselves 'disegnatori sperimentali' which can mean 'experimental draftsmen' as well as designers (Gruppo N 1961). They used this term not only because several members had a background in architecture, but also to signify a distance from the traditional image of an 'artist' for political reasons. N were from the same city and also were contemporaries of Toni Negri¹⁴. The ideological stirrings of the Italian New Left were particularly strong in Padua and N participated passionately in the cultural and political life of their city. N was founded as a group to enable an internal discussion about topics such as 'what is an artwork'; what are 'structures of the exhibition system and who manages them'; what constitutes 'the market for artworks'; and 'the relationship between producer, work and viewer', explained Edoardo Landi, one of the group's members, in retrospect (Meneguzzo 2001, p.206).

N's Marxist analysis was primarily directed at the position of the artist in society. They recognised themselves as producers of objects which were treated by the art market as commodities (Massironi 2009, p.362). The group as an organisational form provided the potential for a more revolutionary type of artistic self-organisation. The recognition to be 'part of capital,' was understood 'as a necessary precondition to break it open through an objective act of will power' (Ibid., p. 363). N consciously used new materials and new media from mass production which were cheap, such as

14 Toni Negri became an influential figure in the Italian New Left and one of the co-founders of autonomous Marxism, see below, p. 114.

punchcards, plastic ribbons, cardboard, plywood (Meloni 2009b, p.55).

Dissatisfied with the local cultural organisations they started to organise exhibitions themselves and later ran their studio as an independent gallery and event-space. They collaborated with Azimut gallery in Milan and brought the *MOTUS* (1960) exhibitions with members of GRAV to Padua. They also organised *La Nuova Conzezione Artistica (The New Concept of Art)* (1960), again in collaboration with Azimut. In a co-authored manifesto they wrote that the new art was characterised by 'a search and by research,' that it existed 'outside any existing schemata' and that 'growing out of the diverse structures of modern life' it was transgressing 'traditional aesthetics to defend an *ethics of collective life*' (Biasi, Castellani, Mack, Manzoni, Massironi 1960, quoted in Meloni 2009b, p.45 my emphasis).

Like group N, many other of the groups and individuals involved in *NTI* shared a strong critique of the commodification of art which motivated their search for a new direction and led to their engagement with the notion of research. Despite the emphasis on groups of young artists in NT, there were a number of older artists whose ideas inspired them. Those older and more well known artists such as Lucio Fontana and Vasarely were not invited by Mavignier, insinuated Denegri (2004, p. 125), because he consciously tried to provide a stage for young artists.

Artistic Context of NT1

Lucio Fontana's studio in Milan became a point of pilgrimage for artists from all over Europe who were interested in new forms of art by the end of the 1950s (Burnham 1968, p.240). In the *White Manifesto* (1946) Fontana and his students in Buenos Aires had already formulated ideas for a 'spazialismo', a new spatial art (Harrison & Wood 2003, p.652). The manifesto stated that 'the transformations of the material base of existence have determined man's psychological states throughout history. [...] Man's psychological make-up is transformed. We are living in a mechanical age, in which plaster and paint on canvas are no longer meaningful.' Fontana declared speed to be a 'constant in the life of mankind' and celebrated the subconscious as providing 'the means of adaptation to the new artificial life-world' and as 'source of all artistic

concepts' (Fontana 2003, pp.653–655). Fontana went on to realise the concept of 'spatialism' not only in his famous cut images, but with works such as *Struttura al neon par IX Triennale di Milano*, (1951) a curvy structure consisting of 100 meters of neon-light, hung from the ceiling of the lobby of the exhibition venue. Giovanni Anceschi, an artist from Milan who co-founded Gruppo T - another important group in NT (who for some unknown reason did not participate in NT1) - had been deeply impressed when as a boy he had seen Fontana's *Ambiente a luce nera* (Environment with Black Light) (1949) at Galleria del Naviglio (Anceschi 2010).

Milan was a centre of innovative artistic and intellectual activity in the late 1950s, early 1960s (Anceschi & Cullars 2002, p.49) and Azimut gallery a particular flashpoint. Azimut, run by Enrico Castellani and Piero Manzoni, existed only for a short while but helped to bring together those networks between artists which resulted in NT. Azimut were in touch with Group Zero, founded by Otto Piene and Heinz Mack in 1957, later joined by Günter Ücker. Zero organised one-evening exhibitions in their studio in Düsseldorf and published a magazine, the *Zero Review*. Their name signified a desire to make a fresh start and explore new media such as light and colour in art (Brett 2000, p.196).

Zero were great networkers (J. H. Martin et al. 2006) and established links with Nouveau Réalisme, a movement founded by Yves Klein and the critic Pierre Restany in 1960, joined, among others, by Jean Tinguely, Niki de Saint Phalle, and Daniel Spoerri. Tinguely, who became known for his self-destructing machines, dropped 15.000 leaflets with a manifesto over Düsseldorf. Klein built a grid of gas flames at a gas works in nearby Krefeld. At about the same time Gustav Metzger wrote his manifesto of auto-destructive art in London (Brett. op.cit.) and, in a public demonstration, used acid to decompose plastic to illustrate his idea. Mavignier's '*Rasterbilder*' (grid paintings) were shown at a one evening exhibition titled *Vibration*, Düsseldorf (1958), together with works by Heinz Mack, Otto Piene and other artists (J. H. Martin et al. 2006, p.266). Inspired by Zero, a group around the Dutch painter Henk Peeters formed the group and magazine NUL. The late 1950s and 1960s were a time when many new beginnings were made. A lot of those activities were artist-led, happened in studios or storefront galleries, or developed around the publication of artist's magazines.

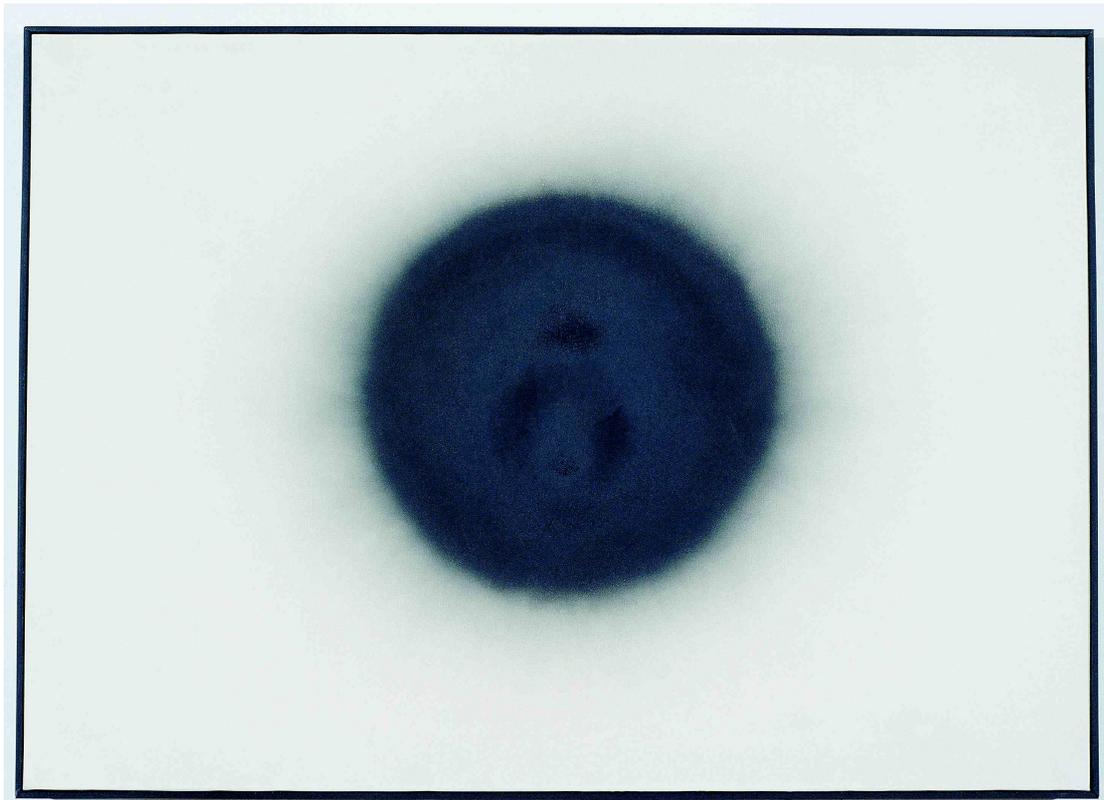


Illustration 7: Rauchbild, (Smoke Painting) Otto Piene (1961); MSU Zagreb. Nr. 764

Another important influence on NT was pioneer of optical art Victor Vasarely, a Hungarian artist who had been trained in the Budapest offshoot of Bauhaus, the Műhely (Compton 1967). Vasarely was father of GRAV member Yvaral and his studio in Paris in the 1950s was a meeting point for young artists with an interest in new forms of abstract art. Vasarely co-organised, together with art critic Pontus Hulten, the exhibition *Le Mouvement* (1955) at gallery Denise René, which was a key moment for kinetic art. It was the first exhibition to focus exclusively on movement and brought together works by Victor Vasarely, Yacoov Agam, Jesus Rafael-Soto, Pol Bury and Jean Tingeluy, contextualised by film screenings and works of historical importance such as Duchamp's *Rotary Demi-Sphere* (1925) and mobiles by Alexander Calder. On the occasion of *Le Mouvement* Vasarely co-authored the *Yellow Manifesto* (1955/1996). There, Vasarely expressed the democratic idea that 'the art of tomorrow will be a common treasure or it will not be' (Vasarely 1996). Vasarely's writing showed social commitment and an interest in quantum physics, in particular wave-particle duality.

Although NT started in Europe, it had an international orientation from the very start. Vasarely's dream of a 'planetary folklore' (Vasarely & Joray 1965) found support in the fact that many Paris based Latin American artists played a part in NT. An exhibition of Max Bill in Brazil in 1950, and his trip to Brazil and Argentina in 1951, had made an impact there on a number of young artists (Rickey 1967, p.62). However, there were native Concrete Art impulses before Bill. In Argentina Agrupación Arte Concreto-Invencción (Concrete Art-Invention Group) had been formed by 1945. 'In Rio de Janeiro, a group of young artists was being formed around the art critic Mario Pedrosa' in the late 1940s who 'exposed Abraham Palatnik, Ivan Serpa and Almir Mavignier to the principles of Gestalt theory - an influence that would prove instrumental in the development of geometric abstraction and kinetic art in the country' (Kac 1997). Group Zero had good contacts with Japan, in particular the Gutai collective, while Klein travelled to Japan frequently since he was a Judo fanatic. Jesus Rafael-Soto arrived in Paris from Venezuela in 1950 with an idea to 'make Mondrian move' (Barrett 1971, p.62). After a period of research from 1955 onwards, Soto started to create multiples using grids and strings to create 'vibration structures' which achieved a kind of threedimensional moiré effect (Barrett 1971, pp.62–74). For Burnham, Soto was an unacknowledged inspiration behind NT, along with Vasarely, Fontana, and Bill (1968, p.247).

The gestational period of NT in the late 1950s was characterised by social networks between artists who tried to go beyond Informel and Abstract Expressionism. Although it was quite common to be dismissive of gestural painting, the art of NT was not a result of total negation of Informel but of a 'dialectics of contradiction' (Pellegrini 1966, p.17). While NT defined itself in opposition to Informel, a closer look at some of the careers of the artists involved reveals that many had to work themselves *through* gestural or Informel positions. Gerhard von Graevenitz, for instance, initially admired Pollock because of the dynamic treatment of the surface, but then, in a step-by-step process of reduction, arrived at a very different way of achieving dynamic effects (Berswordt-Wallrabe & von Graevenitz 1994).

NT artists turned to the historic avant-gardes for inspiration, reconnecting with the spirit of Dada and Constructivism. The influence of *Neo-Dada* (Hapgood & Berger

1994) was thereby much greater than some of the artists would have wanted to acknowledge. Common was an attitude of making a fresh start, a new beginning, by declaring a tabula rasa. Painting was abandoned and work with new media matched a desire to explore new concepts of space, time and events. While activities converged on artist run galleries and magazines, there were also several larger museum exhibitions in the period leading up to NT1 where those younger artists met and their networks were formed. Highlights were *Monochrome Malerei* (monochrome painting) (1960) at Städtisches Museum Leverkusen Schloss Morsbroich, *Konkrete Kunst* (concrete art) (1960), curated by Max Bill for Helmhaus Zürich, and *Bewogen Bewegingen* (Moved Movements), Amsterdam Stedelijk Museum (1961).

The Aesthetics of Relational Fields

The artist, curator and theorist Jack Burnham dedicated a long chapter to NT in *Beyond Modern Sculpture* (1968). Burnham described his first impressions as 'fluid traces of completely ethereal phenomena' (Ibid., p.244). He ascribed to NT a new sensibility toward 'material aspects of a work of art [that] influence its appearance,' such as 'shadows created by the raised surface of a painting, the reflective glass protecting a drawing, or the diffusion properties of emitted light'. This, Burnham suspected, 'might be the key to a new mode of artistic perception' (Ibid., p.238). Burnham brought together this aesthetic sensibility with the 'scientific concern with fields of energy' (Ibid.).

In Burnham's interpretation, NT artists showed a 'drive to escape the confines of painting and sculpture by bringing them together into relief form via field dynamics' (Burnham 1968, p.249). Burnham elaborated this into the main idea through which he understood NT. He conducted a kind of genealogy which linked the history of the science of electromagnetism, Einstein's relativity theory and the aesthetics of the relative field (Ibid., p. 253.). From 'the idea of a field as a plenum of kinetic effects' he saw an almost inevitable advancement to directly creating 'motion by mechanical means' (Ibid., p. 254). As Burnham put it, 'the epistemological transition in physics during the 1920s was a shift from discrete, geometrical models of the atom as an array of points in space to the use of field configurations to show stable and unstable energy states' (p. 256).

As Burnham recognised, in NT dividing lines ran between 'those groups and individuals who stressed experimental objectivity, anonymity, perceptual psychology, and socialism, and those who stood for individual research, recognition, poetry, idealism, immateriality, luminosity and nature.' According to Burnham, to the first group could be counted the collectives GRAV, N, T, some Munich artists and various artists of the Communist countries whereas the second set consisted of Zero, NUL, other Munich artists and 'sundry individuals' who venerated Fontana and Klein (Burnham 1968, p. 247). This classification, while it should not be understood too schematically, is quite useful.

NTI brought together a variety of new trends in art. For instance, Piero Manzoni's white *Achrome* (Colourless) (1961a) has only superficial links with Otto Piene's *Smoke Painting* (1961). In Burnham's scheme, both would belong to the more poetic and immaterial tendency. Manzoni's work, however, had an analytical and demystifying intellectual orientation while Piene and the Zero group were fascinated by metaphysics and the poetics of light (Denegri 2004, p.107). What united those artists was 'not only pointing to a future yet to come, but more precisely, announcing art's present state as an expanded territory of investigation, invention and resistance' (Basbaum 2006, p.90).

Burnham helped me to understand that the relation with the viewer was central to the art of NT. I have developed a system of classification based on different formal relationships between producer, work and viewer. There are paintings or other static works which create virtual movement in the mind of the viewer. The painting has no moving parts but the effect of movement in the mind of the viewer is very real (Barrett 1971). Because the content of the painting only becomes known as a mental image the viewer becomes integrated into a model of interactive communication which underpins many works shown in NT (on 'optical illusions' see the next subsection). The artists of NT were not interested in the optical effects for their own sake, but because through them a relationship with the viewer was established .

The second form which the relationship between work and viewer can take is between a work that has a spatial dimension and a moving viewer. These works -

frequently in the form of reliefs - use different materials to create foreground-background relationships which give different views depending on the movement of the person. *Dynamic Vision* by Tony Costa (1961) of Gruppo N consists of intersecting and twisted plastic threads so that viewers experience an interplay between foreground and background resulting in quick changes of form. N group made a number of such works using plastic ribbons, ascribed to different authors. Marc Adrian's *Series Delta Nr.4 (1961)* uses layers of rippled glass to create quickly changing impressions depending on the position of the viewer. Burnham's 'aesthetics of the relational field' suits those works quite well as a description because they share a certain lightness and ephemereal quality.

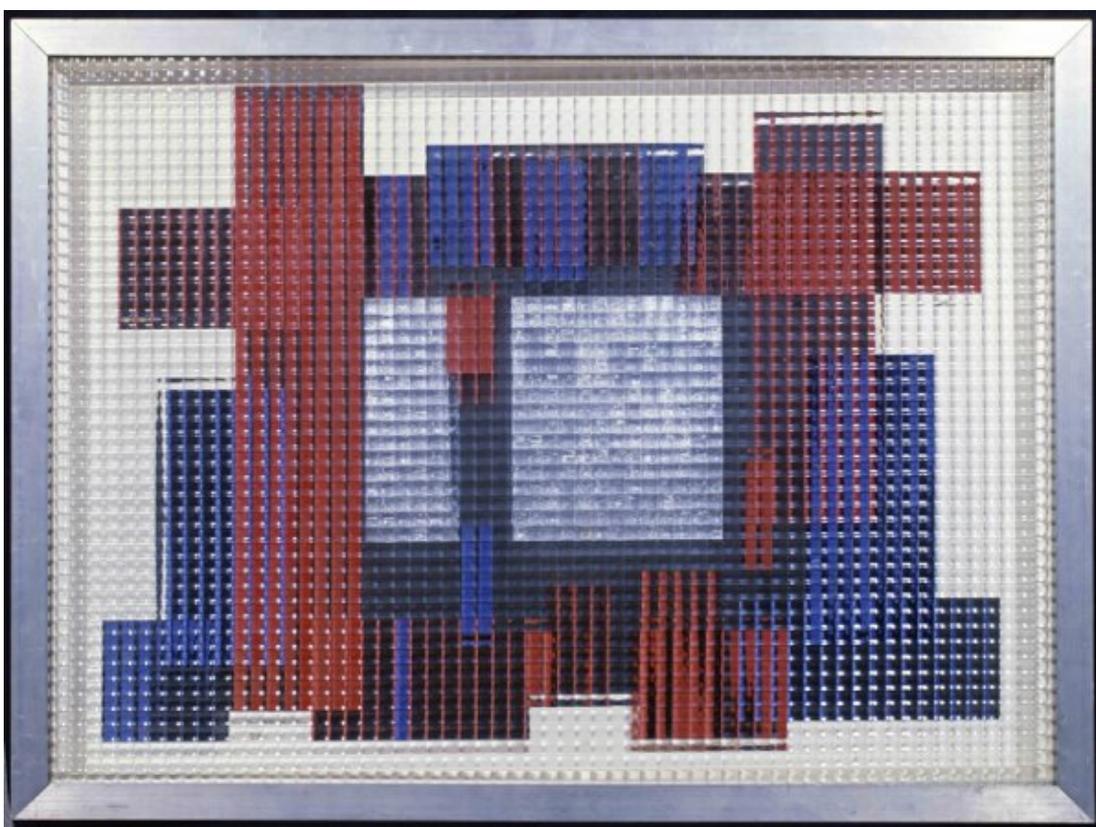


Illustration 8: Marc Adrian, Delta Series N° 4 (1961); MSU Zagreb Nr. 759

These works created virtual vibrations – a field effect – which did not limit the artwork to its frame. By arranging a number of such works together within an exhibition space, the viewer became engulfed in different vibrations, colours and visual interferences. Importantly, the viewer was not just looking at but became part of this space; s/he, in order to enjoy such works, needed to move around in space. A relationship between a moving viewer and an object was established, whereby the

object had already been built with a moving viewer in mind. Catalogue statements of artists confirm that this was not coincidental but programmatic. Manfredo Massironi summarised the work of his colleagues from Gruppo N in the catalogue of NT1: 'surfaces that are optically dynamic and indeterminable; structures made visible by light; dynamic views that change according to the angle from which they are viewed' (Massironi 1961a; Rosen et al. 2010, p.82). The works were created to produce dynamically changing visual impressions. This also meant that the work was designed to make the viewer *actively* became co-creator of the work (my emphasis).

The next logical step is to create actual movement in the object. Objects moved by motor power did not play a significant role in the first NT exhibition in 1961, yet this would soon be changing. Gianni Colombo of Gruppo T had produced a work, *Strutturazione Pulsante* (1959) which showed a new way forward for kinetic objects. It consisted of a panel made from individual blocks of styrofoam moving in irregular patterns caused by an arrangement of strings and motors at the back. Rather than just representing the repetitive movement of the mechanical energy source such works appear more organic, 'pulsing,' as the title says, making it necessary for the viewer to consider a new relationship with objects. Another way to use movement in an object in an irregular, non-repetitive way is to combine it with light. Over the course of the lifespan of NT, a wide range of works was exploring forever-changing combinations of light and movement which did not allow the identification of sequences with a clear start and stop. A further logical expansion of the relationship between viewer and work is the creation of interactive environments such as those realised by GRAV from 1963 onwards or environments created by Gruppo T since 1964 (see my Chapter 3, pp. 145-48).

The interest in the viewer has much more significance than movement or optical effects as such. In analogy to the communication models established by semiotics and information theory, the viewer becomes part of a relationship artist-object-viewer which implies that the artwork does not receive its legitimation from its intrinsic properties – such as the laws of composition in the art of Mondrian or the spatial objects of Constructivists – but only through the relation it creates with the viewer. This resonates with contemporary aesthetic theories such as Umberto Eco's ideas on *The Open Work*, published in Italian in 1962 (1989).

Burnham's perception of the art of NT as an *aesthetics of the relative field* was similar to how the work was understood by other contemporary observers. George Rickey was a kinetic artist and writer who placed NT within a 50 year continuity of *Constructivism* (Rickey 1967). Rickey thought that NT was about nature, 'but not nature as an outside, as landscape or still-life, but nature as a great fount of physical phenomena, inexorable laws, and orderly relationships.' According to Rickey, 'forces such as gravity, or energy such as light, serve as stimuli for the observer,' thereby 'supplanting' the older idea of nature in art. The new image of nature was one not recorded as a visual image but constructed on the basis of its inner laws, 'thus nature, as aerodynamics, mathematical relationships, probability, chance, or magnetic lines of force.' Confronting the viewer with this new image of nature, 'the artist himself then withdraws, sometimes covering his tracks by the use of an alter fabricator as his alter ego, and a title which reads like a science textbook' (Rickey 1967, p.81).

This is not that different from the way Guy Brett perceived NT in the 1960s when he curated *In Motion* (1966) for the Arts Council and wrote *Kinetic Art* (Brett 1968). More recently, Brett returned to the subject by curating the exhibition *Force Fields* (2000) for which he wrote the catalogue essay 'The Century of Kinesthesia' (Brett 2000, pp.9–68). There Brett states that 'speculation on the structure of the universe, for these artists, is inseparable from a transformation of the formal structures of art, and vice versa, that the formal transformation of art is itself a proposition on the structure of the universe' (Ibid., p. 10). The implications of this approach, according to Brett, 'question the art historical categories and schemas which have been handed down to us' (Ibid.). Brett claims that 'Kinetic work expressed the notion that there is no one centre. It was a focus for the aspirations of diverse peoples to be absolutely modern, to speak in universal terms, and to evolve further the contemporary perceptions of space and time' (Ibid., p. 61).

The implications of the new scientific paradigm of quantum physics for the social world have been outlined by Gaston Bachelard in *Le nouvel esprit scientifique*, first published in 1934 (Bachelard 1984). Bachelard argued that the obsolescence of Euclidean space also undermined a worldview based on a stable, representational reality. His chapter on determinacy/indeterminacy appears to be directly reflected in

some of the artist's statements and practices. The mobiles which Argentinian GRAV member Julio Le Parc produced at the time expressed the tensions between 'determination and indetermination' (Le Parc 1961a; Rosen et al. 2010, p.82). Le Parc used reflective pieces of glass or metal hung from strings and illuminated by a light source which was reflected through the space in irregular patterns.

The introduction of chance, probability and non-causality was supposed not only to reflect the new knowledge of science about physical matter on the quantum level but also had social implications. Bachelard's chapters on 'Determinism/Indeterminism' (Bachelard op.cit., pp. 100-34) and on Non-Cartesian epistemology (Ibid., pp. 134-177) furthered a reading which emphasised the social implications of the new physics. According to the view suggested in those chapters, psychological realism was tied to Newtonian Physics and used to justify heteronomic forms of government, whilst the idea of 'freedom', i.e. indeterminacy, on the micro-level of atoms and electrons, provided the foundation for an idea of social indeterminacy and autonomy.

This idea was further elaborated by the Greek-French political economist and philosopher Cornelius Castoriadis. In *Crossroads in the Labyrinth* Castoriadis (1984) argued that relativity theory and quantum physics had shaken not only the foundations of science but also of philosophy. The thinkable could not be thought anymore without thinking the observer. The notion of indeterminacy also implied a relief from determinism in the social world. Castoriadis drew those ideas together in 'The logic of magmas¹⁵ and the question of autonomy' (Castoriadis 1997b). 'Indetermination is not merely chaos or a statistical description' (Ibid., p. 308) but, on the individual and social level, 'autonomy understood as *ontological opening*' (Ibid., p. 310, my emphasis).

The new physics, while of immediate impact at the beginning of the 20th century, triggered a philosophical crisis which became productive in the 1950s and 1960s only. The thinking-through of the consequences of such paradigm changes or epistemic shifts may not even have been consciously influenced by natural science, as Vasarely wrote (Vasarely & Joray 1965, p.158). The formal but empirical

15 Castoriadis uses the term 'magma' metaphorically to describe psychological energies which have not yet found fixed form (cf. Castoriadis 1997).

enquiries of artists arrive at results which permit certain analogies to become evident. Or, as Vasarely put it, 'expressed in quanta by some, in plastic equivalents by others' (Ibid. p. 163). Umberto Eco also referred to quantum physics in his definition of the field. It 'implies a revised vision of the classic relationship posited between cause and effect as a rigid one-directional system: now a complex interplay of motive forces is envisaged, a configuration of possible events, a complex dynamism of *structure*' (Eco 1989, p.14 my emphasis).

The 'aesthetics of the relational field' offers a convincing entry point to the understanding of NT but still leaves open some major questions. Most of the artists involved in NT held leftist political ideas. Some groups such as N from Padua explicitly based their poetics on a Marxist analysis. But in which way did the artists conceive of their works as socially engaged? What differentiated them from Concrete Art? In which ways were those indeterminate relationships between works and the viewers considered topical?

Art and Structure

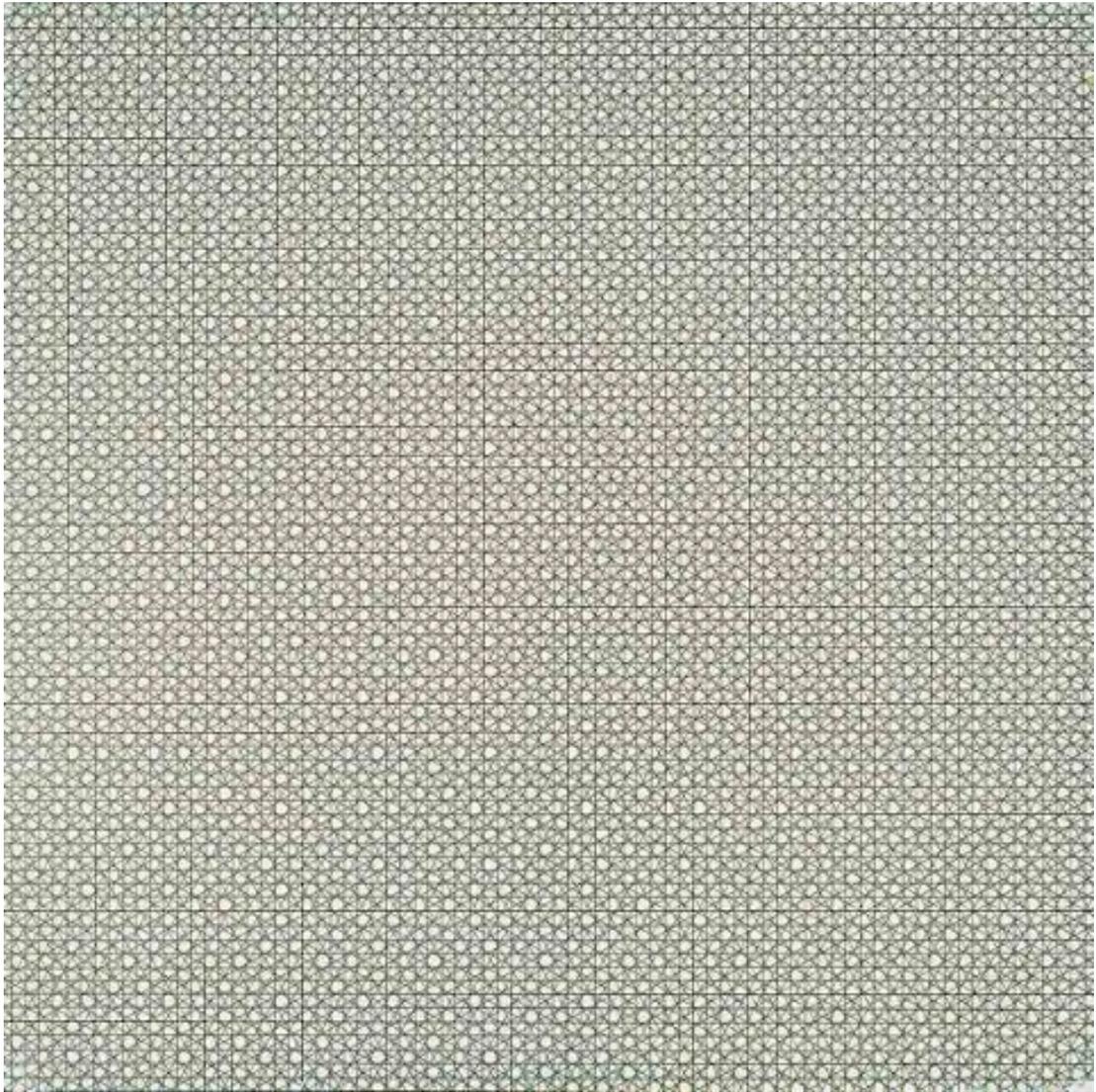


Illustration 9: Francois Morellet, 4 Double Grids 0°, 22.5°, 67.5° (1961); MSU Zagreb Nr.1255

Only a few years before *NTI*, in 1958 a new journal was started, *Structure*, whose early issues were strongly influenced by the reliefs of the American artist Charles Biederman. Biedermann had written the influential book *Art As the Evolution of Visual Knowledge* (1948) which transported ideas of the historical avant-gardes into the second half of the 20th century. NT artists were probably not aware of Biedermann and the journal *Structure* but there is a certain formal similarity. At the turn of the 1950s to the 1960s the notion of structure in art was gaining valency. In the writings of artists and critics involved in NT there were no explicit references to

the French structuralism of Lévi-Strauss and Barthes. Despite that, structure was very important in NT. Its visual structuralism had many different sources, some of which I am going to present in this section. Jack Burnham's *The Structure of Art* (1970) serves this investigation as a kind of guide in the background.

NT and structuralism shared similar roots in the shape of Gestalt psychology and semiotics. Jean Piaget explains that psychological *Structuralism* (1971) drew on the work of Wolfgang Köhler and Max Wertheimer, 'which became extended to social psychology by Kurt Lewin' (Piaget 1971, p.53). Köhler, who was trained as a physicist, and Kurt Koffka developed a *field theory of visual perception* (Köhler 1992; Koffka 1950). The assumption of Gestalt psychologists was that the relationship between an image and its perception in the human brain was based on the field structure of brain waves. 'Experienced order in space is always structurally identical with a functional order in the distribution of underlying brain processes,' thought Köhler (1992, p. 61). He called this the principle of psychophysical isomorphism (Ibid.). The structural analogy between what was perceived and the field structure of the brain enabled unmediated insight, explains Piaget (op.cit.). The field hypothesis was also related to 'the prevalence of good forms [as] a consequence of physical principles of equilibration and least action, the same principles that account for the sphericity of soap bubbles' (Ibid., pp. 56-7).

Piaget criticised the emphasis early Gestalt psychologists had put on the field for implying 'a slighting of all functional and psychogenetic considerations and, ultimately, of the agency of the subject' (Ibid., p. 55). The fundamental insight that 'complex perceptual units' have 'perceptual qualities which accrue to them as configurations' was considered to be a too mechanic 'physicalist' interpretation of the way the brain works (Ibid.). Neuroscience conducted more recently found out that the 'field theory' wasn't entirely wrong insofar as specific receptive fields do actually encode specific visual or chromatic stimuli in the area striatum (Ehrenstein et al. 2002). This however, does not amount to the 'brain images' early Gestalt psychologists had suspected to exist.

Thus, in the early to mid 1960s, for artists who engaged with Gestalt psychology but were no experts in the very latest neuroscience, the notion of 'structure' offered a

convincing explanation that tied together the thermodynamical law of a tendency toward equilibrium with the visual quality of 'good form' as a basic property of nature. Both were underpinned by the idea of structure as a self-regulating whole, a Gestalt (configuration) understood as a universally applicable principle. In the 1960s structure became the new 'central model of understanding' in science, architecture and art, claimed Gyorgy Kepes in the 'Introduction' to *Structure in Art and in Science*, (Kepes 1965, p.ii). Without making the reference explicit, Kepes returned to Giedion's concerns regarding the dangers arising from a gap between knowledge and feeling (Ibid.p. iv). Kepes demanded that 'there must be feedback to our central scale of values from the new vistas that confront us in the scientific, technological field' (Ibid., p. i). Invoking Gestalt psychologists, linguistic structuralism and natural sciences, Kepes claimed that structure was the new ordering principle which could be extended from inorganic structures to plants, animals, social behaviour patterns of animals and human relations (pp. ii-iii).

As Kepes' earlier book *The New Landscape* (1956), this new book was also richly illustrated, and particularly emphasised analogies between scientific images and visual structures produced by artists such as Max Bill, and NT artists Gerhard von Graevenitz and François Morellet. The visual examples revolved around the topic of isomorphisms between the micro-structures of nature made visible by scientific visualisation, and artistic practices aiming at producing images that would convey 'truth' to the viewer (Held 1965, p.50).

Concrete Art 'had emphasised the social responsibility of the artist and had underlined the fact that their art especially could have an effect on civilization and could bridge the gap between art and everyday life,' explained Margit Staber in her contribution to Kepes' book (Staber 1965, p.178). Artists such as Bill believed that the 'primordial pictorial order of Concrete Art could be understood as 'fulcrums' or 'centers of equilibrium' whose objectivity had a broad and general effect' (Ibid.) Artists should create 'psychic objects for intellectual use' which had a direct positive effect on the mind of the 'viewer' which would 'like 'medicine' even work subconsciously (Bill, n.p., quoted in Staber 1965, p. 178).

NT artists created structures whose principles of organisation were, they thought, isomorphous to those of micro-structures of matter and which corresponded with the perceptive field capacities of the brain. Visual perception was understood to be intricately related to 'knowing' (cf. Gregory 1977, p.10). The socially engaged artist had to create structures which would convey knowledge of the world adequate to its contemporary condition and the findings of science. Such a programme informed Max Bill and George Vantongerloo's work, who personified the link between NT and the interwar abstract avant-gardes. Drawing strongly on Bense's aesthetic theories Staber explains that Bill's paintings were characterised by 'a complete loss of semantic information', yet 'the aesthetic information [is] nevertheless of relatively high value' (Bense 1958, quoted in Staber 1965, p. 178). In other words, 'what constitutes 'meaning' in the traditional sense is introduced into the relationships of the formal elements themselves' (Staber, *Ibid.*). The traditional dichotomy between form and content was resolved by the form becoming the content. Yet NT artists went one step further.

Lancelot L. Whyte explains that the concept of structure supersedes the concepts of atoms, order and form (L. L. Whyte 1965). The focus on structure provides a different understanding of the world - the laws that govern the formation of structure assume priority. In other words, nature starts to be seen as being computed by an algorithm (or many different, complexly interwoven algorithms). The relationship between form and content becomes replaced by the one between code and its physical manifestation. 'Structure,' writes Whyte, is to the mathematical logician 'a formal system of relations of certain logical types, and the emphasis in all uses is on the relations rather than on the terms or entities which they relate. Structure is thus the antithesis of matter' (L. L. Whyte 1965, p.21).

It is for this reason that Julio Le Parc could write in the catalogue for *NT1*, 'Form has become neutralized; with no inherent value, it has become an anonymous element, evenly distributed according to simple rules whose relationships follow a rigid system that results in total homogeneity' (Le Parc 1961a; Rosen et al. 2010, p.82). In this approach was already contained a definition of art as *visual research* and the notion of *programmed art*. NT artists were striving to objectify the process of artistic creation. This meant to define an ordering system, according to which elements

assumed a place within a structure. Yet this programme of structure superseding form was based on a new mystification, as the following sub-section explains.



Illustration 10: Piero Dorazio, Esmeralda 3 (1961); MSU Zagreb Nr. 762

Grids

A major theme in the work of NT artists was the grid. Piero Dorazio's contribution to the Biennale of Venice 1960 had inspired the initial discussions between Meštrović and Mavignier. At *NT1* Dorazio's *Esmeralda III* (1960) was shown (see Illustration 10), an emerald green painting of grids superimposed on each other. This painting is, in the words of Marina Viculin, 'pointing to the infinite. A structure without substance. The structure is to become so absolute that matter disappears. It is a conceptual negative space' (2010, p.63).

The work of François Morellet shown at *NT1*, such as *3 Double Grids 0°, 30°, 60°* (1960) is closely concerned with structures resulting from overlaid grids turned against each other in different angles. Almir Mavignier's works such as *Rectangle* (1961d) distribute colour dots on a point based grid to create wave-like oscillations of colour and form. Eduardo Landi's *Visual Structure* (1961) is a line-based grid created using black rubber bands woven in and out of a white masonite surface whereby every second point of intersection is omitted. The result are two grids, one consisting of black crosses where the black rubber bands intersect on the surface, and a second diagonal grid emerging, as an optical illusion, from those intersections where the rubber bands carry on behind the surface. This effect is known as the Ehrenstein illusion, after Walter Ehrenstein sr. (Dresp-Langley 2009).

Grids occupy an important place in the history of art and visual culture, yet paradoxically 'do not appear to be the suitable subject for discussion, seeming to be beyond - or is it above, or below - discourse,' reasons Rosalind Krauss (1978). Historically, states Jack H. Williamson, the four basic grid sub-forms were directly related to the grid's symbolic content (Williamson 1986, p.15). Thus, for instance, the late medieval grid favoured the point-based grid whereby the points represented 'crossing points' between 'spiritual and physical reality' (Ibid., p. 17). The secularised worldview of Renaissance coincided with a shift to a field-based grid which 'defined a set of horizontal relations occurring on a physical plane' (Ibid. 18) The new field-based grid was of practical value for the development of Mercator projection for geographic maps and for artists who used grids for mathematical perspective construction and as a drawing aid (Ibid., p. 19-20). The Cartesian grid articulated

Descartes' philosophy of science. As a mathematical construct of the mind, it loosened the grids ties with reality.

At the beginning of the 20th century the Cartesian grid became the 'emblem of modernism'. According to Krauss it stated 'the absolute autonomy of the realm of art. Flattened, geometricized, ordered, it is anti-natural, anti-mimetic, anti-real' (op.cit.). In the work of de Stijl and Bauhaus artist's and architect's grids attained a new symbolic content. Not only were grids visualising 'the mathematical laws that rule matter, space, and time' (Williamson, op.cit., p. 22) the universalism of grids was also supposed to serve as an antidote to individualism which was seen by those internationalist modern artists as the root cause of the descend into the chaos of the First World War (Williamson Ibid. p. 23).

'Bauhaus artists,' argues Brian Holmes, put great emphasis on 'developing the potentials of the grid, as a sensible and yet also mathematizable mediator between the free-floating imagination and the constraints of the industrial process' (Holmes 2009). According to Holmes, the involvement of Bauhaus artists with grids tried to achieve 'a thorough-going abstraction of human identity,' promising an escape from the horrors of industrialised warfare and nationalism in First World War. 'In a period of overt political crisis,' Holmes concludes, Bauhaus' overarching ambition had been to find 'both a technics and a regulatory aesthetics for a cosmopolitan industrial democracy' (Ibid).

As Reinhold Martin argues, after the Second World War Bauhaus principles found entrance into US corporate architecture as a symbol of a new social form which he calls *The Organizational Complex* (R. Martin 2005). The principles of the pre-war avant-garde were translated into a cybernetic milieu by artist-theorists such as Kepes (R. Martin 2005, p.9). As Constructivist architecture became the International style, Kepes' ambition to bring order to the visual sphere was realised on the gigantic scale of skyscrapers with curtain wall surfaces and the campus architecture of the research labs of IBM and Bell Labs. Rather than treating those buildings as expression of brute corporate force, Martin suggests seeing their gridded surfaces and interiors as empty infrastructures which incorporate a new logic of horizontal, networked organisation. Kepes' set of visual technologies, argues Martin, 'enables us to

recognise the curtain wall and its topological innovations as modulations of a continuous dynamic field pulsing up and down in scale' (Ibid. p. 11). A new organisational logic arose which linked the corporation, the campus and the military. The patterned surfaces of IBM's and Bell Labs' research campuses expressed architecturally the convergence of the 'equilibrated organised complexity of the perceptual field, the social system, a unified science or even a unity of art and science' stated Martin (Ibid., p. 13).

Krauss reminds us that the 'the peculiar power of the grid' arises from its potential to both mask and reveal art's role as a refuge for religious emotion in an increasingly de-sacralised society. The grid, like all myths, 'deals with paradox or contradiction not by dissolving the paradox or resolving the contradiction, but by covering them over so that they seem (but only seem) to go away. The grids mythic power is that it makes us think we are dealing with materialism (or sometimes science or logic) while at the same time it provides us with a release into belief (or illusion, or fiction)' (R. Krauss 1978; 1985, p.12). Myth is a cultural attempt to deal with contradiction and allows for holding conflicting views in para-logical suspension, explains Krauss with reference to Lévi-Strauss' *Structural Anthropology* (1963).

The grids of NT artists such as Morellet, Mavignier, and von Graevenitz express not only a new aesthetic sensitivity but are also based on new structural principles. The grids produced by NT artists, however, are not Cartesian. They are not ordering systems used to place graphical elements on a plane. The artists lift the grid from the background to the foreground and make it the topic and subject matter of their works. While still Modernist in principle the grids in NT mark not so much a break or rupture, but a sliding shift to the new networked organisational logic.

The key lies in Krauss' analysis of the contradictory function of the grid. The visual structuralism of NT promised to transcend the form-content dichotomy by replacing it with one between code and materialisation. Their grids, by promising 'the final demystification of art' (Meštrović 1963; 2010d), produce a new myth. The grid in NT, to speak with Krauss, 'allows a contradiction between the values of science and those of belief to maintain themselves within the consciousness of modernism, or rather its unconscious, as something repressed' (Krauss op.cit. 1980, 1985, p. 13). At

the time of *NTI* a 'secret revolution' (Moles 1968a, p.6; Moles 2010b, p.264) was going on. With generous funding from military budgets in the US the foundations of computer science and technology were created (cf. Edwards 1996). After the Sputnik shock, the USA launched ambitious new projects to develop global communication networks.

The grids of NT were charged with symbolic content of a new world to emerge from the laboratories of Bell Labs, MIT and IBM. Through places such as HfG Ulm and teachers like Max Bense, Tomàs Maldonado and Abraham Moles, NT artists caught glimpses of this new reality under construction. In 1961 the grids of NT symbolized the transition from Fordism to a new yet unknown techno-economic paradigm. NT artists created grids as symbols of that future, expressing their anticipation of the transition to a utopian society. NT emerged during the old paradigm but was capable of visualising the new one. As NT artists were objectifying the creative process they were replacing the agency of the artists with the step-by-step-definition of rules, an algorithm. The grids of NT were hinting at the emerging logic of codes and networks in the new informational paradigm. While such a redefinition of art exorcised the old demon of its religious content, it contributed to the new historical myth of the technological society, and subconsciously bought into the structuralist myth of agency without a subject.

CHAPTER 2: Art as Visual Research (NT2, 1962-63)

'We are on the eve of a revolution in art which will be just as large as the one in the field of science. Therefore, common sense and the spirit of systematic research need to replace intuition and individualistic expression' (Morellet 1961; Morellet 2010a).

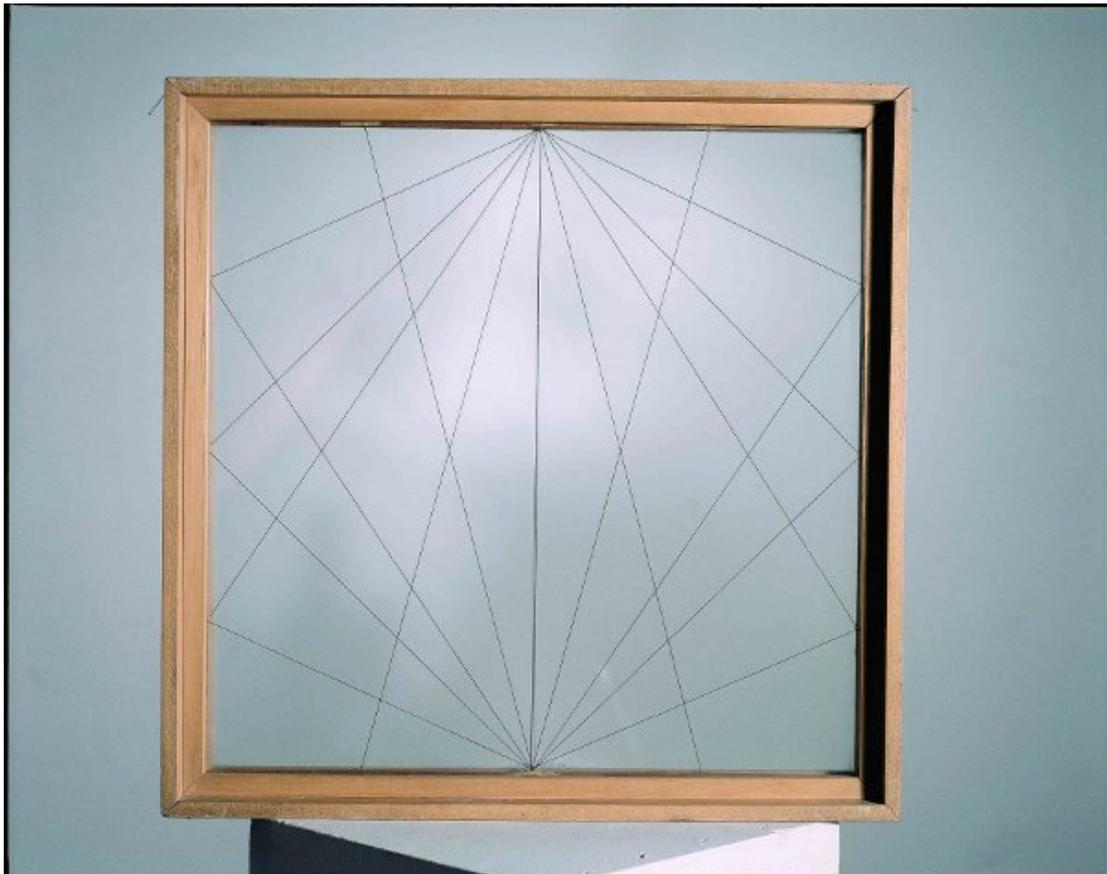


Illustration 11: Gruppo N, Manfredo Massironi, *Oggetto (Object)* (1961); MSU Zagreb Nr. 768

The first NT exhibition showed to the artists, 'that they were many, not one' (Meštrović 2009). 'After the opening of the exhibition on 3rd August 1961, the artists present met at a restaurant in the hills surrounding Zagreb,' and, 'discussed taking art onto new paths and releasing it from its established forms. Full of new intentions, the artists present on that evening – all of whom were young – established the New Tendencies movement' (Scholl 2006, p.278). 'The biggest surprise of the exhibition was the amazing kinship of the experiments by artists from different countries,

although these artists knew little about each other or frequently did not know each other at all,' wrote Mavignier. 'This phenomenon made us in Zagreb conscious for the first time of the existence of an international movement; a movement in which a new conception of art is revealed' (Mavignier 1970, p.n.p.; 2010a, p.345).

At *NT1*, the existence of a movement had been openly declared. Now it became necessary to define a programme (Scholl 2006, p.279). Through the combination of travelling, meetings and correspondence NT strengthened its ties as a network (Fritz 2009a; Fritz 2008a, p.176) and defined its agenda as an internationally oriented art movement. A scholarship allowed Matko Meštrović to spend half a year in Paris just after *NT1*, from October 1961 to February 1962 (Denegri 2004, p.126). There, he developed a close working relationship with members of GRAV, and also with Gerhard von Graevenitz from Munich who, by coincidence, also had a French stipend. The time in Paris allowed Meštrović to become 'more acquainted with the new ideas' and 'to develop his vocabulary' relating to emerging new notions in art (Meštrović 2010e).

Another frequent visitor to Paris at the time was artist Ivan Picelj who had several exhibitions abroad during those years. In 1959 Picelj and another former EXAT 51 member, Alexander Srnec, together with sculptor Vojin Bakić showed at gallery Denise René. In 1960 they had an exhibition at Drian gallery in London, followed by another one in 1961 and an exhibition *Contemporary Yugoslav Painting and Sculpture* curated by GSU at the Tate Gallery (Tate 1961). In December 1961 Picelj, Bakić and Knifer participated in *Art Abstrait Constructif International* (1961) at Denise René gallery (Denegri 2004, p.89).

This turn of events could give the wrong impression that Paris became headquarter of NT. Yet, during the same period, there was a string of exhibitions at Studio Šira, the workshop of a picture framemaker which became Salon G, an exhibition space for projects of the Gorgona group. There, initiated by Meštrović, François Morellet showed work in 1962. Denegri highlights how important this exhibition was in forging a friendship and developing ideas for *NT2* (Denegri 2004, p.126).

In Zagreb, plans took shape to turn NT into a biennale. The City of Zagreb was keen 'to make an important contribution to art, in music and the plastic arts' (Meštrović 2009). In 1961, the Music Biennale of Zagreb (MBZ) had been initiated by the composer Milko Kelemen. It had been decided that the MBZ and NT should be held together every two years and that the first instant of the combined events should happen in spring 1963. The meetings in Paris and the whole activity of networking happened with an eye on that major upcoming show. Meštrović acted as a kind of travelling messenger making 'three nights trips from Zagreb to Padua to Milan to Paris and back in the same way by third class in train' (Meštrović 2009; Meštrović 2010b).

The meetings in Paris were certainly also important. Photographs (Rosen et al. 2010, pp.104–105 Photos Archive Ivan Picelj; Denegri 2004, p.170 Photo by Carlos Cruz-Diez) taken in the confined studio space of GRAV in Paris in November 1962 show people wearing jackets, coats, warm pullovers; participants sitting on benches and low stools, forming a circle, engaged in intense discussions, reading out papers, wielding pens, gesturing; on other images, hands are folded, or buttressing tired heads. The working atmosphere must have been intense as the program for the new art was developed.

The appearance formed that GRAV gained a strong influence on the programme of NT (op.cit. Scholl 2006, p.278). This may partly be due to the importance of Paris as centre of fine arts, partly because GRAV were prolific producers of brochures and programmatic texts. In September 1961, only weeks after the opening of *NTI* in Zagreb, GRAV released the first of a number of programmatic statements. In a small leaflet produced on the occasion of the 2nd Biennale of Paris, GRAV stated their principles under the headline *Assez de Mystifications (Enough Mystifications)* (1961). They declared that the notion of the unique and inspired artist was an anachronism and that the stable, unique, definitive and irreplaceable work went against the grain of the current epoch. GRAV's 'point of departure' was the 'human eye' as opposed to the 'eye of the intellectual, the specialist, the aesthete, the sensitive' (Ibid.).

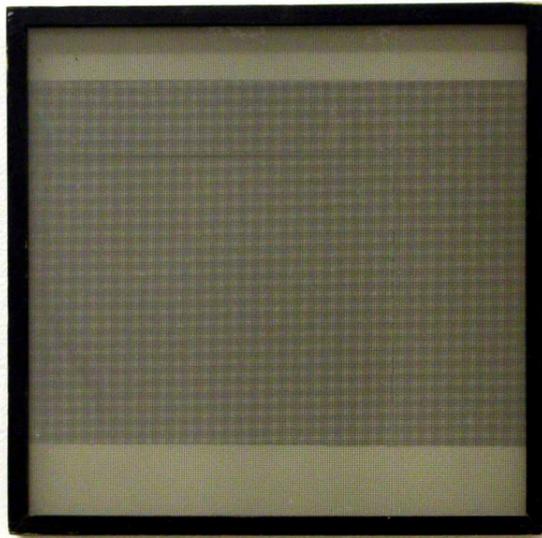


Illustration 12: Alberto Biasi, Optically dynamic surface (1960); MSU Zagreb Nr. 760

In April 1962, GRAV published a group statement under the title 'Nouvelle Tendence' (1962b) on the occasion of the exhibition *L'Instabilité (Instability)* at the Maison des Beaux Arts, Paris (Groupe de Recherche d'Art Visuel 1962a). In a sweeping statement GRAV declared that NT was implicitly critical of everything that existed in contemporary art, including 'lyrical abstraction, Informal art, Tachism, etc.', yet also a 'mannerism dwelling on geometric forms.' Only Neo-Dada and Nouveau Réalisme were viewed 'with a certain sympathy' (Ibid.). The authors conceded that NT still had something in common with these movements but was 'above all a search for clarity.' In a sentence which uses this term for the first time *continuous research* is proclaimed to 'transform the plastic activity into nothing else but making evident the primary elements' (1962b my emphasis).

Nouvelle Tendence, recherche continuelle (New Tendency, continuous research), often spelled *NTrc*, became the official name of NT when it was widely perceived as a movement. George Rickey believed that the term was officially adopted in January 1963 at a meeting in Paris (1964, p.276). The statement quoted above suggests an earlier usage. Moreover, the comparison between *Assez de Mystifications* and

'Nouvelle Tendance' shows the swift conceptual development taken after *NT1*. If GRAV had a strong impact on NT as a movement, then this can equally be put the other way round.

Next to the programmatic statement 'Nouvelle Tendance' GRAV published a list of 45 artists who belonged to this 'new tendency' as interpreted by themselves. Listed were three groups, N, T, and GRAV, yet members of the German Zero group and the Dutch Nul group were not listed as groups but subsumed as individuals under the 'neo-dada nuance'. This activity of drawing lists would soon bear consequences (see sub-section Breton Moment, pp. 126-130). Susanne Scholl has analysed the letters which were circulated in 1962. They constantly revolved around the question who belonged to NT and who didn't. Piero Manzoni was the first to become excluded because allegedly his work *Merda d'Artista* (1961b) did not fit the criterion that work should be comprehensible solely through the viewers perceptive faculties and would not have to rely on additional explanations (Scholl 2006, p.279).

In Zagreb, Radoslav Putar, Boris Kelemen, Matko Meštrović and Božo Bek formed an organisational board who decided together which artists and works should be included. Radoslav Putar (in the name of the organisational board) wrote to Otto Piene of Group Zero that 'through the materials you sent us we are familiar with your latest work, The board of NT2 found those works very interesting but in a certain sense and to no small degree in opposition to the spirit of NT. The board has nevertheless decided to show your works in the exhibition. If possible, please send the work *Rauchbild (smoke painting)* [...] as quickly as possible' (Putar 1963b). On the same day, Putar sent out a number of similar letters. Günter Ücker, also of group Zero, was asked 'please send work which is more in spirit with NT' (Putar 1963a). Dutch artist Herman de Vries was informed that the board had 'examined the plastic orientation of [his] work' and had 'decided that the character of the works strongly exceeded the borders of the programme.' Therefore the board asked 'not to send those works. This does not mean that we don't want to work with you. On the contrary, please keep us informed about your work' (Putar 1963c). The work of de Vries which had been rejected was *Random Objectivations* (1962-1975), a series of works begun in 1962 and carried out well into the 1970s (Gooding 2006). *Random Objectivations* were shown in NT in 1968/9 as part of *t-4*.

GALERIE GRADA ZAGREB
ZAGREB

GALERIJA SUVREMENE UMJETNOSTI
Zagreb - Katarinin trg 2.
"Nouvelles tendances II^o"

Primitivo	102.63
Dati	
10/82	01

NOTIFICATION DE L'OUVRAGE

Nom de l'auteur *Albert Biasi del gruppo enne*

Nom du groupe d'auteurs *Albert Biasi Edoardo Sestini del gruppo enne*

1° APPELLATION DE L'OUVRAGE *Cinoretico spettrale n. 4*

- Année de réalisation *1963*

- Matériel *plexiglas, legno, smalto, ottone, alluminio, lampade, lenti - motore*

- Dimensions *cm. 90 X 90 X 20*

- Prix d'assurances: *50'000* Prix de vente *250'000 (lire ital.)*

2° APPELLATION DE L'OUVRAGE *struttura cinospettale n. 1*

- Année de réalisation *1963*

- Matériel *Vinil, plexiglas, alluminio - lampade - lenti*

- Dimensions *cm. 60 X 60 X 10*

- Prix d'assurances *60'000* Prix de vente *180'000 (lire ital.)*

ANNEXES:

1° Photos de l'ouvrage

2° Photo personnelle *vi abbiamo inviato delle foto di Paolo (v. pag. 100 di)*

3° Texte (explication de la signification de l'ouvrage, point de vue de principe sur le thème) *si ved. pag. 3 e 4 di [] bollettino n. 2*

4° Données biographiques

Date *27 - giugno 1963* Signature *Albert Biasi*

Les ouvrages doivent être restitués à l'adresse ci-après:
ci risponderemo in seguito (ma dove la veniamo a riprenderli noi stessi)

** Albert Biasi - n. nel gruppo 1937 -
- dal 1953 appartenente al gruppo enne
- studi: architettura e di spazio industriale
- vive a Zurigo*

Illustration 13: Participation form, Alberto Biasi, Group N, (1963) Archive MSU Zagreb

Scholl gives the impression that there was a kind of Jacobin wind blowing from Paris and that Zagreb was complicit in this. She bases this on the fact that the artists were asked to fill out forms with information about themselves and their works and that those were like 'application forms' used for the selection of artists for the upcoming 2nd exhibition in Zagreb (Ibid.). In fact the case was that all artists always had to fill out forms throughout the existence of NT (see Illustration 13 for example). This was

simply the way GSU had decided to rationalise the organisation of big exhibitions. Furthermore, Zagreb had decided on curatorship by committee and asked artists to submit information in order to have a shared basis for decision making. The letters bear evidence of such a process, with signed stamps of received dates and important letters signed by several members of the board in different ink to acknowledge they had read the respective letter. Meštrović recalls that selection criteria 'had been mostly implicit, intuitive and in permanent evolution' and that artists and their works were discussed with his colleagues on the basis of a 'good mutual understanding' (Meštrović 2010e). Taking all evidence together it seems that in the run-up to *NT2* in 1963 a conscious attempt was made to formulate a cohesive position which was carried over into the selection process and which occasionally led to aspects of a bureaucratic formalism.

Art as Research

NT wanted to find a new mode for the production of art which would be adequate for the new world which was coming into being. The place where they found such a new way of making art was science. This does not mean that NT artists created works that would now be subsumed under an 'art and science' label. When Morellet spoke of the 'eve of a revolution in art that would be just as large as the revolution in science' (op.cit.) he spoke of a radically different way of making art which took inspiration from science, but was still a way of making art. Morellet and his colleagues did not fancy themselves to be scientists. The aim of their research was not to contribute to the canon of scientific works but to conduct *visual research*. They created optical phenomena which were to be exhibited and thereby tested. This, from their point of view, was the most radically new way of making art. Art as research for intrinsic reasons implied that the way of working could neither be individualistic nor subjective. In order to obtain the quality of research, the content of the work had to be stripped of any signs of individualism. Therefore gestural painting or spontaneistic creation was out of question. Such works would merely be an expression of a specific psychological state of mind of the artist and compromise the quality of the work as research.

NT artists were striving to create optical phenomena which, according to the Gestalt psychology's field theory, would correspond to the structure of reality and the structure of the mind. The goal was to determine 'the objective psycho-physical bases of the plastic phenomenon and visual perception' wrote Meštrović in a seminal text in the catalogue of NT2 (1963; 2010c). Meštrović expressed the expectation that the innovations of NT 'in the visual domain,' would change 'our ability and manner of perceiving visual phenomena, which by being perceived, or mentally adopted, enhance our entire perception apparatus' (Ibid., p. 116). Such improvements of perception should make people better prepared for the 'complex phenomenology of the world and society' (Ibid.). To come closer to such a goal, artists had to find rigorous methodologies for the creation of work to qualify as 'experiment'.

In a statement on art as research published in the catalogue of the exhibition *L'Instabilité* (1962) François Morellet declared: 'A real experiment should [...] be carried out, based on controllable elements, whereby systematic progress would be made by following a program. The development of an experiment should run on its own, almost outside the control of the programmer.' Such 'programmed experimental paintings' would match the 'need of the audience, which is keen to take part in the 'creation' of works, is keen to demystify art and wants to understand things a little bit better;' those experiments would also provide material for a 'new science of art', based on 'psychology, in particular on the transmission of messages' (Morellet 1962a; 2010b, p.92).

This definition of research was based on Morellet's own experience over the previous 10 years. Morellet had started to work as an artist around 1950, then influenced by Piet Mondrian, Paul Klee, and the Bauhaus (Lemoine et al. 1991). Slowly he developed his own methodology increasingly focusing on grids. A formative experience was a trip to Andalusia, to Malaga and Sevilla where he studied Arab ornamental art (Ibid., p. 28). Morellet started producing many small studies with pencil on paper. Rather than drawing freehand he used templates and even Letraset. Morellet's studies became based on strict applications of 'rules of play', as opposed to composition. He began experimenting with 'the superimposition of two identical forms', 'harnessing chance' by strictly adhering to self-imposed rules such as 'using the number Pi' (Ibid. p. 32). What Morellet tried to achieve thereby, was not just 'aesthetic enjoyment' but 'a deeper understanding of [his] own aesthetic sensations'. To transfer those results from small drawings done with templates and Letraset onto large scale paintings 'caused [Morellet] great difficulty' (Ibid., p. 38).



*Illustration 14: GRAV, *Instabilité* (1962), Brochure, Archive MSU Zagreb*

Each NT artist developed a research strategy adequate to her or his own way of working. Julio Le Parc researched 'surface-sequences' beginning with chess board pattern effects of progression and juxtaposition. Introducing small changes into sequences 'gave rise to impressions of new and surprising structures, a form of movement which we might call consecutive. Each small modification of the sequences brought in fact evidence of a different structure' (Popper 1968, p.103). This way of working eliminated the subjective element of 'creativity' (Ibid.). Those works have 'no aesthetic pretension', 'they are designed purely as a means of provoking the spectator to action' (Ibid., 150).

Le Parc's approach was shared by other members of GRAV who 'were looking for a constant relationship between image, movement and time, which would only make itself manifest, in their opinion, within a "field of vision." Their interest lay exclusively in the object/eye relationship, rather than in the object considered for its intrinsic plastic properties' (Ibid., p. 103). The 'spectator was not invited to contemplation or passive consideration of the work, but should take an active part in its enactment, which is a matter of constant variation either as a result of his own

movements or because of the intrinsic mechanisms which keeps it in a state of continual movement and change' (Meštrović quoted in Popper 1968). Graevenitz used simple, rationally ordered progressions of micro-structural elements, controlling those micro-structures through statistical random elements (Popper 1975, p.32). The work exploits the brain's tendency to find ordering principles among equally distributed shapes on a surface. Through the searching gaze those visual elements get animated in the mind of the viewer. In some objects, the microstructural elements were moved by a motor so that through the combination of real and imagined movement even more complex structures came into being (Ibid., p. 33).

Many works of NT artists exploited phenomena known from textbooks of Gestalt psychology, such as the phi effect (virtual motion), visual ambiguity (i.e. perception of 3D images from two-dimensional forms, or non-decidable images where background and foreground keep switching), after-images, colour- and size-constancy, virtual distortion of forms. A good summary of the state of research that would have been accessible to NT artists was *Eye and Brain* (Gregory 1966). The Italian artists' engagement with the science of perception was in all likelihood influenced by the strong presence of Gestalt psychology at the university of Padua, where Vittorio Benussi, one of the founders of this branch of psychology and physiology, had been teaching in the 1920s (Meloni 2009b, p.73 footnote 4). Benussi's students Cesare Musatti and the latter's students, Fabio Metelli and Gaetano Kanizsa, helped to develop Gestalt psychology in Italy and furthered its cross-fertilisation with phenomenology and psycho-analysis (Weibel 2007a).

NT artists did not simply apply known perceptual phenomena as a scientific ready-made, but took them as starting points for their own explorations. Turning the artist's studio into a psycho-physiological research laboratory, they performed practical and empirical research to create new versions of known effects or even completely new effects by using new materials such as light and moving elements. Rather than seeing themselves as scientists the artists were providing an empirical foundation for further scientific research (Morellet op. cit.). The perceptual researcher Julian E Hochberg confirmed scientist's interest in those works writing that 'the study of the results of prolonged visual disturbance [was] critically important in the understanding of the perceptual process' (1969, p.121).

The search for structures which corresponded to the psycho-physical reality of perception led to the invention of 'programmed art' (see below, pp. 109-116) based on the objectification of the production process of art. Although no computers were involved each procedure for producing an art work was based on an algorithm, a set of instructions which was defined so exactly that it could be carried out by a machine or by workers in a workshop. Such an objectification of the creative method antedated conceptual art as formulated for instance in Sol LeWitt's 'Paragraphs On Conceptual Art', first published in 1967. LeWitt wrote that 'all the planning and decisions are made beforehand and the execution is a perfunctory affair' (1996, p.846).

Research as Anti-Art

The production of programmed art in a research oriented process was an anti-art statement. The rigorous examination of optical phenomena would create results of an inter-subjective quality which would be accessible to any viewer, and not just those with an art education. A mediation would be created between the structure of the artwork and the psycho-physical structure of perception. 'It was in a sense proletarian,' declared Cyril Barrett (1971, p.36). The intended audience was not one of art specialists but members of the public whose day-to-day visual environment was shaped by the forces of modernisation. As this audience was free from the pre-conceptions of an educated bourgeois art public, it would be capable of engaging directly with the new visual phenomena created by NT artists. Such a 'proletarian' approach also implied that 'the artist could no longer claim the usual recognition accorded him and his unique masterpieces by bourgeois society' (Ibid., p. 36).

This programme combined research with an anti-art stance in such a way that both were mutually dependent on each other. As GRAV wrote in 'Propositions Généralés' (General Propositions) (1962c) a key position paper written in October 1961, the goal was to 'strip the conception and the realisation of works of art of all mystifications and to reduce them to simple human activity'. This was combined with the idea 'to liberate the public from the inhibitions and warping of appreciation produced by traditional aestheticism, by creating a new social-artistic situation.'

(1962c; 1968). As Meštrović put it, the task was the 'demystification of the notion of art and artistic creation,' and 'debunking the art market, which speculated with art treating it contradictorily as a myth and a commodity' (1963; 2010d).

The 'demystification of art' and critique of the art market were not really new propositions. What was new was the specific way through which NT tried to achieve this: through the formula 'art as visual research.' Abstract art had tried to resolve the dichotomy between form and content by collapsing it: form became content. The elements of a picture did not reference reality, they tried to create a new reality. The artwork was to be non-representational, non-objective, pure form and colours in painting, or pure function in design. The problem however was that despite the formal purity of the work, as soon as it entered the art market, myth would always return. The mythical function of art is not just based on its residual religious content (see Krauss, above), but on commodity fetishism (see my Introduction, pp. 33-36).

NT artists thought that by defining art as research, they could prevent artworks from becoming artistic commodities. GRAV's 'Propositions' stressed the 'non-definitive work' (1962c; 1968, p.251). GRAV proposed to transform 'the usual values of art' by limiting the work to a 'strictly visual situation,' and 'to establish a more precise relationship between the work and the human eye.' To achieve this they had to rely on forms which were 'anonymous' and completely 'homogenous' to avoid any possibility of the elements of work lending themselves to acts of interpretation (Ibid., p. 251). The works to be shown eventually in an exhibition were preliminary results of an experimentation process, not finished *artworks*. If a work was not satisfactory it would be replaced by another one, based on a modified algorithm. Works were defined as objects which in principle could be built by everyone. This set of ideas was particularly strong in the practice and writings of Group N. Critique of a market which mystified their works (Massironi 2009, p.361) led artists to define their works as research producing objects which could be reproduced by everyone (Meloni 2009a, p.131).

The Group Phenomenon



Illustration 15: Members of group Effekt at the opening of NT2 (1963), photo MSU Zagreb

For group N from the definition of art as visual research directly followed the necessity to organise in groups as a kind of artistic trade union or revolutionary cell (Massironi op.cit., p. 362). For other groups active in NT it was the neutrality of 'visual research' which opened up the possibility for collaboration. The notion of an art group or movement was nothing new per se. In NT however groups had an overwhelming presence, it was almost like a movement of movements. In the initial years groups participating in NT were Paris based Group d'recherche d'art visuel (GRAV), Padua based Group N, Milan based Group T and Dusseldorf based group Zero, also joined by Equipo 57 Spanish exiles in Paris, Effekt from Munich, NUL based in the Netherlands, groups Anonima and ARC from USA, MID, from Italy, Dvizidenje from the USSR, and a number of other groups who played a less prominent role.

Valerie L. Hillings traced the correspondence and 'bulletins' communicated between 1961 and 1965 in minute detail but did not analyse the reasons *why* artists formed groups (Hillings 2006). Hillings' starting point was a diagram drawn by Zero member Heinz Mack in 1970 (Ibid., [image] p. 76) which wrongly gave the impression that NT was a group among other groups. While NT reasonably may be called a 'movement' the number and character of participants was always too big and diverse to allow for the 'group' label. Rickey states that 'groups have always been a disease of the young, [...] they tend to dissolve as members achieve success and fame' (Rickey 1964, p.278). Rickey continues, 'the New Tendency artists could be different; the very nature of the "research," their aesthetic (or non-aesthetic), and their principle of self-effacement preclude individual expression and display of talent. Personal style, preference, and bias are eliminated. This brings their cooperation close to the anonymous team work of scientists' (Ibid.) Burnham argues in a similar way that 'sharing results toward small but real increments of plastic progress became a legitimate posture for the New Tendency artist' (Burnham 1968, p.241). The group facilitated an intense discourse and exchange. Group T, for instance, 'was like an alternative educational institution, discussing phenomenology, existentialism, information theory and semiotics,' (Steinle 2008, p.15). The Italian Group N and Spanish group Equipo 57 even signed their works collectively, whereas other groups, while working out a strong shared programme, still preferred to assign individual authorship to works.

Collaborative work in groups was made possible through the definition of art as visual research. All the consequences which followed from there, the anonymity and homogeneity of the materials and forms, the anti-individualistic approach and the notion of programmed art allowed artists to distance themselves from the typical ego-maniacal approach hitherto associated with artistic creativity. One participant, the Austrian artist Marc Adrian produced a theory of 'methodic inventionism' (Adrian 2007b, pp.394–395) influenced by the Chilean poet and anarchist Iván Contreras-Brunet. The production of art would be conceived of as creating 'rational instruments' which would be made available to the general public so that poetry would be made by all, in reference to Lautréamont¹⁶ (Bogner 2007, pp.40–41).

16 Comte de Lautréamont was the pseudonym of French writer Isidore Ducasse (1846 - 1970) who said that 'poetry must be made by all, not one' in *Poésies II* (1870)

Through the quasi-scientific attitude, collaboration became less problematic than in art forms based on self-expression of an individual. In this early stage, when NT defined itself as a movement, it was all about the 'ethics of collective living' as quoted above (see Meloni 2009b, p.45). The collectivism of NT was connected to the socially progressive ideals of the artists involved who tried to redefine art in a way more suited to the social forms of societies based on mass production.

The Scientification of Art

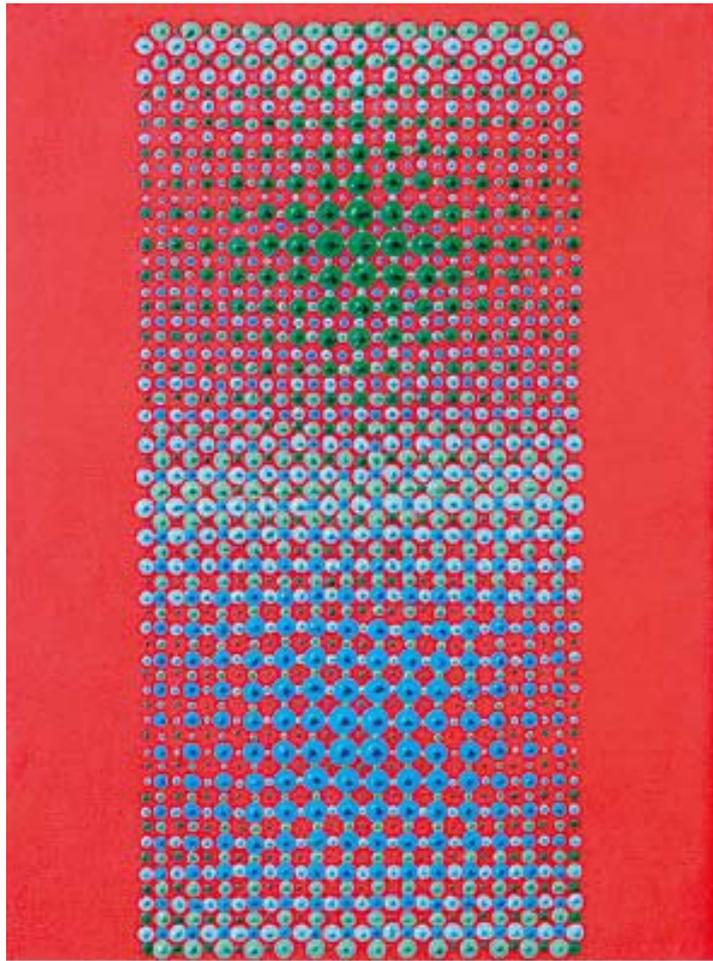
The intersubjective model of art as visual research on one hand provided the opportunity for collaborative visual research and to potentially sidestep the market. On the other hand this opened up art to an unprecedented scientification. As Morellet had stated, artists were not scientists themselves yet their empirical research provided the material for a 'new science of art [...] psychology, in particular the transmission of messages (Morellet op.cit). Max Bense and Abraham A. Moles who both at different times were teaching at HfG Ulm each developed a scientific aesthetic theory. This new science of art brought together semiotics, information theory, psychology, sociology and, above all, cybernetics.

Max Bense defined the artwork as a sign, based on Charles S. Peirce's definition of the sign as 'something that stands to someone for something in some respect or capacity' (1991, p.141). The artwork as sign then became a message in a communication system based on Shannon's model of transmitter-channel-receiver (Shannon & Weaver 1949). Bense announced 'sign processes become information processes, sign aesthetics becomes information aesthetics' (1965, p.123). The terms of information theory allowed Bense in the third part of *Aesthetica* (1965, pp.187–256) to equalise the measure of information with the measure of the 'stylistic properties' of an artwork. The artwork was understood by Bense to be a macro-sign consisting of micro-signs. Bense stated that since in the production of an artwork freedom of choice was highest at the start and declined over time, the probability of choices could be calculated according to the rules of stochastic processes (Ibid., p.

214). The aesthetic characteristics of an artwork became measurable, defined in terms of a distribution of elements, their probability and redundancy (Ibid., p. 215).

The key to that was Birkhoff's theory of *Aesthetic Measure* (1933) which Bense augmented with the inclusion of information theory (Bense 1965, pp. 317-342). For Birkhoff, the aesthetic measure M resulted from the quotient of order O , and the complexity C of an artwork. Bense translated C into the statistical amount of information and O into subjective redundancy both of which could be expressed by the measure of entropy (Ibid., p. 329). Artistic originality then was the measure of innovation, as the ability to introduce unforeseen elements (Ibid., p. 330), and 'information aesthetics' the systematic application of information theory to aesthetic analysis but also, and increasingly, in consideration of its 'synthetic capacities' (Ibid., p. 331). Bense used Mavignier's paintings as examples for his aesthetic theory.

Mavignier had started painting 'dots' in 1954 when a student at HfG Ulm. Mavignier acknowledges the influence of other teachers at Ulm on his dot paintings. Helene Nonne-Schmidt relayed to him an idea from Paul Klee who said that 'if a line meets another line, they meet in a point, and this point is an energy point, which contains the whole power [Kraft/force] of the two lines meeting there' (Hoffmann & Schmidt 2002). Josef Albers' teaching on colour and perception provided another important facet of Mavignier's education at Ulm. Albers' investigation into colour relations were of key importance for many NT artists (Popper 1975, pp.10–11) Yet it was Bense's teaching of semiotics and information theory which had the greatest influence (Krampen & Hörmann 2003, p.23). Mavignier created dot based grids of colour progressions along geometric forms. At some point he started to use the head of a nail to apply paint in such a way that little cones were left standing. Progressions of dots allowed him to deform geometrical structures and discover 'unknown geometries' (Mavignier 2010d).



*Illustration 16: Almir Mavignier, Rectangle (1961);
MSU Zagreb Nr. 763*

Although produced with painterly methods, Mavignier's pictures look, especially from a distance or as photographs, as if they were technically produced. Mavignier came to see the distribution of dots on a surface according to Bense's ideas about order and redundancy, trying to achieve more with less, an optimised balance between expenditure of energy and communicative value. Mavignier's dot-based grids are like prototypes for the information aesthetics of the network age: arrays of coloured bits optimised for the circulation in electronic networks.

Bense and Abraham A. Moles had initially developed their theories independently yet began to influence each other and acknowledged this in their writing. Moles' *Théorie de l'information et perception esthétique (1958)* which appeared in English under the title *Information Theory and Aesthetic Perception (1966)* was even more

technically oriented than Bense's work. Moles imagined and described in detail a computer-based system which would be capable of analysing and producing artworks. What both fundamentally shared was the idea that the aesthetic value of an artwork could be scientifically rationalised. Echoing Warren Weaver's final passages in the introduction to Shannon's work, they thought that 'entropy not only speaks the language of arithmetic; it also speaks the language of language' (Weaver 1949, p.15). As Weaver, with reference to Shannon, initially pointed out, the concept of information in information theory has nothing to do with meaning. In an about-turn at the end of his paper, Weaver claims that 'the powerful body of theory concerning Markov processes seems particularly promising for semantic studies' (Ibid.). Bense and Moles thought that with the help of computers objective rules for the definition of beauty could be formulated. Claudia Giannetti pointed out that in the long run this project failed on its own terms (Giannetti 2004, p.53). Yet for a number of years this idea had a strong appeal and contributed to a narrative about the power of science and the growing abilities of electronic calculating machines.

Aesthetics and art, however, are not one and the same thing. Even if it was possible to produce objective criteria for what is beautiful and those criteria could be used for a painting algorithm, the result would not necessarily be art. This is not because of an intrinsic philosophical barrier against 'computers making art' but because what is art and what is not is a social category which, by definition, cannot be the subject of a natural science. The social determination of art was acknowledged in *Pour un art abstrait progressif (For a Progressive Abstract Art)* (Morellet & Molnár 1963; 2010) where the painter Morellet and the theorist François Molnár¹⁷ tried to develop a theory of progressive abstract art which was compatible with historic and dialectic materialism.

While using Bense and Moles' theories and some of their sources such as C. W. Morris and C.S. Peirce, they also reflected on Henri Lefebvre's notion of *Dialectical Materialism* (2009) and Lenin's work on Hegel in *Philosophical Notebooks* (1963). The authors recognised the importance of the social sphere for the perception of

¹⁷ François and Vera Molnár were co-founders of GRAV in 1960 but then did not participate in the artistic activities. Vera Molnár became known as an expert in symmetry studies and computer artist. François Molnár was originally trained as a painter in Hungary, yet chose, after studying experimental psychology, to pursue a scientific career at the newly founded Institute of Aesthetics and Art at the Sorbonne (Rosen et al. 2010, p.136).

artworks. They tried to find a way of considering both, the 'physiology of the field of vision' and the social determination of art, its rootedness in the concrete historic experience of producers and viewers. Both areas are 'concrete lines of research'. 'The essential thing is that in making visual work and critically examining it, it should not be necessary to descend into the murky depths of metaphysics' (Morellet & Molnár op.cit., p. 141-3).

In 'The Ideology of the New Tendencies'¹⁸ (1963; 2010d), a text written for the catalogue of the second New Tendencies exhibition, Meštrović set out an ambitious programme for NT. He thought that in the current historical stage 'the classical forms of capitalist society [were] dismembered and dissolved by an inner revolution of the productive forces.' Meštrović explored the contradiction between 'the inevitable process of socialization' as 'the world's historical perspective' and the reasons why this process was constantly impaired by alienation, whether in capitalist or socialist societies. Meštrović demanded that the 'equal distribution of all material and spiritual goods' (Ibid. p. 115) should be made the measure of all further developments whether in science, production or the arts. Although deeply critical of the 'objectification' of science into 'constant technological and industrial progress,' Meštrović argued 'we must not neglect science but make it our own.' He implied a specific purpose of art: as a 'positive attempt at understanding historical realities and the laws of transformation,' not just as a theoretical exercise but with the intent of 'extending its energies into immediate social action.' Meštrović expected that through the art of NT 'transcendentality as a human explanation of the non-human' would disappear. This implied that 'the notion of art must be erased as such, while art should be subjected to necessary scientification' (Ibid., p. 117).

In order to understand the demand expressed here for a 'scientification' of art, it is necessary to read this text alongside with another text written he wrote at about the same time, in 1963, 'Scientification as a Condition for Humanization' (1967b; 2010a). Here, Meštrović stated that regardless of ideology, whether from a capitalist

18 Published without title in the catalogue of NT2, it was translated into Italian for the follow-up exhibition in Venice and published there under the title *Analisi sociologica di 'nuova tendenza* (The Sociology of the New Tendency). The text was republished in Matko Meštrović's book *Od pojedinačnog općem* (From the Particular to the General) as *Idelogija Novih tendencija* (The Ideology of the New Tendencies) (1967/2005), the title that finally stuck so that it is also used here.

or Communist viewpoint, the two processes that really characterised the time were 'the process of industrialization, i.e. urbanization, and the process of socialization.' Meštrović suggested that 'this experience finds its most objective expression [...] in science' whereby this referred not just to the 'natural sciences and humanities,' but 'the integrative nexus of all knowledge, including philosophical knowledge; contemporary science, of course, is not equal to this yet.' It was only based on such an understanding that a 'total scientification of the world' was called for. The 'absolute scientification of man' would be bound up with the 'absolute humanization of science' (Ibid.). Art's task was the 'transformation of the artistic act into a social act and vice versa.' Only then we could see 'the abolition of the necessity of art as a separate social phenomenon' (Meštrović op.cit., p. 117).

Meštrović' ideas about scientific humanism echo aspects of Engels' *Socialism, Utopian and Scientific* (2006), written in 1880, and Marx' and Engels' position regarding art as expressed in *The German Ideology*: 'The exclusive concentration of artistic talent in particular individuals, and its suppression in the broad mass which is bound up with this, is a consequence of the division of labor. [...] In a communist society, there are no painters, but at most people who engage with painting among other activities' (Marx & Engels 1970, p.109).

Meštrović assumed a Productivist position which in turn was based on the ideas of Saint-Simonists (see my Introduction, p. 30). Like the Russian Productivists who stopped producing formally innovative abstract art and tried to participate actively in the development of the productive forces in the post-revolutionary Soviet Union, Meštrović suggested a guiding role for art in shaping industrial production and urban development. Kiaer's study of Productivism (Kiaer 2008b) excavated an early text by Arvatov about "*The Socialist Object*" (Kiaer 1997). Arvatov had developed a theory about objects of the everyday which were mass produced but not 'commodities' in the capitalist sense. The design of those objects would not only consider their forms but also the social relations regarding their production and usage. HfG Ulm's design discourse with which Meštrović was familiar, upgraded Productivism. In 'Science and Design' Bonsiepe and Maldonado demanded that the designer should not only alter the outward appearance of things but apply 'sociological imagination' (Bonsiepe & Maldonado 1969).

Shortly after *NT2*, in 1964, Meštrović was to dedicate himself to the newly founded Centar za industrijsko oblikovanje (Center for Industrial Design). His writing in the early 1960s revolved around topics not only concerning art, but also architecture, urbanism and industrial design. A collection of essays in bookform *Od Pojedinacnog Općem* (1967a) dealt with topics such as the Jugomont 61 system for prefabricated housing and the 'synthetic urbanism' of Exat 51 co-founder Vjenceslav Richter (Ibid., pp. 321-328). As Yugoslavia was in a process of catch-up modernisation, issues of design and urbanism had an urgency around them. A socialist functionalist general urban plan for Zagreb was devised by Vladimir Antolić who had worked with Le Corbusier in the 1920s, and foresaw the building of a new city centre along the Avenue of the Proletarian Brigades as its main axis. Invited by Zagreb's enterprising mayor, self-managed companies created their own housing cooperatives and became main investors in grand scale modernist building projects. The city commissioned a new city hall and the Workers' University (Blau & Rupnik 2007, pp.176–201). The Zagreb trade fair was consciously used to create a consensus around modernisation projects and the introduction of mass consumerism in Yugoslavia (Ibid., p 224). The exhibitions showed workers how to shop in supermarkets and how to make the best use of modern furniture optimised for the 'machines for living' they were about to inhabit (pp. 214-233).

A Croatian team of three architects had developed the Jugomont 60 and 61 system for prefabricated housing. Made from standardised, pre-fabricated concrete blocks, Jugomont 61 was more than just the usual postwar scheme for cheap and quick building. Optimised for Fordist mass production in the new 'machine age' (Banham 1962) it was conceived as an open system around a few core components which was adaptable to different conditions and would be permanently serviced and renewed by the Jugomont company. Jugomont 61 became a success with housing cooperatives and inhabitants and was franchised to other parts of Yugoslavia. Success stories such as Jugomont 61 gave reality to the idea that a better world could be created through advanced technology, architecture, design and art.

Yugoslav self-managed socialism was genuinely different from Stalinism as it gave workers more scope for self-defined initiative as collectives. Politically Yugoslavia

remained a one-party state, but economically it resembled the 'mixed economies' of Western Europe which in countries such as France, involved strong aspects of state planning (Lieberman 1977). While opening up to the West, the 'Yugoslav experiment' allowed forms of collective participatory and emancipatory projects distinct from capitalism's narrow definition of individualism. At that particular moment in time the unification of art, science and socialism into one humanistic and emancipatory project appeared possible, if still utopian to a degree. The future turn of events would close off such a different path of development. Yet the related notions of art as research and of the scientification of art cannot be separated from such a social, emancipatory agenda.

Programmed Art



Illustration 17: Gianni Colombo, Floating Structuration, (1961), photo Gianni Colombo, Archive MSU Zagreb

In 1962, a series of exhibitions were shown under the title '*arte programmata - arte cinetica, opere moltiplicate, opera aperta*' (programmed art - kinetic art, multiples, open art works) sponsored by the electronics and office equipment company Olivetti. The project was initiated by the Italian artist Bruno Munari who 'in April 1962 took Ricardo Musatti, advertising director for Olivetti, and Giorgio Soavi, art consultant for Olivetti's advertising department, to the studio of Gruppo T in Milan,' (Rosen et al. 2010, p.98). At the first exhibition in May 1962 in the Showroom Olivetti, Galleria Vittorio Emanuele, Milan, artists from the Italian groups T and N, and Enzo Mari and Bruno Munari participated. At the following exhibitions at the Olivetti

Showrooms in Piazza San Marco, Venice, and Piazza Barberini, Rome, in addition to them artists from GRAV and Getulio Alviani joined.

The centrepiece of the catalogue was a text by Umberto Eco with the title 'Arte Programmata' (Eco 2010a). In the same year Eco had also published *The Open Work* (Eco 1989) which became recognised as seminal. Eco's key examples for open artworks were musical scores which could be given different interpretations by conductors and musicians, but also works of literature and Informel art which allow a great wealth of interpretation by the reader or viewer. Many of the works of NT artists in the Olivetti exhibition used electrical motors as a power source in such a way that the resulting movement did not look mechanical and repetitive. Gianni Colombo's *Floating Structuration* (1960) was 'an endless plastic ribbon pushed up into a space confined between two glass plates, where it is convoluted into an infinitely diverse design, the feed is constant, the form is random (Rickey 1967, p.162); and *Magnetic Surface* (1961) by Davide Boriani, also from Gruppo T, a slowly rotating object made with a magnet and iron filings. None of these works used computers, but their 'programmed' nature was, in Eco's words, how they implemented 'a unique dialectic between chance and program, between mathematics and hazard,' to create 'fields of events' (2010a, p.99).

The use of the term 'programmed art' in the context of an exhibition arranged by Olivetti was highly ideological. In the early 1960s the term 'programming' had a strong evocative meaning, argues Marco Meneguzzo, just like 'subconscious' in the 1930s or 'nuclear' in the 1950s. 'Merely naming the term it became a symbol of modernity, emancipation and a future oriented epochal change' (Meneguzzo 2001, p.16). In those years the most advanced Italian corporations such as FIAT and Olivetti went through a surge of technological upgrading of their working processes summarised by the term 'automation' (see my Introduction pp. 17-8). Automation set into place a dialectics of deskilling and reskilling at the workplace. More highly skilled manual labour was replaced by machines and untrained or semi-skilled human labour. At the same time new jobs were created at the higher end of the skills spectrum, in engineering, design and planning. The intense discussion on deskilling and the reskilling began in the USA in the early 1950s (Pollock et al. 1964, pp.30–38) and reached Italy with some delay.

A group of leftist Marxists around the Turin based magazine *Quaderni Rossi*, edited by Raniero Panzieri, recognised the danger automation posed for leftist politics. The traditional Socialist and Communist mass organisations such as the Communist Party of Italy, CPI, and the major trade unions tended to accept technological innovations proposed by management as long as they were accompanied by a rise in living standards for workers. *Quaderni Rossi* rejected this approach as a policy determined to fail, since it exchanged small economic gains for complete political subordination. *Quaderni Rossi* started a discourse about the politics of technology and labour which fought at two fronts at the same time. It aimed at convincing the trade unions and party to change their 'objectivist' understanding of technology as a neutral tool, and sought to identify the seeds of workers' resistance among the workforce of FIAT and Olivetti.

'The Capitalist Use of Machinery' (Panzieri 1980) showed that as opposed to conventional wisdom Marx had not been a technician. Marx had written that 'It is a result of the division of labour in manufacture that the worker is brought face to face with the intellectual potentialities of the material process of production as the property of another and as a power which rules over him' (Marx 1976, p.482). While this tendency had its origin in earlier, simpler forms of production based on the division of labour, 'it is completed in large-scale industry, which makes science a potentiality for production which is distinct from labour and presses it into the service of capital' (Ibid.). Panzieri's subsequent analysis broke with the 'objectivists' among the Marxist-Leninist left and demanded 'the *socialist use of machines*' (1980, p.56 my emphasis).

The works in the Olivetti exhibition were celebrated as a programmed art which invited viewers to participate in a 'field of possibilities.' While the works were technically relatively simple, they projected a high-tech aesthetics of steel, aluminium, acrylic glass, light and movement. At approximately the same time as these results of visual research were exhibited to produce a progressive corporate image, intellectuals associated with Panzieri and *Quaderni Rossi* infiltrated Olivetti to conduct 'con-ricerca' (joint research), a new concept of militant activist research, pioneered by Romano Alquati together with Romolo Gobbi and Gianfranco Faina'

(Bologna 2010). Alquati and comrades understood *con-ricerca* as a pretext for making contact with workers, gaining systematic knowledge of the factory and the subjective situation of the working class, with the aim of then using this knowledge for militant workers' struggle conducted by the workers themselves and not a party or trade union on their behalf. This *near-miss* of the artistic and political avant-gardes in 1961-2 illustrates the close relationship of the participatory art of NT with automation and cybernation.

At the time Olivetti was starting to get a foothold in mainframe computer hardware production with the Elea 9003, the first fully transistorised computer (Logrippio 2007). The existence of an art form that lent itself to being described as 'programmed' came in handy for a company that was expanding into the production of programmable machines. Olivetti's patronage of the arts had a deep background in the company's corporate ethics. The son of the founder, Adriano Olivetti combined Fordism with social reformism and an interest in Modernism. Founded in the small northern Italian town of Ivrea, Olivetti had employed CIAM architects Luigi Figini and Gino Pollini to build not only new factory and office buildings but also housing estates and social and cultural facilities for workers (Momoneco 2010). Adriano Olivetti's ideas 'drew on Fordism, planisme¹⁹, the New Deal, and social Catholicism, centering on the idea of *comunità* (community) which, after 1945, became the name of a political movement, a publishing house, and a journal, all founded by him' (Pieri 2002, p.561). Olivetti managed to gain a large share in the world market in typewriters and electronic calculators, based on the stylishness of its products, such as the Lexicon 80 typewriter (1948) designed by Marcello Nizzoli (Ibid.).

The Elea 9003 was not only the first fully transistorised commercial computer, but probably also the most beautiful (Meštrović 1967a, p.191[Image]), designed by Ettore Sottsass and with an instrument panel by Tomàs Maldonado of HfG Ulm (Lindinger & Britt 1991, p.142). Besides producing Elea 9003, Olivetti also used a prototype of it to run its warehouses. Olivetti stood at the forefront of progressive corporate capitalism applying cybernetic production methods in its factories, and using paternalistic social strategies to improve the quality of life for its employees and deflect potential labour unrest. Olivetti, producer of programmable machines,

19 An interwar ideological current which advocated the use of economic plans.

tried to create social harmony through a programmed society.

Alquati exposed the benevolence of the Olivetti regime as a myth. There existed exploitative labour practices in outsourced companies in the vicinity of the main factory of which Olivetti directly benefitted (op.cit., p. 114). While Olivetti presented itself as a highly organised factory 'the verdict of the workers was,' according to Alquati, 'that although everything is organised and fixed in advance there are still too many things which don't work. [...] One could almost get the idea that at Olivetti the organised desorganisation gets studied' (Ibid., p. 119). The researchers found clandestine forms of workers' organisation from which the traditional labour organisations were excluded (Rieland 1974, pp.32–33). While Olivetti presented itself as an example of rational organisation of labour at the highest technological level, it actually depended on workers' self-organisation on the shop floor.

In advanced automated industries technological feedback mechanisms started to replace not only muscle power but 'a whole series of measurements and judgements' (Alquati op.cit., p. 148). While the rhetoric promoting automated production promised to make work easier, to the point where 'the worker [...] only watches instrument dials to catch the right moment for the mythical push of the button,' Alquati revealed this as another myth. The 'essential core of "productive labour" now gets recognised in the improvised decisions, in the creative intervention and in the comprehensive capability of foresight and interpretation' (Ibid., p. 148). While their work is classified as 'non-skilled' or 'semi-skilled', workers in automated production are actually burdened with an accumulation of functions for which the allegedly ultra-rational system has no pre-determined answers. The participation and collaboration of the worker became 'the essential pillar' (p. 175) of capitalist value production. Through Alquati's research, the myth of the perfect rational organisation of labour in the automated factory got debunked.

The notion of programmed art suggested that the artist's role was to conceive of new algorithms for artworks whose execution could be carried out by non-artists. The artist became part of the planning department, metaphorically speaking, of the cybernetic society. The notion of programmed art contributed to the fetishisation of intellectual labour. Through the objectification of the creative process in visual

research NT artists emphasised the immaterial aspects of art, the 'rules of play' or algorithm, over its execution. To paraphrase what Sohn-Rethel said about science (1972, p. 120), an artform which depends on the autonomous activity of the mind cannot be part of the class of manual workers. While NT artists sympathised with the working class and in principle wanted to facilitate empowerment and emancipation through the 'activation of the spectator,' the emphasis they placed on immaterial labour only re-inforced a general tendency at work in advanced industrial societies. NT artists in 1962 found themselves in the showroom of the corporation rather than at the picket line.

Alquati and Quaderni Rossi recognised the revolutionary potential of the new mass worker. Steve Wright, who has written a history of the Italian 'workerist' (from Italian 'operaismo') labour movement, sees *Quaderni Rossi* as incubators where 'many of the themes central to classical operaismo were to receive their initial nourishment' (2002, p.32). Quaderni Rossi was joined by Toni Negri and his Veneto based circle at the time of the second issue of the magazine (Ibid., p. 41), and after some further splits and reconfigurations a new magazine, *Classe Operaio*, was founded. The Italian workerist movement which initially formed around those magazines, their writings and agitation, provided fuse and primer for the Italian '68, the 'hot autumn' of 1969-70 (S. Wright 2002). In the 1970s workerism turned into autonomous Marxism and provided new insight into the political subjectivities of workers. This theoretical strand developed key theoretical categories for the analysis of informational capitalism, such as 'Immaterial Labour' (Lazzarato 1996; 2006) and the 'multitude' (Virno 2004; Hardt & Negri 2004; Hardt & Negri 2001).

The near-miss turned into a real encounter when in 1964 Gruppo N started to forge links with *Classe Operaio*. In the mid-1960s N shared their new studio space with the group who held their regular meetings there which 'explains some of the more extremely politicised statements' (Meloni 2009, p. 47). By that time N's ideological rigour would soon lead them to break up and, with the exception of Alberto Biasi, leave art altogether.



Illustration 18: Davide Boriani, Grande Superficie Magnetica (1961); photo Davide Boriani, Archive MSU Zagreb

In Italy, the term 'arte programmata' was widely and favourably received in the art scene, in the early 1960s, claims Meneguzzo, since it explained the intentions of artists such as groups T and N, Enzo Mari and Getulio Alviani much better than the term kinetic art (Meneguzzo op.cit.). Paraphrasing Meneguzzo it can be said that arte programmata expressed the potential for new relations between artists and a corporate sponsor with social reformist goals of his own, thereby acknowledging a social function for art (pp. 37-8).

The support the groups received by theorists such as Eco and the Rome-based art critic Carlo Julio Argan gave additional impetus to what was understood as a new art form. An important breakthrough was the Almanacco Bompiani of 1962, a kind of

yearbook of new art, literature and design. There, Eco wrote a text on the notion of order and disorder in art richly illustrated with works of Italian artists involved in NT (1961). 'Programmed art' came to be seen, 'as a plan for social change through new human forms of agency which were also based on ethic-aesthetic conceptions' (Meneguzzo op cit., pp. 16-7). However, after a boom in the mid-1960s arte programmata and Gestalt ricerca faded into the background. The strongest impact this phenomenon had was in the Milan design scene (Ibid., p. 48), claims Meneguzzo, while the art scene never forgave programmed art its socialist ideological orientation (Ibid., p. 50).

Participation in the New Machine Age

Georges Friedmann's (1964) early yet comprehensive study of automation complements Alquati's findings by repudiating claims that automation actually improved working conditions. Work in automated factories, even where physical strain falls away, Friedman found out, induces 'industrial neuroses' through psychological pressure (Ibid., p. 171). In the feedback system of the cybernetic factory the worker adds 'information' through her or his human faculty of decision making and communication. She or he is the human element in a perfectly programmed cycle of command and control whose real reason of being, however, is the valorisation cycle of capital.

The 'organic composition of capital' is a term invented by Marx. It describes the proportion between investment in the means of production and investment in labour. A high organic composition of capital is prevalent in industries where a lot of investment in machinery is intricately linked to the employment of relatively few people (cf. Mattick 1969, p.41). Accelerated automation in the early 1960s led to a higher organic composition of capital. It meant that fewer workers produced more. It also meant higher initial costs of investment.

Aglietta understood Fordism as a 'principle of articulation between processes of production and modes of consumption' (Aglietta op.cit., 116-117). What that means is that there is no automatism that links production and consumption. Keynes'

'effective demand' (see my Introduction, pp. 24-5) is not just the result of people having enough money to buy things but also depends on consumption norms, social norms, values, ways of life. In order for an economic system to be in balance, there need to be mediating processes. The rise of automation necessitated an increase in advertisement and other forms of mass media communication to transmit consumption norms.

This period saw the rise of *Hidden Persuaders* (Packard 1991) – methods in advertisement which addressed subconscious resistance against consumption. Methods of mass media research developed before Second World War were joined with functionalist sociology (A. Mattelart & M. Mattelart 1998, p.31). Politicians and corporations wanted to gain insight into voter behaviour and the adoption of new products (Ibid., pp. 28-38). Communications researchers such as Ernst Dichter and Herta Hertzog became gurus of the advertising industry and added other methodologies such as psychoanalysis and cultural anthropology (Ibid., 37-38). The Gestalt psychologist Kurt Lewin provided additional insight into group decision making (pp. 37-9).

The new production systems also motivated a heightened interest in industrial sociology with a view to humanising working conditions and winning the loyalty of workers through softer, less coercive methods than in the early phase of Fordism. As Harry Braverman (1974) showed, automation relied on a specific politics of knowledge. The separation of the execution of work from planning furthered the growth of technical and of managerial strata in societies. Those groups however were also exposed to the rationalisation of labour. There was a demographic shift on the way which saw the sudden and unexplained rise of a new middle class, first noticed by C.W. Mills in *White Collar* (1963). According to Braverman (op.cit), the mechanisation of office work affected engineers, office clerks, draftsmen and the lower managerial cadres, and basically all wage workers involved in modern society. Each worker had only minimal oversight of the whole of the production process. The meaning of the work got lost, the consciousness of the workers became fragmented while knowledge got concentrated in the hands of an ever smaller number of high-level managers. 'The closer we come to automation,' wrote Friedmann, 'the more the share of labour left to man seems, in itself, stripped of all intellectual or

technological interest' (Friedmann op.cit., p. 178). This caused a widely shared feeling of alienation which, however, was not channelled into workers resistance. The new middle class saw the rise of *Organisation Man* (W. H. Whyte 1967), an overly well adapted figure lacking individuality and spine.

The new production system could only achieve balance, a temporary equilibrium, through the establishment of several feedback mechanisms: feedback in the automated factory; feedback on the macro-economic level through Keynesian demand management; feedback in the sphere of consumption (market research, rating agencies like Nielsen, customer surveys); feedback in the sphere of production (industrial sociology and psychology). A new image of society as a cybernetic organism emerged and cybernetic governance was carried into the domain of government. *The Nerves of Government* (Deutsch 1963) projected the idea of a benevolent cybernetic form of government based on an analogy between the function of the human nervous system and communication media in society.

Inspired by the spread of cybernetics as a meta-theory which cross-fertilised fields of the natural and social sciences an image of society as a cybernetic organism took hold which maintained itself through managing communication flows. For this idea Barbrook coined the term *cybernetic Fordism* (Barbrook 2007, p.63). In cybernetic Fordism humans were considered equal to what was technically called the 'servo-mechanism'. It became the role of people to enter the right feedback information into the system. The main problems with cybernetic Fordism were that a) it worked only for a small part of humanity, and b) for those it worked too well, inducing a widely shared feeling of deep alienation, alienation not only in the realm of production but also in consumption and during leisure time.

Cybernetic Fordism was not unique to the West. On the contrary, after initially being condemned by Stalin as 'bourgeois science', cybernetics was adopted by elite technocrats in the Soviet Union as the best way of solving the problems of the planned economy (Gerovitch 2002). Cybernetic Communism was not only pursued in the USSR but was enthusiastically adopted by its more advanced satellite states such as Walter Ulbrich's GDR and Czechoslovakia (Richta 1969).

In the early 1960s a new electronic pulse started beating, in the 'servo-mechanisms' of sensors and electronic circuitry in production, through the rising importance of computers, electronic media such as television and the development of global communication networks. McLuhan expanded the analogy between the human nervous system and society to an 'instant processing of information' on a global scale as an 'organic unity' (McLuhan 1964, p.348). While mechanization had depended on breaking up processes into homogenized but unrelated bits, electricity unified these fragments (Ibid., 352-3). Automation on the level of the factory, as McLuhan saw it, was the model for a globally networked system where 'organic interrelation' of production, consumption, leisure and learning linked by a global electronic network was becoming the norm. Optimistically, McLuhan believed 'the social and educational patterns latent in automation are those of self-employment and artistic autonomy' (p. 359).

The works of NT responded to a fundamental need in societies which were quickly transformed by automation and cybernation. NT was expanding the field of possibilities of human-machine interaction at that point in history when the participation of the worker-consumer-citizen became a key issue. As the cybernetic control loops closed, the people became missing, absent without leave. The participatory artworks of NT invited viewers to get engaged within a field of relations. In various ways, they brought the perceptual capacities of viewers into play, creating indeterminate and unstable situations whose political aim was to make them reconsider their established views of reality. Eco considered formal innovation as a type of social commitment. The works, by breaking through the established standards of understanding and judgement, facilitated the regaining of people's 'lost autonomy at the level of both perception and intelligence' (Eco 1989, p.83).

The atomised individual who was subjected to a 'scientific' organisation of labour in her daily life was to find beauty in the science of aesthetic perception. The forms of participation offered by NT artists can be understood as a rehearsal of new relationships with an environment which started becoming responsive. NT's key concepts were developed in the early 1960s when automation and cybernation could still be considered the basis of a utopian society. As the course of events would show, by the end of the same decade alienation would turn into discontent and open revolt.



Illustration 19: Ivan Picelj, Poster NT 2 (1963) MSU Zagreb

The Exhibition NT2

Throughout 1962 and early 1963 Meštrović had been busy collecting information for the forthcoming second exhibition of NT. When he returned to Zagreb to discuss with Božo Bek, the director of GSU what the forthcoming exhibition would be like, he found him 'in miserable condition.' Bek was unable to speak. Only after repeated questions he would admit "we sent the telegrams" recalled Meštrović (2009). The invitation for the second exhibition was cancelled after a speech by Yugoslav president Josip Broz Tito at the beginning of 1963. In this speech Tito claimed that abstraction was "irreconcilable with our socialist ethics, something that is attempting to divert the course of our development from the one determined by our revolution" (Tito 1963 quoted in Kolečnik 2010, p.218). As Ljiljana Kolečnik explains, this came at a time when Yugoslavia and the USSR attempted a rapprochement after the new Soviet leader, Nikita Krushchev, had distanced himself from Stalin and Stalinist policies. Krushchev, however, was not a friend of abstract art and in that domain stuck to the doctrine of Socialist Realism. Tito's remarks were meant to please a foreign audience to the east rather than actually being a pronouncement of policy.

There is also reason to believe that some scapegoating was going on. The Yugoslav economy, which had been so successful for 10 years, entered a difficult stretch. Two bad harvests, in 1960 and 1961, a negative balance of payment, a shrinking industrial growth rate and negative real income growth amounted to a recession in 1961-62 which alarmed the leadership (Rusinow 1977b, p.111). Tito blamed 'excessive liberalism' and the individual 'un-Communist' behavior of state managers and private entrepreneurs for the economic problems in a speech in May 1962 (Ibid.). While economics were the cause of the problem, for a populist such as Tito it may have been convenient to remember in the same breath that abstract art had once stood for bourgeois decadence. Despite this Yugoslavia continued on a path of reforms which generally went into the direction of decentralisation and economic liberalisation which according to Rusinow, amounted to 'Laissez-faire Socialism' (Ibid., pp. 138 - 191).

In Yugoslavia reformist tendencies also continued on the intellectual front. The magazine *Praxis* started to assert itself as a specific and notable contribution to the phenomenon of the postwar New Left. Philosophers and sociologists from Zagreb and Belgrade had tried to launch a new type of Marxist discourse as early as 1952 but encountered some problems. The conference of the Yugoslav Philosophers and Sociologists in Bled, 1960, marked a turning point when leading Yugoslav orthodox Marxists were publicly defeated (Kangruga 2008, pp.127–8). The main point of debate had been Stalin's reflection theory according to which the superstructure was merely a reflection of objective material conditions, and that therefore, for any given social order, there was only one correct form of artistic practice.

The protagonists of this new type of philosophy founded Korčula Summer School in 1963, an annual international meeting of philosophers and social scientists, and the *Praxis* Journal in 1964. 'Why Praxis', a kind of mission statement published in the first issue of *Praxis* journal (Petrović 1965) proclaimed not only 'the ruthless criticism of everything existing,' a quote from 'The Letter from Marx to Arnold Ruge' (1842/1972a), but also hinted at a very anti-dogmatic and 'liberal' line. *Praxis* did not have one single political ideology, yet the ideas can be brought under the umbrella term *Socialist Humanism*, title of an anthology of texts edited by Erich Fromm (1965a). In pieces such as Rudi Supek's 'Freedom and Polydeterminism in the Criticism of Culture' (Supek 1965), the Stalinist orthodoxy of reflection theory was repudiated. While there were 'rather few articles by the Praxis philosophers that demonstrate interest in the problems of visual arts,' according to Kolečnik (2010, p.219), the value of Praxis philosophers for NT was to create an open space of freedom for art within a Marxist political spectrum.

In 1963 there was also established the Genre Film Festival (GEFF) in Zagreb which was to be held as a biennial analogous to the Music Biennial and New Tendencies. The festival was organised by film enthusiasts some of whom had already been collaborating in the context of Cinema Club Zagreb. In the spirit of self-management of the arts there was a network of amateur film clubs all over Yugoslavia, officially endorsed by the authorities. GEFF stretched the notion of amateur film to the breaking point, adopting an avant-gardistic line around the notion of anti-film and emphasising its proximity to the spirit of experimentation in NT. GEFF was also one

of the incubators from which a radical counter-culture emerged at the end of the 1960s (Janevski 2010).

As things turned out, cancellation had been a premature act and there were no real obstacles against having the second NT exhibition in Zagreb. 'The response to the new invitation was absolutely incredible, everyone came to Zagreb for the second exhibition' (Meštrović op.cit). The exhibition that opened on August 1, 1963 in the spaces of GSU had doubled the numbers of participating artists. Among the new additions to NT2 were several important Yugoslav artists, such as Vlado Kristl, Miroslav Sutej, Alexander Srnec, and Vojjin Bakić. Kristl made, besides paintings, experimental cartoon films. His *Don Quixote* (1961) is a brilliant combination of an almost completely abstract, Constructivist aesthetic with a hilariously funny cartoon narrative. Here the Quixotic struggle is against exploding car and bus traffic. New groups joined NT, group Effekt from Munich, and a group of Spanish artists, Equipo 57²⁰. NT2 also cast its net wider internationally through the participation of several new Paris based artists from Latin America such as Martha Boto and Carlos Cruz-Diez.

'In presenting the works in the exhibitions we had a general principle which we followed also in the published catalogues: from the works that still used the classical means of painting to those which used the pure light as a matter of forming/structuring/imaging,' explained Meštrović (2009). The catalogue (GSU 1963) provides the opportunity to follow the development of a progression of ideas: from pictures which express motion and a new understanding of space through painterly means; to reliefs which interact with their environment; to sculptural works which express new ideas about space; to works directly employing motion; and, finally, works which combine movement and space through the use of light. In different ways, nearly all those works offer ways of engagement for the viewer, so that the aspect of 'participation' is for the first time fully realised in NT2.

But already the sheer number of works creates the feeling that this new aesthetics could become a bit repetitive. Rickey smells the 'flavour of the [Bauhaus] foundation

20 Juan Cuenca, Angel Duarte, José Duarte, Augustin Ibarrola, and Juan Serrano, who had formed as a group in Paris in 1957.

course' (Rickey 1967, p.76). Yet a certain similarity between works could also be interpreted positively. Artists in NT viewed their work not as individualistic artistic creation but as research, and as such it was legitimate to develop the field collectively by borrowing from each other. Vjenceslav Richter showed *Asymmetrical Centre* (1963), a sphere consisting of a wooden grid which strongly resembled François Morellet's *Sphère-grid* (1962b), made of aluminium rods one year earlier but not shown at NT2. Richter, one of the co-founders of Exat 51, was actually an architect and his small scale works could be read as studies for application on a bigger scale. The principles generated for the creation of gallery scale works could be applied on a much larger scale, which was more than just a lingering thought in the mind of a number of participants (cf. Morellet & Molnár 2010, p.139).

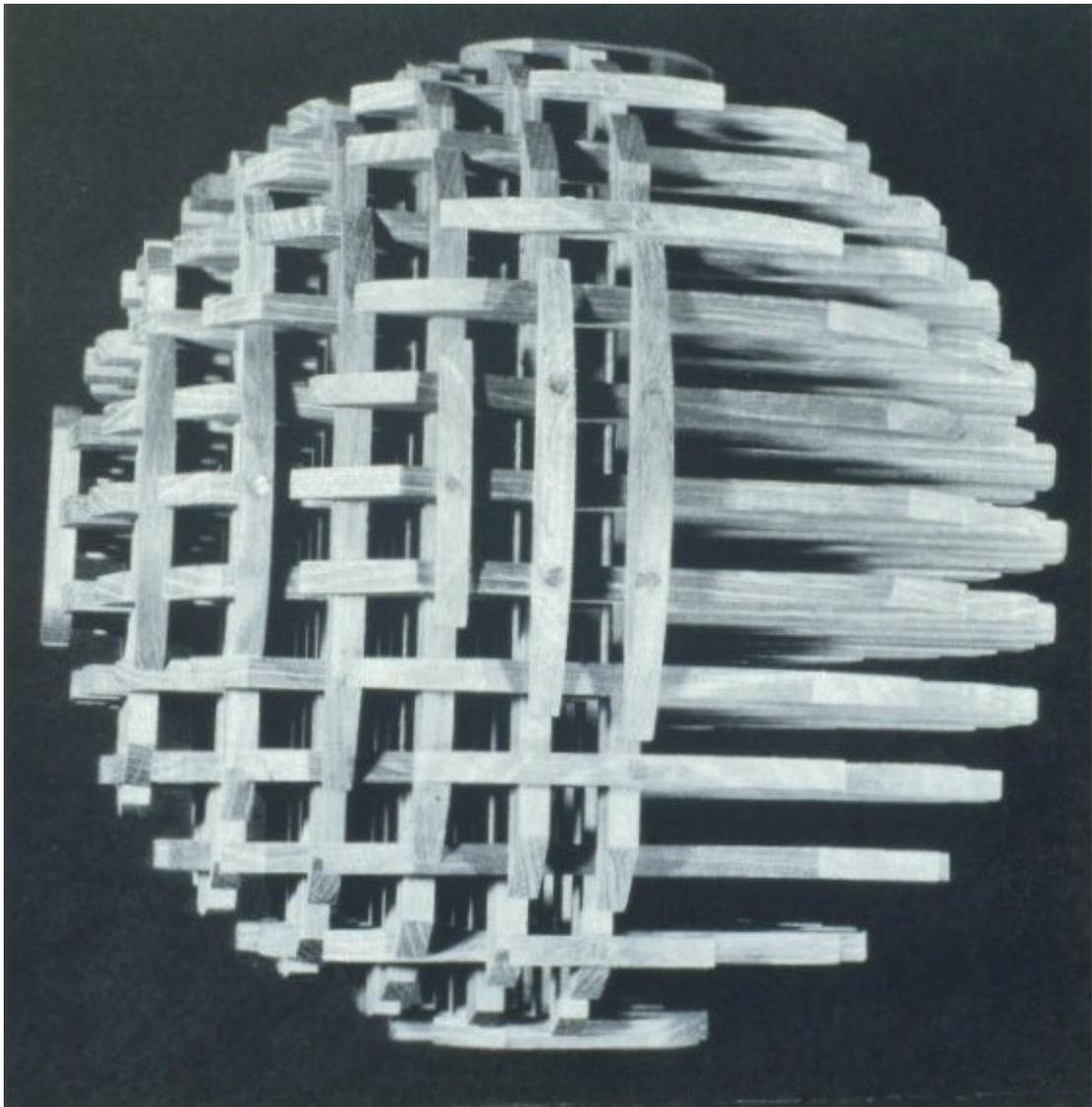


Illustration 20: Vjenceslav Richter, Asymmetrical Centre (1963) photo MSU Zagreb

The *NT2* catalogue shows that NT artists were aware of their predecessors (GSU 1963). It contains a timeline of Constructivist and kinetic art from Giacomo Balla via Duchamp to Munari and the events immediately preceding NT. Jöel Stein's *Turntable with Curved Reflector* (1963), a set of exchangeable disks with abstract motifs, rotated by a kind of turntable system and reflected in a curved mirror references Duchamp's rotating works: the *Rotary Glass Plates* (1920), *Rotary Demi-Sphere* (1925) and the *Rotoreliefs* (1935). Quite a few of the works which deployed actual, motor driven movement had been created in the context of the *Programmed Art* (1962) exhibition at the Olivetti showroom. Literally 'highlights' of *NT2* were objects which used combinations of light and movement. One of the most sophisticated works in this regard was created by Julio Le Parc, a member of GRAV. The *Continuous-light-cylindre* (1962) consisted of a stainless steel cylindre illuminated by changing reflections of a light source.

In 1963 the repertoire of NT was almost fully developed. Only one thing was missing, the environment. Environments are both outdoor installations, which completely define a certain area with a specific aesthetics, as well as indoor installations which immerse the viewer in a space. Most of the environments of NT were of the latter kind. Frank Popper suggests there is a kind of natural progression that leads from the participatory art works of the early 1960s to the creation of environments (Popper 1975, p.93). In the summer of 1963 NT were artistically already at, or near their peak.



*Illustration 21: Gianni Colombo (centre) tries out Joel Stein's work *Tourne-disque avec réflecteur courbé (Turntable with Curved Reflector)* (1963); Giovanni Anceschi (left), Helge Sommerrock of group Effekt (right); photo MSU Zagreb*

The Breton Moment

Like vanguard political parties avant-garde art movements are known for frequent purges of their memberships, because they are not seeking strength in numbers but ideological cohesion. André Breton, the leader of the French Surrealists, carried out so many purges that there was almost no one left to throw out but himself. During and after the exhibition of summer 1963, NT went through their own Breton moment. The previous two years since the first exhibition had already been characterised by a search for a more homogenous artistic identity whereby the term *Nouvelle tendance recherche continuelle (NTrc)* had been coined. In the context of the exhibition opening of *NT2* in Zagreb a series of meetings took place where the movement tried to clarify its aims and membership (Scholl 2006, pp.279–281; Hillings 2006; Rosen et al. 2010, p.145).

Shortly afterwards three documents were published in French and circulated, *Bulletin N° 1* (NTrc 1963a), a collectively authored statement of principles culminating in a list of confirmed memberships and artists who were excluded; *Nouvelle Tendance - recherche continue. Evolution de sa composition*, a history of the development of NT (NTrc 1963b); and *Proposition pour un règlement de la N.T.* (NTrc 1963c), a set of organisational rules. The overall aim of those documents was to turn a loose association of like-minded artists into an organised movement.

The whole attempt was riddled with contradictions. *Bulletin N° 1* stated the principles on which the movement was to be built, thereby drawing strongly on previously published positions by GRAV. NTrc was 'not to be a venture that belonged to anybody in particular' (NTrc 1963a, p.2) yet GRAV's dominance was unmissable. NTrc was to be 'self-determining with regard to its characteristics, members, objectives and activities' and its membership was to be conditional and non-definitive, subject to a collective decision making process (Ibid.). At the same time, those present in Zagreb had felt an 'urgent need to formulate an explicit criterion of selection to define the movement' (Ibid.).

The document contained a list of members of NTrc and a list of artists who had been excluded. Excluded were all members of groups Zero and NUL, most Yugoslav participants and, in the person of Martha Boto, one of the few women involved during that stage. The reasons for exclusion were laconically added to each name. They ranged from 'formal problem of constructive art,' to 'traditional painting,' to 'lack of clarity in the problem treated', or 'lack of clarity in the position,' and, last but not least, 'sensitive execution' (Ibid. pp. 3-4).

The third document, authored by Gerhard von Graevenitz, consisted of 14 points which proposed a strict regiment for the behaviour of members, rules covering the admission of members and their exclusion, and how NT should be represented to the outside world. One key rule was that whenever one member or group was invited to an exhibition they should try to convince the organiser to invite the other members as well. A spirit of collectivism was combined with elements of coercion. This was proposed probably in the most well meaning spirit, in the interest of the collective and not the individual. The rules were designed in such a way to avoid possible

stagnation. As point c) of *Bulletin N° 1* stated, NT's defining point was 'not to imprison itself in definitive formulas, but to assert itself as a movement in continuous evolution' (Ibid., p. 4). In other words, continuous research was equal to permanent revolution.

Maybe it should have been clear from the start 'that such an authoritarian form of organisation could not work for NT' (Scholl 2006, p.280). Rather than creating unity, reliable rules and organisational foundations for a movement, the outcome was divisive. Almir Mavignier who had helped NT to get started in 1961 was deeply annoyed. 'This is the catastrophic result of some artists' intention of transforming the NT into a "trade union" in which rules are set in order to classify, align and exclude independent artists and groups,' complained Mavignier in a five page letter to Božo Bek (Mavignier 1963). Mavignier was so annoyed by the whole affair that he announced his withdrawal from the 'movement' (Ibid.). The democratic legitimisation of the decisions made was thin. While allegedly 70% of those present had agreed to the exclusions, the reactions of some who supposedly had supported the process cast serious doubt over it. Enzo Mari, newly appointed regional coordinator for Italy, started a letter campaign to stop the publication of the document. Mari's complaint was that *Bulletin N° 1* was made to look as if it had been the result of a collective discussion, while in reality 'the discussion had been led in haste [...] had been disordered and interrupted by other activities outside' such as 'public meetings, discussions with people outside, distractions' (Mari 1963).

Davide Boriani of Group T put forward arguments similar to those of Mari, while adding that the programmatical points had been presented in ready-made form. Boriani was also unhappy with the fact that the historic sketch contained in *Evolution de sa composition* (NTrc 1963b) omitted all the Italian exhibitions which had preceded NT so that 'to outsiders this would look like GRAV had simply enlarged itself and had become NT' (Boriani 1963). The discussion of that divisive moment in existing literature such as work by Susanne Scholl (2006) and Valery Hillings (2006) makes it look as if this was one of the usual squabbles between artists, an unfortunate distraction from what *really* mattered, their art. I propose to take those splits more seriously.

NT had discovered themselves at the first exhibition in Zagreb in 1961. The accent had been on the plural of *New Tendencíes*. As I have pointed out, the work of Manzoni had little in common with, for instance, the geometrical rigour of Morellet's grids. Manzoni had also been rigorous, but in a very different way. Burnham had spotted two different currents inside NT, 'those groups and individuals who stressed experimental objectivity, anonymity, perceptual psychology, and socialism, and those who stood for individual research, recognition, poetry, idealism, immateriality, luminosity and nature' (Burnham 1968, p.247). What happened was that the more objectivist and socialist majority tried to get rid of the 'neo-Dada nuance' represented by Zero, Nul and others. While GRAV were leading this effort there is no indication that other participants from the more rationalist-socialist orientation opposed that move in principle. Objections were raised on the basis of the manner of proceedings and representation of certain subjects, but *not* regarding the need for a clarification.

Throughout the statements of artists published in the catalogue of *NT2* a strong urge for clarity becomes visible, the desire to define NT more precisely. There is a consistency between the urge to find clarity in the area of art making and the setting of organisational rules. What was at stake were both content and context - what NT stood for in the eyes of the public and how NT behaved in an environment perceived to be hostile or at best indifferent to its aims.

NT were not thinking they were making art, they were conducting visual research. They tried to find ways of producing work based on 'rules of play' in order to demystify art and the role of the artist. NT hoped to decommodify artistic production and put it into the service of society, not just the elites. NT's collective idealistic engagement was aiming at changing the whole of the environment rather than merely finding another way of producing objects for the art market. It would have been absolutely vital for NT to find a way of formulating their collective engagement in a better way. If NT had found that additional layer of an international, decentralised organisation capable of renewing itself and evolving permanently through processes of self-determination, with cohesive yet adaptive and flexible standpoints and principles, it may have had a much better chance of getting its message across and withstanding the disintegrating forces of the art market. Unfortunately the opposite

happened. The attempt to find more cohesion as a movement through formal ways of organisation undermined the informal personal ties which had existed before. As the next chapter will show, at that very moment, in 1963, NT was about to be absorbed by the art system. In the process, however, a new terminology would be applied which covered over the socially engaged ideas.

CHAPTER 3: The Dissemination of Research (NT3, 1965)

Between *NT2* in 1963 and *NT3* in 1965 the movement rose to fame. In this subsection the main steps of NT's meteoric rise are presented, before discussing *NT3* itself.

In 1963 the Groups N, Uno and Zero were together awarded the first price at the 4th International Biennale of Arts in San Marino. The title of the Biennale *Oltre l'informale (Beyond Informal Painting)* was to be understood programmatically as an argument in support of the new trends in art. The influential Italian art critic Carlo Giulio Argan stood behind the decision of the jury. Argan also published a series of articles in Italian papers which argued for a close engagement between science and arts, for a collective artistic practice and advocated the work of NT artists under the term 'Gestalt ricerca' (Gestalt research) (Meloni 2009a, pp.119–121).

For Gruppo N member Manfredo Massironi, the period from August 1963 to May 1964 was the crucial phase of NT when it failed to form a large and unified international movement (Massironi 1965b; 1965a). Massironi saw the honors and awards received as a kind of 'Pyrrhic' victory (Denegri 2004, p.169) anticipating absorption by a system they had worked hard to combat. At this point, artists such as Massironi started a strong polemic against critics in a drive for self-determination of the movement. The 'explanations always come from outside,' complained Massironi, 'yet it seems all that critics want is to find a label they can stick onto our works to explain things to themselves but not to help us to solve ideological and cultural issues' (Massironi 1963; 2009, p.363).

NT's rising reputation was reflected by the fact that *NT2* was shown with some minor alterations in December 1963 in Venice (G. Marangoni & Fondazione scientifica Querini Stampalia. 1963), and again, with slight alterations, at the Municipal Museum of Leverkusen, Germany (Städtisches Museum Leverkusen Schloß Morsbroich 1964), where it opened on March 13 1964. The preliminary highlight, however, was an exhibition at the Musée des Arts Décoratifs, Palais du Louvre, Pavillon de Marsan, in April 1964 (Musée des arts décoratifs (France) 1964). GRAV

had been invited to show their own work yet had, in the spirit of their own proposals as published in *Bulletin N° 1*, arranged to have a large exhibition of all participants of NT instead. That same year saw a strong presence of NT artists in the Italian pavilion at the XXXIInd Biennale of Venice with the groups N and T and Castellani and Mari. The expectation was that this would bring international attention to the concerns of NT artists, yet all of them were 'overshadowed by a tempestuous offensive of American Art' (Denegri 2004, p. 171), in particular Pop Art and Minimal. GRAV and Zero participated in a special show on *Light and Movement* at Documenta III in Kassel (Popper 1975, p.181). The *Light and Movement* room had been a last minute addition to Documenta III but was the reason why the Kassel show was perceived as innovative (cf. Media Art Net 2011). The movement that had rejected art and had wanted to replace it with visual research had, within the space of a few years, arrived at the most prestigious international art exhibitions and institutions in Europe. NT was going to the Louvre.

The exhibition *Propositiones visuelles du mouvement international Nouvelle Tendance (Visual Proposals of the International Movement New Tendency)* (Musée des arts décoratifs (France) 1964) (April 17 1964) was grander in scale than the Zagreb exhibitions with regard to the size of individual works, as well as the spaces in which they were shown. GRAV realised a so-called *Labyrinth*, the second instance of such an arrangement after the Biennale of Paris of 1963. In GRAV's *Labyrinths*, individual works were arranged together so that they formed a sequence of rooms through which visitors would pass along a preordained way. 'The intention was to use these collective exhibitions, with their extreme variety of perceptual phenomena, as a method of obtaining the highest degree of participation from the spectator,' wrote Frank Popper (1968, p.182). 'The dominant aesthetic impression was to be one of instability,' explained Popper, 'the impression that the formal aspects of the separate items on view could never be precisely localised or identified' (Ibid.).

This intention was most graphically illustrated by a an image I jokingly came to call *The Blitz of the New*. It shows a fashionable Parisian art crowd enthused by an installation made by Gianni Colombo of Group T at the entrance of the Louvre. One of Colombo's first if not his very first environment (Weibel & Jansen 2006, p.232), *Inhabitable cinématique structure* (1964) consisted of wall panels with orthogonal

and diagonal neon lights placed on both sides of a narrow dark passage and switched on and off by electronic controllers (von Wiese 2006, p.457). On closer inspection the black and white photograph (see Illustration 21) almost certainly turns out to have been the result of a photo-montage. At the same exhibition Davide Boriani also of group T showed *Space+Light Beams+Spectators* (1964). In Boriani's work the viewer is engulfed by electronically controlled light beams whose colour values slowly change from all four directions and the ceiling (Anceschi 2010; Rosen et al. 2010, p.165). The works of GRAV and T were early immersive and participatory environments confirming Popper's idea of a 'logical transition' from the participatory object to the environment.

The exhibition at the Musée des Arts Décoratifs also showed works by Bridget Riley and Lily Greenham which were soon to be classified by the term Op Art. The Paris exhibition was visited by MoMA curator William C. Seitz who, guided by George Rickey, was trying to identify suitable works for the forthcoming show *The Responsive Eye* (1965) at MoMA in New York (Scholl 2006, p.281). In an article in *Time* magazine (Anon 1964) which prepared the public for the exhibition a journalist had coined the term Op Art (from 'optical art') in juxtaposition to Pop Art. From now on this label would stick, often lumped together with the older term kinetic art. The reputation of the famous institution which hosted *The Responsive Eye* (1965) and the way works were presented there, made kinetic and Op Art a big success on the biggest art market of the most affluent nation.

The introduction of the curator William C. Seitz in the catalogue did not crudely trivialise the works of NT. Yet although quite a large number of NT artists participated, their ideas and motivations were sidelined. Seitz emphasised scientific theories of perception in connection with formal and stylistic properties of abstract art. The *Nouvelle Tendance* received a brief mentioning at the bottom of page 41, only to conclude on the following page that 'these artists are not revolutionaries; they aspire to full cooperation with the modern world and are open to almost any application of their creativity' (Seitz & MoMA NYC 1965, pp.5–43). The MoMA exhibition was one of the first blockbusters of modern art (Rosen et al. 2010, p.27). It made the career of individual artists and popularised kinetic and Op Art.



*Illustration 22: Gianni Colombo, *Strutturazione cinevisuale abitabile* (1964) at opening of Paris exhibition; photo Gianni Colombo, Archive MSU Zagreb*

The Relation between Art and Design

The third Zagreb exhibition in 1965 was organised after the New York show. The way the market had absorbed NT without accepting its political premises must have been weighing heavily on the minds of the organisers. For some of the artists, those with the strongest political convictions, NT as a 'movement had virtually ceased to exist' (Biasi 1968; 2010, p.269). The title *Nova Tendencija 3 (New Tendency 3)* in the singular tried to demonstrate to the world 'the intention of ideological concentration and the commonality of the goals' (GSU 1965b, p.4; Hoffmann & Museum für Konkrete Kunst 2006, p.282, f. 54). Those things - commonality and concentration - however, were in short supply.

Massironi wrote in the catalogue for NT3, that 'the doubts and insecurities which earlier had been refused' had now, with this third exhibition, taken over, so that 'when we are looking around we see that our growth is stagnating, that mediocrity is spreading and decay threatens, and that these are dangers which are characteristic of all kinds of intellectual work which takes place within a capitalistic society' (Massironi 1965b, p.27; 1965a, p.8). The example for that, Massironi added, had been provided by the exhibition *The Responsive Eye* (1965) (Ibid.).

The organisers in Zagreb tried to counter the crisis by launching a new offensive. With a new, larger editorial board²¹ and the Italian artist and designer Enzo Mari providing key input, *NT3* set itself the task of *Divulgation des exemplaires de recherche (Dissemination of examples of research)*. An initial circular letter and call for participation were sent out which together amounted to 14 pages, containing a summary curatorial statement, a detailed programmatic statement by Mari, and a call for participation including a contest and its conditions (GSU 1964; GSU 1965a).

The curatorial committee stated that after 'analysing the results' of previous exhibitions NT members had taken part in or organised themselves 'it was found that a similar type of exhibition is not adequate today' (Ibid., p. 5). Complaining of 'a lack of consciousness towards the comprehension of various problems' while there was

21 Božo Bek, Boris Kelemen, Enzo Mari, Zdenka Munk, Matko Meštrović, Radoslav Putar, and Vjenceslav Richter

also 'a myth made of NT,' the committee had decided on a new way of organising it. Each time one topic would be dealt with, either to focus energies on its solution or, if that was not possible, developing a shared vocabulary (Ibid.). The network of participants was asked to submit work in one of three categories: section I, a historical overview of the subject and examples of research on visual perception; section II, current projects and statements concerning the problem of disseminating research examples; section III, a competition for which artists were asked to submit a *Project for the Mass Production of One Example of Research on Visual Perception* (GSU 1964).



Illustration 23: Exhibition visitors of NT3 with works entered in competition 'Dissemination of Research' (1965); photo MSU Zagreb

Mari's competition posed the question and gave an answer at the same time. The Milan based artist and designer with connections to Edition Danese, a design publishing house, suggested that the 'dissemination of research' should be facilitated through reproduction. The winning proposal would be reproduced 55 times by Danese. Mari claimed that works of visual research were unsuited for traditional dissemination methods because neither photography nor film could fully disclose the character of three-dimensional art-design objects (Ibid., p. 4). Mari's text contained contradictions and was probably not in tune with the majority views held by participants in NT. For instance, while Mari advocated 'total integration into the industrial world' (Ibid., p. 6), a few paragraphs later he warned that because of 'the industrial world's commercial orientation, concessions to a mediocre public taste were to be feared' (GSU 1964, p.7; GSU 1965a, p.7).

The initiators were positively surprised about the response - 29 contributions were sent by 22 artists and groups (Scholl 2006, p.283; Meštrović 2009). The award winning object however, *A Visual Instrument* (1965) by Michel Fadat, was deemed disappointing. The jury had excluded many works because they had not met the very detailed conditions layed out in the call for the competition (GSU 1965b, p.119). Of the very small number of remaining works, Fadat's winning piece was the outcome because it had met Mari's criteria best (Meštrović 2010b).

NT3 was about 'the total integration with the industrial world' (see above). NT artists wanted to directly intervene in social reality, and design would offer a route toward that. The whole history of NT pointed towards a Constructivist orientation. NT's predecessors such as Exat 51 had stated in their manifesto that they saw no separation between art and design. In 1965 Meštrović was working at the newly set-up Centar za industrijsko oblikovanje (Center for Industrial Design) founded at the end of 1963 by the chambers of commerce on the federal, state and city level. Richter was officially its director but did not become formally employed. However, Denegri judged *NT3* very negatively: 'This programme had no consideration for the sensibility and nature of art, and this "immolation" of art will prove as fatal for this Zagreb exhibition, as well as for the entire destiny of the NT movement' (Denegri 2004, p. 175).

This strong condemnation is surprising given that the movement NT had replaced the term art through visual research years earlier. There was no philosophical reason for the maintainance of a barrier between high art and applied art or design. There was also no way back to an individualistic and subjectivistic practice - the private production of art. Interestingly, however, NT produced hardly any published discourse about the relationship between art and design. Even if there is no difference in principle, there remain many differences in practice if someone aims at designing an object for mass production, or if someone produces a work of pure visual research. Thus the question, what was the relationship between those types of activity in the mind of the participants? Mari's competition gave one possible solution. Maybe Denegri was right in condemning this idea of the multiple. *NT3* was a big and beautiful exhibition, the section with the multiples probably its weakest part. The

works *were* the research, and not some object which was specifically built to be reproduced in small numbers. Yet this still leaves open the question how NT articulated the relation between pure research and application.

The artworks of NT could be seen as models or prototypes. The lessons learned in making them could then be transferred to an engagement with industry. This understanding was confirmed by correspondence between the American curator Douglas MacAgy and Matko Meštrović. In summer 1965 MacAgy was working on an article about 'ideological aspects of the aesthetic group movement outside the US' and wrote a letter to Meštrović of eight pages in total where some of the questions ran to more than one page (MacAgy 1965). Meštrović answered in an equally detailed way. The interest in production, he wrote, 'has its source in the wish to annul the conception according to which a work of art is unique and "unrepeatable" and so control the speculations of the market, based upon the myth of artistic creation, and 2: to learn and master industrial technologies which define the contemporary world' (Meštrović 1965a).

Meštrović' reply confirms that the ideas about design were closely related to Yugoslavia's economic development which was on the verge of changing from a focus on heavy industries to producing consumer goods (Ibid., p. 1). This was not merely a utilitarian economic concept but closely related to Bauhaus ideals according to which the role of design as an 'agent' was emphasised, which 'changed (humanised) aspects of life of contemporary man' (Ibid., p. 2). In the West, according to Meštrović, this idea was 'deformed' because of the fact that design was understood to promote sales and consumption (Ibid.), whereas in the East 'it has been utterly neglected as it didn't suit the dominant petit bourgeois mentality and dogmatic (primitive) views' (Ibid.). Meštrović also stated - and this is very important - that 'NT is not directly connected with the practice and theory of design [...] Moreover [NT] can be considered as a plastic forerunner of the design in the sense that they open new possibilities of form, exploring the domain of visual perception in which spiritual conditions of time, created by scientific and technological development, are best reflected, but which remain buried by common views of people' (Ibid.).

Meštrović added 'the kind of research undertaken by NT naturally includes itself in [...] the education of designers (at the Hochschule für Gestaltung in Ulm for example)' (Ibid.). The mentioning of Ulm is significant because the fate of the college of design can be considered indicative of the problems of a progressive design approach in capitalist societies during that era. Ulm advocated an ideology of design according to which designers should shape the whole of the environment (see above, pp. 56-7). In practice, because of the leftist political orientation of many designers, artists and researchers teaching at Ulm, they inevitably ran into problems with Germany's conservative local politicians and heads of industry. The college's commercial branch had won some large contracts and turned them into success stories. In 1956 Ulm designer Hans Gugelot had designed a combined radio and record player for electric company Braun, the SK4, which became famous for its simple design, nicknamed Snow White's Coffin (Krampen & Hörmann 2003, p.111). In 1962, a team around Ulm co-founder Otl Aicher developed the corporate design for German airline Lufthansa (Ibid., p. 185). Those were exceptions, however, and lacking contact with industry as well as through its own choices, based on Ulm's ethical and aesthetical orientation, the activities became ever more research oriented. Having soon found itself labelled a 'monastery of rationalism' (Rübenach & Meurer 1987, p.57), Ulm had little space for manoeuvring in the Germany of the postwar economic miracle and was closed down in 1968 (Spitz 2002).

NT3: The Exhibition



*Illustration 24: Exhibition view, NT3 (1965); left, Vjenceslav Richter, *Reliefometer* (1964), photo MSU Zagreb*

NT3 had the biggest number of participating artists so far. For the first time there were artists from the two rival superpowers, Anonima from the USA, founded in 1960, and Dvizjenije from USSR, founded in 1962. Božo Bek of GSU had received images and a letter from Dvizjenije via Russian people who had come to Croatia as part of a tourist group (Meštrović 2009). Dvizjenije (Movement) were founded during an era when cybernetics was embraced by parts of the intelligentsia in the USSR. Formed around Lev Nusberg (who later emigrated to Paris) the group developed a special type of *electric kineticism*, and later (after 1965), a cybernetic art with responsive environments and 'cybertheatre' (Chatzichristodoulou 2010, pp.11–2). No members of Dvizjenije, however, made it to the opening of *NT3*. Anonima, founded in Cleveland, Ohio, had gone through a formational period in the late 1950s, and early 1960s whose results showed amazing similarities with parallel developments in the studios of Düsseldorf, Milan and Paris, although there was no

direct link between the artists involved. Anonima produced grid based paintings of permutative elements generating optical effects. (Anonima 2010).

Many new groups joined NT, especially Italian ones, where the discourse on arte programmata and Gestalt research had inspired many artists. There was Gruppo 63, of which Eco had been a member (Eco 1989, chap.XI), Operativo R from Rome; Gruppo di ricerca cibernetica (Group of cybernetic research), a large group of fluctuating membership around the Milan based philosopher Silvio Ceccato who directed the Cybernetics and Linguistics Studies Centre at University of Milan; and group MID from Milan, whose members were only a few years younger than their counterparts from Italian groups N and T, but whose work was already a reaction to theirs, taking it consciously closer to industrial design and technology (Wolbert 2007, p.v).

MID produced an aesthetics which was as radical as it was slick, using light, electronics and rotating objects. For Mari's competition at *NT3*, MID submitted *Interference Generator* (1965), a cylindrical object with two rotating discs whose speed could be controlled with two buttons, creating different forms of visual interference (Barrese & A. Marangoni 2007, p.110). In the main exhibition at *NT3*, MID showed *Structure 3 + 3 vertical cylinders* (1964). Covered in fluorescent industrial paint and rotated against each other, the structures generated complex and changing patterns. *Mechanic* (1964-1972) first shown in Zagreb under the title *Disk* (MID 1965), was a large rotating disk at which stroboscopic light was shot from behind. With those large scale works the artists aimed at a 'polysensorial effect' integrating the viewers and the whole of the environment (Barrese & A. Marangoni 2007, p.118).

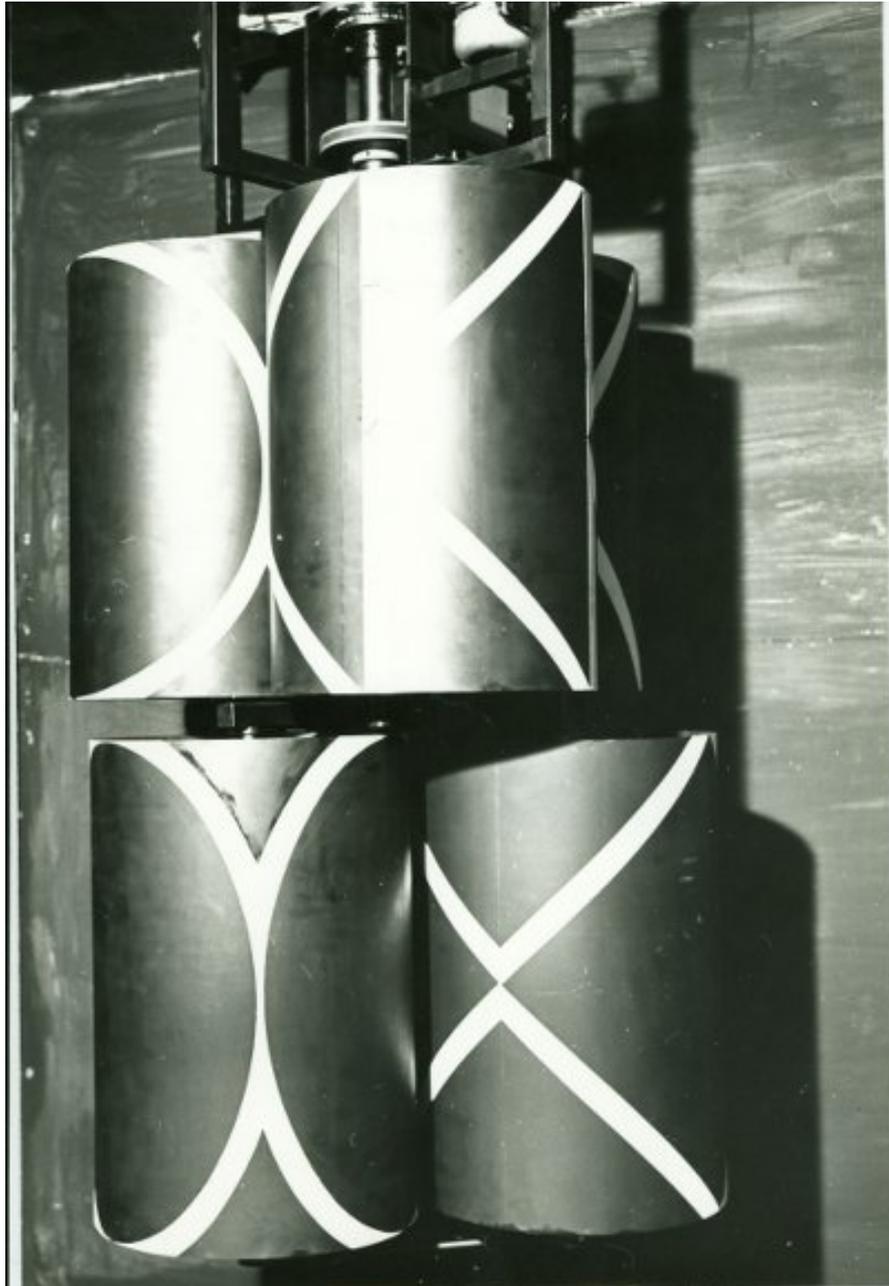


Illustration 25: MID, Struttura 3 + 3 cilindri verticali (Structure 3 + 3 vertical cylinders) (1964), photo MSU Zagreb

At *NT3* more artists from the Soviet zone of influence in Eastern Europe participated, such as Zdeněk Sýkora, Czechoslovakia; Sandor Szandai, Hungary; and Edward Krasiński, Poland. Sýkora's *White Dashes* (1963) consisted of white dashes regularly spread over a black canvas generating strong optical phenomena. Sýkora was soon to collaborate with a computer programmer to work out the logic of the formation of structures of his paintings, then carried out by hand. There was a growing number of

women participating, among others Helga Philipp, Marina Apollonio, Lucia di Luciano, Marianne Aue, Inge Claus-Jansen, as well as female artists who had already participated at earlier exhibitions of NT, such as Bridget Riley, Grazia Varisco, Dadamaino, and Martha Boto.

The works of Dieter Rot, Waldemar Cordeiro and Edward Krasinski formed a category of their own in this exhibition. Their works had an affinity with the ethics and methodologies of NT, but ventured into directions which brought them closer to conceptual art. Krasinski's *Spear* (1964) was suspended in mid-air, whereby, as a contemporary critic wrote, the work 'dematerialises sculptural volume' (Julian Przyboś 1966 quoted in Piotrowski 2010, p. 120). Krasinski was on his way to discover the 'line.' From a certain point on, Krasinski made works by using so called Scotch tape to make a straight blue line at a certain height. 'The line, a basic element of an image, was transformed into an entity stripped of any symbolic association,' observed Piotrowski (Ibid. pp. 120-1). Was this, 'just another Modernist myth?' Piotrowski asked, reminding us of Krauss' discussion of grids (which were discussed in Chapter 1, pp. 82-5).

Waldemar Cordeiro showed *Optical-intentional Deformations* (1964), a work which transgressed the borderlines between Constructivism and neo-Dada. In his catalogue text 'Art concret sémantique' (1965; 2010) Cordeiro argued that NT operated at the level of 'infrastructure' where 'everything is hygienic, impersonal, and economic. The consumer is reduced to a virginal and disinterested retina' (Ibid.). According to Cordeiro the ethical stance in NT had relied on an utopianism which had become 'outmoded.' Now, all that remained was 'hedonism, the amusement park, and the kaleidoscope' (Ibid.). Cordeiro demanded that infrastructural research should develop a 'qualitative link up to the infrastructure of semantics' (Ibid.).

Yugoslavian artists always present in NT such as Picelj and Richter were joined by several new participants such as Ivan Čizmek and Koloman Novak. Vjenceslav Richter's *Reljefometar (Relief-meter)* (1964) was correctly described by Douglas MacAgy as a kind of abstract instrument with which to formally contemplate ideas that could be applied on an architectural or urbanistic scale (MacAgy 1965). MacAgy was actually referring to another work by Richter belonging to a series of spheres

made from wood, but the principle was the same (Meštrović 1965a). The series of works titled *Relief-meter* (1963-69) were 'systemic sculptures' made of mass produced aluminium rectangles which were arranged into larger units in such a way that they could slide in and out, and thus create many possible variations of surfaces.

The *Relief-meters* were related to Richter's pyramids, the elementary architectural structure of his concept of 'synthetic-urbanism' (Susovski & MSU 2003, pp.28–31). Richter imagined that people should live in giant Ziggurats with a capacity for 10.000 inhabitants each. The idea may have been influenced by the French utopian Socialist Charles Fourier who suggested that so-called Phalansteries should house 1800 people and contain all functions for living including production. Between Richter's pyramids should be green land and parks; many such Ziggurats would together form a big city called Heliopolis. At the time of writing hardly any literature at all existed about those plans, except in Meštrović's untranslated Croatian book *Od pojedinačnog općem* (From the particular to the general) (Meštrović 1967a).

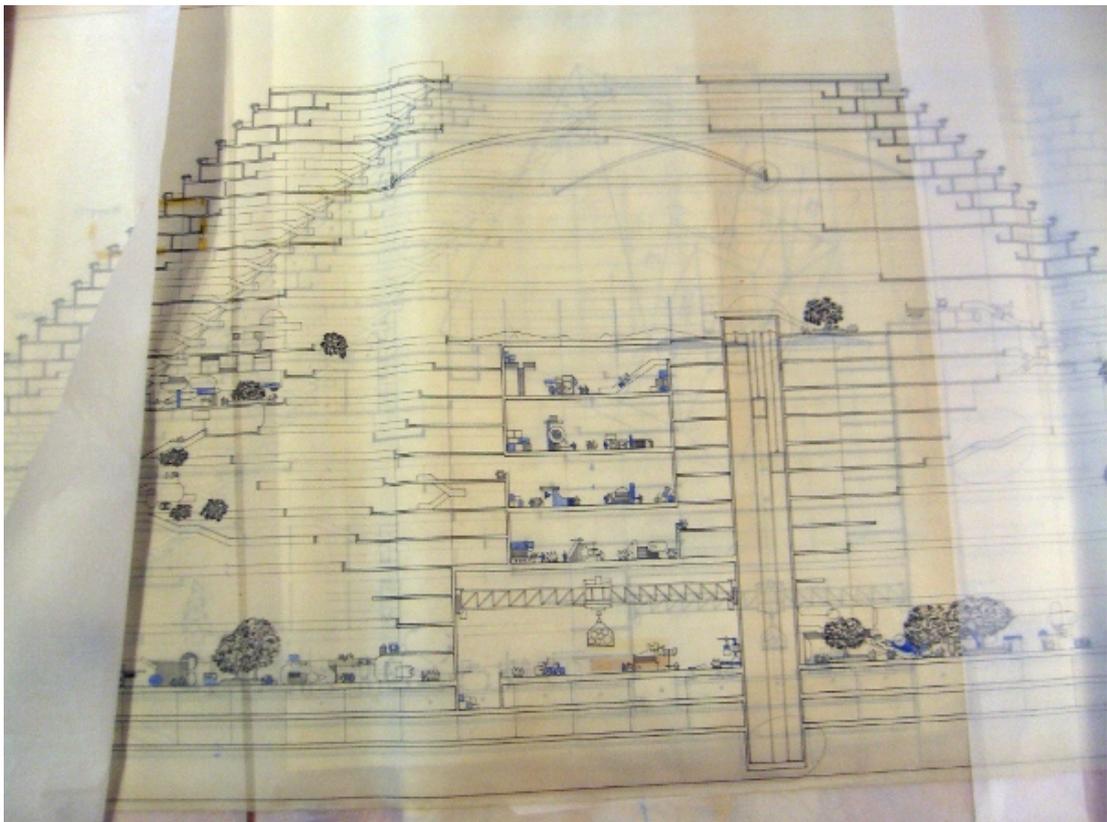


Illustration 26: Vjenceslav Richter, Ziggurat (ca. 1965); architectural drawing, Richter Collection, MSU Zagreb; photo Armin Medosch (2011)

Homo Ludens in the Environment

NT3 was marked by two key interrelated innovations: the introduction of environments or 'ambients', and the notion of play. In a contribution to the catalogue of *NT3* under the title 'Art as Research', Argan (1965) reflected on the fundamental problem NT artists were faced with: 'to accept as an existential situation the way of life determined by technological and industrial processes does not in itself mean to recognize it as a model for behavior that would also be valid on the aesthetic, moral, or political level' (p. 196). Argan juxtaposed 'existence, marked by the rhythm of abstract thought and its operations,' with 'individual existence', 'memory', 'the past', finally asking 'will pragmatism and mass technology utterly destroy the sense and value of the self?' (Ibid., p. 197). The proposal then put forward by Argan is something we meanwhile have become familiar with:

'... as the historical process is irreversible, the only possibility open to us is to liberate ourselves not from, but within personal experience; to return to homo ludens (in the sense proposed by Schiller in *On the Aesthetic Education of Man* in a series of letters) not outside, but inside the activities of homo faber.' (Ibid., p. 197)

Johan Huizinga's thesis of 'homo ludens' (man as player) gained increasing currency in the 1960s. In that era, the belief was widespread that automation would grant people more leisure time. While automation heightened alienation at work it would greatly reduce socially necessary labour time so that people would have more time to engage in playful, cultural and artistic activities.

The exhibition *NT3* invited viewers to get into tactile and visual contact with objects. Many of the participatory works such as Rudolf Kämmer's *Drehgrafik 3/64 (Rotary Graphic)* (1964) applied to ludic instincts, and if we trust photographs taken at the opening, the invitation was taken up joyfully by many visitors. The notion of play was also linked with the construction of environments. The German group Effekt contributed to *NT3* a *Sphere cabinet* (1965), a dark room full of bright spheres hanging from threads moved by motor (see Illustration 28).



Illustration 27: NT3, visitors engage with Rudolf Kämmer's Drehgrafik (Rotary Graphic) (1964-5), photo MSU Zagreb

Group T from Milan showed immersive environments which were concerned with space, colour and perception. Anceschi and Boriani presented *Experimental Environment* (1965a). Visitors entered a cubic space with changing projections of light in primary colours and were then asked to fill out a questionnaire about their sensations. The questionnaire was part of a 'semantic aspects analysis' invented by Dolf Zillmann, who was then a lecturer at Ulm where Anceschi and Boriani were studying. 'Our intention is to highlight and measure statistically, using tests, the aesthetic information content of a programmed visual message' wrote the artists (Anceschi and Boriani quoted in 1965b, p.116; 2010, p.214).

Gianni Colombo showed a new version of *Inhabitable cinematique structure* (1964-65), which was now also a closed cubicle visitors had to enter. In the dark space, orthogonal grids were projected in quick successions. While after-images still lingered in the visitor's mind, another grid, rotated 60° was projected, thereby forcing visitors to adjust their spatial orientation. A text submitted by Colombo explained

that this work was continuing earlier objects' 'tendency to establish a communication which becomes increasingly specific and totally visual.' Colombo stressed that the work addressed a structural knowledge, 'derived from experimental operations' which draw on the 'objective data of perception, [...] preceding the coming into play of will-power, mood, pre-disposition, and the culture of each individual spectator' (Colombo 1965). Colombo envisaged that such research could be integrated on an architectural level or even that of town-planning, but should then be carried out together with experts in mathematics, physics, psychology and other disciplines (Ibid., p. 3).

Colombo developed this idea further in *Elastic space* (1967), an immersive space consisting of ultraviolet light, stroboscopic light and a three-dimensional network of rubber strings which could be changed by the spectators. The disorienting effects of stroboscopic light were combined with the tactile information from touching the strings. The work caused a sensation at *Trigon* 1967 in Graz (Steinle 2008, p.13; Colombo et al. 1971) and won the first prize at the Biennale of Venice in 1968 (Meneguzzo 2001, p.23).

In the years after *NT3*, members of group T, individually and together, created further environments which facilitated close engagements of viewers with spatial structures, with virtual architectures and their changes and distortions in response to acts of the viewer. At *Kunst-Licht-Kunst* (1966), Van Abbemuseum, Eindhoven, curated by Frank Popper, T group were commissioned to create a series of four rooms consisting of programmed light installations, each following a different logic. 'The 'consumer' becomes conscious of himself at the centre of an infinite, if illusory space, whose structure he explores through his own movement' wrote Popper (1966). The 'dematerialising effect' of the light allows visitors to experience space, duration and colour in rooms which can become 'inhabited psychologically' (Ibid).

GRAV did not show a collective work at *NT3*, but their *Labyrinths*, created since 1964, appealed strongly to the ludic instincts of people. The artistic intentions behind those works aimed at helping people to free themselves from alienation (see Chapter 2, pp. 116-18). The formal innovations of NT, their visual research carried out with the help of electrical motors and light, had a didactic aim. NT thought those works would break through established patterns of perception and encourage people to start

to think about their own position in society. The creation of awareness of different realities, of different spaces of possibilities was understood to lead people out of the hierarchical closed loops of the factory, the military, the office and the shopping mall. Those intentions which had already informed works in 1962-63, were now pursued with new tactics emphasising play and using stronger visual stimulants.

At NT3 François Morellet showed *Neon N° 3* (1965), a small grid of neon lights switched on and off in irregular patterns (Popper 1968, p.183). The works of MID with stroboscopes and rotating disks employed a kind of visual shock tactics which would still do well in any techno club today. The desire behind many of those works was, 'to give us a glimpse of the kind of human relations that would be possible in a society that is spared alienation, separation and taboos' (Millet 2006, p. 46).

On 19 April 1966 GRAV organised *Journée dans la rue*, a street action, from eight in the morning till eleven in the night. Moving from the Champs Elysées to the Lation Quarter and other places, with a van full of weird objects, including a giant kaleidoscope, spring mounted stool, and a sculpture which could be assembled by the audience. Their *Labyrinths* and their street actions were considered to be a 'collective party and a model what human relations would be in a "liberated society"' (Stein, quoted in Millet 2006, pp. 31-32).

The playfully interactive environments developed by NT artists in the mid 1960s became a new kind of lingua franca in the arts in the late 1960s. GRAV created a play room for children with oversized objects at Museum am Ostwall in 1968 (Museum am Ostwall (Dortmund, Germany) 1968). For the exhibition *Contenir, regarder, jouer* (1970) in Paris, Enzo Mari offered children the possibility of devising a fable using animals created by the artist (Popper 1975, p. 130). Artists coming from other angles, in particular from Happening and Fluxus, also began making environments. This brought the Constructivist strand in NT back in contact with their neo-Dada colleagues such as Mack, Piene, Yayoi Kusama and the group Gutai. At the end of the 60s and beginning of the 70s the environment, as a new art form, was very much in evidence everywhere in the art world.

This could also take another direction, away from playfulness, towards realisations on an architectural scale. Morellet painted red on blue grids on the firewalls of Parisian apartment buildings in Plateau Beaubourg (Popper 1975, p. 99 colour plate 15). Louis Tomasello in Mexico and Jesus-Rafel Soto as well as Carlos Cruz-Diez in Venezuela were able to carry out large scale urban works (Ibid., p 99).

Yet the environment gave licence to some large scale spectacles which shared few of NT's sensibilities. The gigantomania of Nicolas Schoeffer's kinetic sculptures was viewed with criticism by Colombo (op.cit, p. 2). The kinetic and laser art in the 1970s, and large scale installations such as Adolf Luther's work for the Olympic Games in Munich 1972 (Popper op.cit., p. 101) produced aesthetic spectacles which forced viewers into submission by overwhelming them with sensations. This was the opposite of what the progressive wing of NT wanted to achieve.

The so-called Situationists, who were formed under the name Situationist International (S.I.) in 1957 through a fusion of other groups²², have through their involvement in '68, become admired as truly revolutionary artists. The Situationists were engaging with ideas on the intersection of automation and creative play very similar to those of NT. Influenced by Lefebvre and Huizinga, the Situationists 'invitations to play' aimed at extending the political battlefield into revolutionising every-day life. Already in 1957, their chief theorist Guy Debord wrote, 'We need to construct new ambiances that will be both the products and the instruments of new forms of behavior' (1957; 2004).

When GRAV built their first *Labyrinth* at the Paris Biennale of 1964, the Situationists accused them of the 'integration of the population into the dominant socio-economic system.' Jealously guarding their own ideas about 'putting an end to the passivity of separated spectators through the construction of situations,' the Situationists accused GRAV of making 'the spectator participate in his own misery' (J. V. Martin et al. 2007). The Situationists liked to be polemical, in particular when writing about artists who were close to their own programme. In 1962, they had accused Le Parc and GRAV of using 'proto-situationist formulas' (S.I. 2004, p.141).

22 Mouvement International pour un Bauhaus Imaginiste (International Movement for an Imaginist Bauhaus - MIBI), the Letterist International and the London Psychogeographical Association.

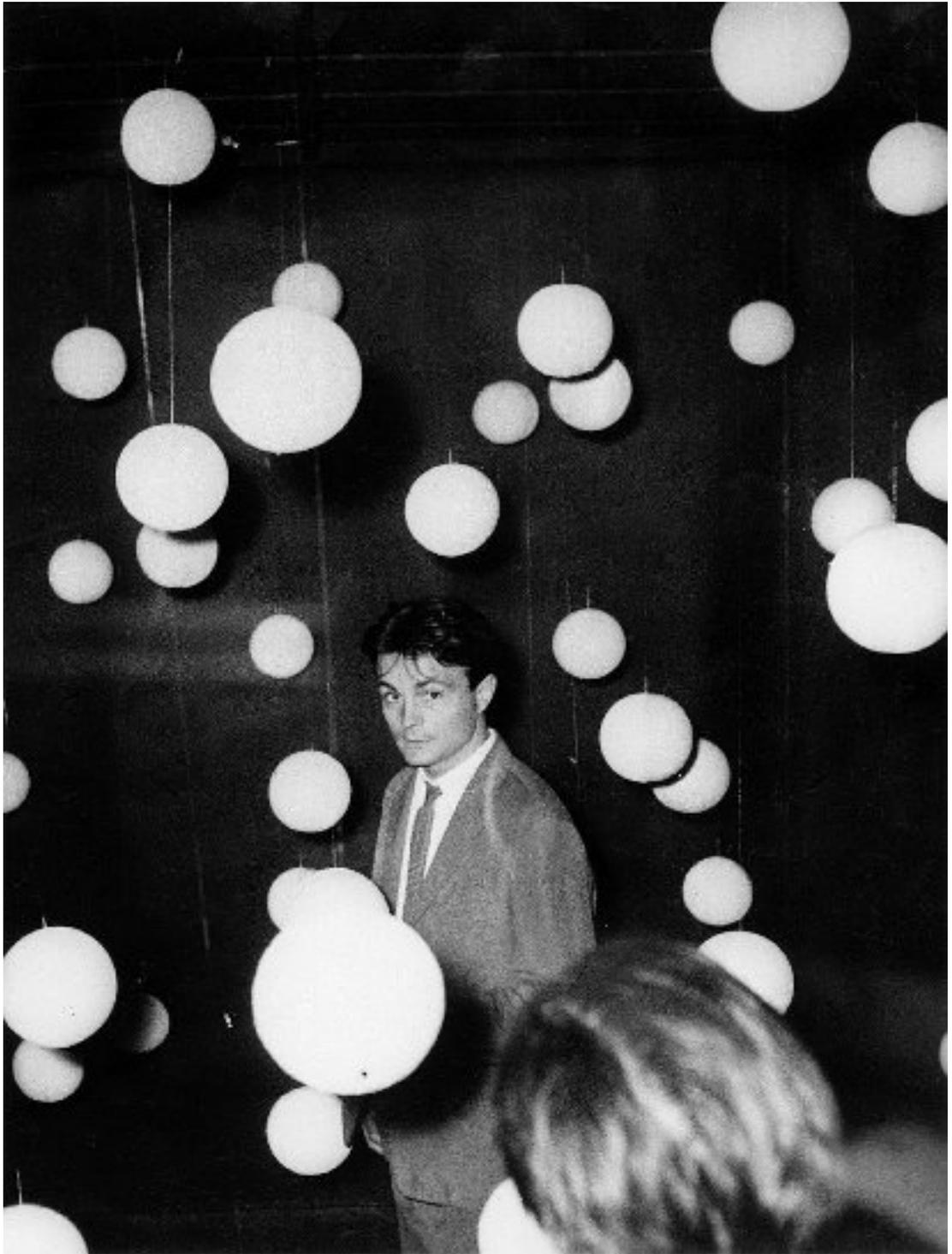


Illustration 28: Ivan Cizmek inside Group Effekt's, Sphere Cabinet (1965), photo MSU Zagreb

Jelena Stojanovic constructs a dual opposition between 'rationalist' artists such as NT and supposedly irrational Situationists. Using the label *Cold Art* after NT participant Karl Gerstner's (1957) book, Stojanovic argues that 'often these artists couched their aesthetic ideology, as well as their obvious glorification of functionalism, in an outspoken desire to create a democratic Marxian (egalitarian) type of abstract art' (J. Stojanović 2007, p.25). With explicit reference to Max Bill, Abraham Moles, and Max Bense, Stojanovic claims that the art those theorists stood for 'was the perfect embodiment of affirmative culture, blindly adhering to the Cold War discourse without any reflection on its function within that paradigm' (Ibid.).

The background to that was a quarrel between the Danish painter and S.I. co-founder Asger Jorn and Max Bill. In 1953 Jorn had been invited by Bill to join HfG Ulm not knowing that Jorn, who had worked at Le Corbusier's office in the 1930s, had meanwhile come to disapprove of functionalism, a critique summarised a year later in 'Against Functionalism' (Jorn 1954). It came to a clash between the two artists and Jorn founded the *Mouvement International pour un Bauhaus Imaginiste* (International Movement for an Imaginist Bauhaus - short MIBI) in a move specifically directed against HfG Ulm.

Jorn's critique of Max Bill's 'functionalism,' however, did not affect NT in the same way, since their art had moved beyond Bill. What Stojanovic' sweeping condemnation ignores is that her heroes, the Situationists, like NT, also tried to find an adequate role for art under the conditions created by the new technological and scientific reality. For instance, the Dutch artist Constant Nieuwenhuys drew plans for a New Babylon, a kind of cybernetic city in which inhabitants would engage with the city's playful reconstruction (Sadler 1999). The two key theoretical works by the S.I., both published in French in 1967, *The Revolution of Everyday Life* by Raoul Vaneigem (Vaneigem 1983) and *The Society of the Spectacle* (Debord 1983) reveal through a close and fresh reading, that the authors' engagement with automation and cybernation occupied a key position in their work. The Situationists recognised that automation potentially liberated people from the yoke of work, but held against that, that this potential could never be realised in capitalism since, as Debord wrote, 'the technological developments that objectively tend to eliminate work must at the same time preserve labour as a commodity' (1983, para.45 p. 23).

Rather than constructing a polar opposition between NT and the Situationists, both groups can be understood as formulating an advanced response to the challenge posed by automation and cybernation. The Situationists developed an unreconcilable critique of consumer capitalism summed up in Debord's term 'spectacle.' As the only way out Debord advocated a revolutionary form of council communism inspired by the Paris Commune of 1871. The Situationists' particular idea of what it meant to be an avant-garde made them abandon art and become full-time revolutionaries. NT's idea of an avant-garde ended in the recognition that a revolution in art alone was not sufficient, as one of the most critically minded artists, Manfredo Massironi wrote in a retrospective article in the catalogue of *NT3* (Massironi 1965b; 1965a).

The End of NT as a Movement



Illustration 29: Symposium at Brezovica, August 18, 1965; photo MSU Zagreb (1965)

After the opening of *NT3*, a symposium was held at Brezovica castle outside Zagreb, on August 18, 1965. The discussions, which were recorded, transcribed and published in edited form in the catalogue, revealed the multiple dilemmas NT found itself in. A gap was discovered between the artists' desire to conduct research and their actual capacity to do so, between a programme oriented towards the most advanced level of industrial production and the actual level of technical execution of artworks. Society was not yet prepared for the definition of the role of the artist as researcher. NT had wanted to replace the notion of art with a practice of visual research, but at the time no institutional structures existed to support it. Artists were still depending on the art market for which they had to produce commodities (Meštrović & Putar 1965; 2010).

At the symposium in Brezovica the 'cyberneticist' Abraham A. Moles gave a long speech which left a deep impression on participants. Moles talked about the possibility of objectifying aesthetic judgement and automating the production of art (Moles 1965; 2010a). Moles' lecture gave the basis for a re-orientation of NT. At the symposium at Brezovica the first phase of NT ended. Three years later it relaunched itself under the new banner of *Computers and Visual Research* in 1968/69. The

exhibition and conference of 1965 marks a real break. While the institution in Zagreb and the circle of people remained largely the same, the producers of art with computers were by and large other artists than those who had formed the movement.



Illustration 30: Symposium at Brezovica, August 18, 1965, Abraham Moles (centre left); photo MSU Zagreb

From the transcript of the discussions it appears the atmosphere at Brezovica was subdued. The participants felt that the movement was losing impetus. This was compounded by the effects of NT's art being absorbed by the market. The overall effect of market success was corrosive or even fatal, argued Denegri (2004, p. 173). When Lea Vergine remarked that 'if the beginning did occur in a scientific laboratory, the end was taking place in a boutique' (Vergine 1984, p. 16, quoted in Denegri 2004, p. 172), this was more than just a metaphor. Denise René gallery started producing multiples in 1965 which were sold in a large upmarket department store. The fashion chain Prisunic began selling clothes with Op Art motifs (Millet 2006, p.15). The temptations for individual artists became just too strong. Le Parc accepted the first prize at the Biennale of Venice in 1966 in the painting category as an individual, and

not as member of GRAV (Denegri 2004, p. 187). This was the beginning of the end for GRAV while group N had already dissolved in 1964.

The paradox was that NT failed as a movement by becoming successful quickly. As Massironi analysed, there was no need for censorship, to neutralise the revolutionary ambitions of NT it was simply enough to absorb it (op.cit.). To the extent that the art market was swamped with works which looked just like NT, the political program of NT was pushed into the background. The terminology of kinetic and Op Art was partly to blame for the demise of NT. Those terms guided attention to the surface characteristics of the work thereby suppressing the social content of the work. The Italian critic Gillo Dorfles wrote that NT were 'perceptivists rather than Op Art.' Their results 'arrive from a penetrating inquiry into the perception of visual events [...] or rather that part which lends itself to the ambiguous, the illusory and the paradoxical' (Hayward Gallery & Institute of Contemporary Arts 1982, p.21).

Meštrović's catalogue text for *NT3* titled 'The reasons and opportunities for historical awakening' (Meštrović 1965b; 2010) gave a concentrated history of NT's first phase. He suggested that NT had initially appeared under a 'then somewhat brighter horizon of the international political situation' and had understood itself as 'something that is exclusively counting on a "new world" and which comes forward as its freshest voice and annunciation' (Ibid.). During those early years, the capacity for 'ideation', the creation and dissemination of ideas, was 'unlimited' Meštrović suggested. The 'coherency of the movement grew consistently until 1963' but then 'waned sharply in that watershed year.' Meštrović suggests that the problems arose because 'the corrosive and corruptive action of the basic material forces that direct the world and set it on a wrong course,' were not foreseen. The NT movement had been unable to understand the basic contradiction between 'the historical horizon at which industrialization transforms into socialization' and the 'conditions of neocapitalism's moral postulates' because of which, 'that historical process is constantly postponed.' What Meštrović thought was needed was, 'critical insight into our own experience [...] regarding our own position at this historical moment' (Meštrović 1965, 2010).

Massironi stated that NT had initially believed that 'it was enough to denounce a bad situation (the myth of creation, the myth of personality, interference of the market,

etc..) to make a proposal for corrections, and with that change would come to the whole panorama of the artistic world' (Massironi 1965b; 1965a). NT had failed to account for 'the real interests that are at work in the system, economic interests, interests of organisations, prestige' (Ibid.). His critique was that NT had thought it was enough to make a revolution in the sphere of arts. 'We cannot continue to think that what we are doing in the field of art is revolutionary, but it is not, as it can be absorbed and partially is getting absorbed by the world we want to destroy, and this absorption occurs with our complicity because it gives us a type of survival' (Ibid.). As Massironi saw it, if NT's proposals on 'an ideal level' carried the 'illusion of universal renewal' on the level of reality, 'this inexorably remained tied to a reformist practice' (Ibid.).

An important aspect of NT's program was a dialectical understanding of science and technology. When Meštrović appeared to propagate the scientification of art, he did not uncritically subordinate art under science, but performed a Marxist critique of the historical role of science arguing *dialectically* from a position within capitalist society. Bourgeois science and technology are progressive insofar as they develop the means of production and thereby, almost against their will, change the conditions for social life in unpredictable ways. Habermas (1982) explained that bourgeois projects, such as the Enlightenment always suffered from this contradiction. The emancipatory effects which reasonably can be expected to arrive from the development of science and technology are constantly subverted through the negative systemic properties of capitalism. Yet this does not mean that progressive artists should reject technology. The forces of production that are unleashed by capitalism can be seized by artists to develop the '*unforeseeable potentials of new knowledge*' (my emphasis)²³. In a text which anticipates NT, Marx wrote: 'The forming of the five senses is a labour of the entire history of the world down to the present' (Marx 1972b, pp.88–9).

NT's engagement with visual perception on the psycho-physical or biological level was, and remains, widely misunderstood. NT did not expose viewers to some retinal dogmatism, subjecting them to Pavlovian stimuli in the hope to trigger pre-programmed responses. NT addressed the collective infrastructure of visual

23 This is a phrase Meštrović used in conversation with me and sums up the effort of NT well.

perception as what in contemporary terms could be called the visual side of *The Grammar of the Multitude* (Virno 2004; Virno 2006; Virno & Hardt 2006). Paolo Virno argues that the multitude because of its alienation needs to find refuge in the most essential resources; not in common places but in that which is held in common by all, the most general categories of the intellect (2004, pp. 43-7). The multitude, argues Virno, now enters production through its participation in the general intellect (p. 52). Applying Virno's ideas about the multitude and linguistic structures to visual perception shows a possible path to an understanding of what visual research really meant for NT.

Gestalt psychologists and later research in cognitive and structuralist psychology had found that seeing was interrelated with knowing. With every stimulus of the retina the mind starts forming perceptual hypothesis (Gregory 1977, p.10). Perception was not merely a passive act but involved a complex yet largely intuitive knowledge about forms and relationships, a topological knowledge which is, to quote Lev Manovich, 'the ability to represent such relations as inclusion, proximity, and relative positions. According to many cognitive scientists, these properties make it a more efficient medium for problem-solving and abstract thinking than language' (Manovich 1993, p.4).

As a summary of the development of NT from 1961 to 1965 it can be said that its starting point had been the critique of the art market and the myth of art as established by the Western canon of art and art system. To counter that myth they took a systematic interest in art as research. The search for a new role of art was closely bound up with the motivation to develop a new relationship with the viewer through the work. The participation of the viewer was one of the key objectives, engaging her with new formal arrangements of seeing, experiencing space, of thinking and feeling. Art became an empirical experimental practice which investigated perceptual phenomena held in common by the widest range of people. NT's concerns with interaction, participation and movement led to formal innovation in art which, at the same time, intended to facilitate people's self-empowerment from general social alienation. This entire social agenda however was sidelined when NT experienced success on the international art market while the influence of the market also proved to undermine the social cohesion between groups and their members.

After 1965, individual artists such as Morellet, Colombo, Graevenitz, and Le Parc, to name just a few, continued to work successfully as artists. Many other participants in the first phase of NT, however, chose a career change. Manfredo Massironi became a lecturer in the psychology of perception at the university of Padua. Giovanni Anceschi went to Algeria to develop the graphic design of the national oil company of the recently de-colonised nation. Within a few years all the groups involved broke up and NT as a supergroup was no more. NT as a movement was over, but the story began afresh with new people.

CHAPTER 4: Computers and Visual Research (t-4, 1968/69)



Illustration 31: Exhibition view t-4, Computers and Visual Research, August 3 and 4 1968, Information exhibition; (background left) Herman de Vries, *Random Objectivation* (1967), (centre left) works by Vladimir Bonacic, (centre right) works by Hiroshi Kawano, (right) works by Peter Milojević; photo MSU Zagreb

After the meeting at Brezovica in 1965, the organisers in Zagreb briefly toyed with the idea of making an exhibition in 1967 with three groups, Anonima from the USA, Dvizjenije from the USSR, and the Italian group MID (Meštrović 2010b). This plan was dropped, however, and the decision was made to focus on *Computers and Visual Research*. This was, in the words of curator Boris Kelemen, motivated by 'the beginning of a crisis for NT, the start of visual research using computers, and the

establishment of an aesthetics of information as the theoretical basis of these movements,' (Kelemen 1970).

At the symposium in Brezovica in 1965, Abraham Moles had given a presentation on 'Cybernetics and the Work of Art' (Moles 1965; Moles 2010a)²⁴ which had impressed the curators and critics involved in NT. Moles proposed a computer-based cybernetic system which was capable of analysing images according to their artistic value and producing new and original images. Although highly automated, the system would still need human labour. Researchers would have to analyse consumers' tastes and aesthetic value-judgements, the ideas for pattern generating algorithms would be developed by artists, whilst their implementation would be done by professional software programmers. On top of the social hierarchy Moles imagined a new type of profession, the aesthetician, who would make the system-level decisions and coordinate the work of the other people involved.

Automation, in Moles' conception, should allow each person at home to enjoy a 'unique' artwork designed by this cybernetic creative machinery of human and machine components. Moles' 'permutative aesthetics' would enable a social-democratic consumer cornucopia of cheaply produced art and design for all. At the same time this idea established a pyramidal hierarchy of labour organisation and provided no outlet for the individual creative agency of the consumer. It fell back behind positions already established in the course of the early years of NT which had been characterised by participatory artworks which made the viewer co-creator of the work, and where works were designed to free viewers from alienation and apathy.

In the mid 1960s Moles was also preparing the English edition of *Information Theory and Aesthetic Perception* (1966). It provided much of the theoretical background for the cyber-art-machine outlined above. Moles tried to integrate information theory and cybernetics with aesthetics and the psychology of perception. The assumption was that human perception and aesthetics could be made part of a cybernetic model of the world that was mathematically and statistically describable (Moles 1966, pp. 2-4). Drawing on Gestalt psychology and structural linguistics as

²⁴ Moles re-iterated those ideas, in shorter form, in a piece titled 'Experimental Aesthetics in the Consumer Society' (Moles 1968).

well as socio-metric models (p. 33), Moles thought he could mathematically define the *measure of originality* (pp. 22 - 27). Believing that it was possible to create out of statistics a 'normalised' human being with average aesthetic perceptions, then it was also possible to establish mathematically the most improbable, the original, those works which were genuinely innovative.

Moles defined the measure of originality as analogous to the quantity of information, as 'the measure of unforeseeability, [...] a problem in probability theory' (Moles 1966, p. 19). Moles was inspired by optimistic assumptions about the computability of aesthetic perceptions motivated by examples such as Wilhelm Fucks' studies on note frequencies in works of classical music (1966, p. 36), crypto-analysis (1966, p. 48); and Markov chain processes (Ibid., p. 51). The latter are 'sequences of random events in which the probability of any future event was determined by the current state and did not depend on all other states,' explains Gerovitch (2002). Markov chains had originally been discovered by Andrey A. Markov senior 'using Pushkin's poem Eugene Onegin. [...] The linguistic origins were quickly forgotten and Markov chains became an abstract mathematical concept which was heavily used by Shannon in his *Mathematical Theory of Communications* (Gerovitch 2002, p. 106). Moles reintroduced it into the study of artworks.

Moles published a table of what he called Hegelian '*dialectical dipoles*': Order-Disorder, Predictable-Unpredictable, Banal-Original, Redundant-Informative, Intelligible-Novel, Simple-Complex (Moles 1966, p. 208). Those categories allowed Moles a seamless transition from physical properties such as order-disorder to cultural properties such as banal-original. Moles was either blissfully unaware or even celebrated the fact that somewhere in that transition a line was overstepped where art became equal to any other object of natural science. As Mirowski has shown, the influence of cybernetics turned several disciplines such as psychology, biology and economics into cyborg sciences (2002). Moles happily turned art into a *cyborg discipline* (my emphasis). Curators in Zagreb, despite their deep grounding in humanistic education and the arts, accepted that. One can only agree with Denegri who found it 'difficult to explain that an Abraham Moles [...] was received in Zagreb year after year as a person of great authority whose word was taken for granted, whose suggestions were readily put into practice,' (2004, p. 190).

The preparations for t-4

A concerted effort was made by the group of organisers in Zagreb to gather information on computer art and cybernetics. As early as May 1965 Meštrović had inquired in a letter to von Graevenitz for information on the Stuttgart group which made experiments on the basis of information theory (Meštrović 1965). Marc Adrian (1965) had informed GSU director Božo Bek about Kurd Alsleben's work and the publication *Aesthetische Information Aesthetische Redundanz* (Aesthetic Information, Aesthetic Redundancy) (Alsleben 1962), an early text on cybernetics and art heavily influenced by Max Bense and the Stuttgart group. Yet it seems that Boris Kelemen played a leading role in the inquiries into computer art. Boris Kelemen was the brother of Milko Kelemen, artistic director of NT's sister festival, the Zagreb Musical Biennale. Boris Kelemen travelled frequently to Germany to conduct research for his dissertation which brought him into contact with the Stuttgart circle (Meštrović 2009).

That Stuttgart became a centre of early computer art was in no small part due to the activities of Bense, whose teaching on information aesthetics inspired students to try to actually make art with computers. One of the first to do so was Theo Lutz who used a Zuse Z22 to create 'stochastic literature' in 1959 (Funkhouser 2007, p.37). Lutz selected 16 subjects and 16 predicates from Franz Kafka's *The Castle* (1930) which were brought into relationships with each other by a program using random number generation to select words and logical operators, and constants to create syntactically correct sentences (Lutz 1959).

Frieder Nake studied mathematics at the Technical College at Stuttgart from 1958-1964. He started visiting Max Bense's famous Monday lectures in 1959/60. When confronted with the task of writing software to control a plotter, Nake began to make computer graphics (Klüttsch 2007, pp.131–2). Georg Nees worked as a software engineer at electronics giant Siemens' research centre in Erlangen. Nees was influenced by Bense's *Aesthetica* and went public with his computer graphical works through writing two articles (Nees 1964a; 1964b). In 1965 Bense exhibited Nees' work in a studio gallery in Stuttgart, an exhibition which in turn encouraged Nake to come forward with his work (Klüttsch 2007, pp.110–11). Nees' exhibition at

Studiengalerie Stuttgart from February 5 to 19 in 1965 is seen as the first exhibition of computer graphics, followed by Michael Noll at the Howard Wise gallery in New York from April 6 till 24 that same year, and a joint exhibition of Nake and Nees at gallery Wendelin Niedlich in November 1965 (Ibid., 2007, p.19).

The Zagreb team's research, however, quickly moved beyond the Stuttgart circle. Moles agreed to become a member of the organisational board of NT and supplied contacts to scientists and artists such as Bela Julesz who worked on stereoscopic vision at Bell Labs; Kenneth Knowlton, also from Bell Labs, who worked on computer animated films; the psychologist Daniel Berlyne at University of Toronto; the pioneer of computer music Lejaren Hiller at University of Illinois; and various computer companies such as Bull, IBM and Siemens (Moles 1968b). Contact was made with Leslie Mezei, a Toronto based artist and author who was an important figure in early computer art on the North American continent (Klüttsch 2007, p. 37).

The organisers in Zagreb acquired a complete set of the magazine *Computers and Automation 1965-72* (MSU Archive) which had organised the first competition of computer art since 1961. Zagreb also collected material about E.A.T, the organisation started by Robert Rauschenberg and Billy Klüver with the aim of bringing artists and technicians together to create an 'effective collaborative relationship' (E.A.T. 1967), and received brochures from Howard Wise gallery which was the only gallery in New York specialised on art and technology practices.

The Zagreb organisers had also made contact with Max Bense. It appears that Bense was not as helpful as the curators had hoped. Bense was involved as a key advisor with the *Cybernetic Serendipity*²⁵ exhibition and unwilling to engage in a project which could have been perceived as competition. Bense was also scared of travelling to Yugoslavia in the mistaken belief that the country belonged to the Eastern bloc and obeyed orders from Moscow. In 1950 Bense had fled the newly established German Democratic Republic where he had held a university post. He feared that the Yugoslav authorities would have arrested him and handed him over to 'their comrades' explained Marc Adrian in a letter to Kelemen (1968). Within a relatively

²⁵ *Cybernetic Serendipity* was together with *tendencies-4* the first large scale international exhibition of computer art. It was curated by Jasia Reichardt and opened one day before *t-4* on August 2, 1968. I will from now on refer to it in abbreviated form as *CS*.

short time the group in Zagreb found out just about everything humanly knowable about computer art at the time, and contacted key protagonists, whether they were researchers, artists or scientists.

In *Programme-Information 1 (PI-1)* of April 1968 GSU informed the world about the ambitious undertaking titled *Tendencija 4 (tendency 4 or t-4)* (GSU 1968a). The idea was to take a look at 'the general and historical connections between the NT movement and the possibilities offered by computers in the field of visual research' (Ibid) through one exhibition called *Homage to NT*; an exhibition and a symposium on *Computers and Visual Research*; a didactic exhibition about computers; and an exhibition of literature on computers and visual research' (Ibid.). All this was meant to happen in August 1968 and recipients were asked to forward that information to people potentially interested and send their addresses to Zagreb.

In June 1968, *Programme-Information 6 (PI-6)* published a new schedule for the same programme (GSU 1968c). 'The *number* of interested people on one hand, and *world political events* on the other hand' were quoted as reasons for the change of schedule. Rather than being concentrated in August 1968, *t-4* was turned into a series of events taking place between August 1968 and August 1969. In August 1968 only a colloquium on *Computers and Visual Research* would be held, accompanied by an 'information exhibition.' The 'world political events' were, of course, the events of '68. Movements for far reaching socially progressive political reforms had erupted almost simultaneously all across the globe as well as in Yugoslavia (cf. Katsiaficas 1987).

The team in Zagreb pursued an ambitious plan. The communications were aimed at not simply creating an exhibition as a one-off event, but tried to raise a discourse and start an international research movement on computers and visual research. A key problem which had emerged during discussions at Brezovica in 1965 was that, for the definition of art as visual research, there was no institutional infrastructure. At the end of the symposium in 1965 Moles had suggested some contacts with institutes which might be interested in facilitating collaborations (Meštrović & Putar 1965; 2010). This had not been picked up at the time. But the whole thrust of the activities of 1968-69 now suggested such a new orientation.

Programme-Information 7 (PI-7), released in August 1968, reminded the recipient of key principles of a socially engaged abstract art such as 'the necessity of demystification of the artistic activity.' There was a belief that there were 'general and maybe historical connections between NT and the possibilities given by computers in the field of visual research.' NT organisers stated their aim to 'incite intensive and organised efforts in the field of computers and visual research' through 'new organisational forms of work, which [were] to gather individual artists, groups and institutions in the international collaboration in the field of computers and visual research' (GSU 1968d, p.2).

An important step was to make contact with the Ruđer Bošković Institute in Zagreb, Croatia's 'foremost research institution for physics, nuclear physics, electronics, chemistry, and biology' (Rosen et al. 2010, p.272). GSU obtained the collaboration of Prof. Zdenko Šternberg and of a young researcher, Vladimir Bonačić who had studied electrical engineering in Zagreb, London and Paris and was working at the Laboratory for Cybernetics. Bonačić's involvement resulted in some of the most outstanding contributions to NT (Fritz 2008b). The institute supported GSU in its research effort through making available its own institutional contacts. For the main manifestation of *t-4* in spring 1969, a computer art competition was organised whereby the winners would obtain free computer time and programming support at the Ruđer Bošković Institute, and also at the Electrotechnical Faculty at the University of Zagreb.

Computers and Visual Research, August 1968



Illustration 32: Colloquium Computers and Visual Research, August 3 and 4, 1968; Herbert W.Franke (second row left), Frieder Nake (left, front row), Matko Meštrović (right, front row); photo MSU Zagreb

The colloquy *Computers and Visual Research* and the 'information exhibition' opened in Zagreb on August 3 1968, one day after the opening of *CS (1968)* in London. The colloquy has been recorded and the moderator can be heard saying that for "major objective reasons which were not all negative" the main events had been postponed to May 1969 (Moderator 1968).

Then the floor was taken by Abraham Moles. The aesthetician and sociologist claimed that the world was 'at the dawn of a new revolution more important than the

mechanical revolution that inspired Marx,' thereby implicitly claiming that this new revolution would make Marx redundant (Moles 1968a; 2010b, p.263). Like many authors at the time (cf. Berkeley 1962), Moles foresaw a 'a revolution of automation, of artificial thought, of symbiosis with machines, of mastery of communications' (Moles 1968a; 2010, op.cit., p. 264). This, Moles explained further, had until recently been a 'secret revolution, [...] a revolution which was concealed, hidden and diffuse,' but now it was 'emerging as one of the deciding factors of the world of tomorrow. It has rightly been said that information is the third fundamental element alongside matter and energy' (Ibid., p. 264).

The computer would modify 'the relations of the artist to the material, [...] the artist no longer *directly touches* or manipulates color, material, objects' (Ibid., my emphasis). Moles predicted that existing obstacles against bringing artists and the computer more closely together would gradually be removed, as 'financial objections [were] crumbling away,' and as the industry developed software routines for 'the smoothing of curves, perspective, volume, rotation of models all now accessible to artists' (p. 266). Showing a computer generated image of a female nude²⁶, Moles finished with a polemic against art academies.

The exhibitions and conferences *t-4* and *CS* were inaugural moments of computer art. It was through such exhibitions that the computer assumed a new meaning in the public mind and eye. Computers had until then been largely seen as giant calculating machines, good only for calculations of payrolls or the trajectories of ballistic missiles, now they were seen as entering the human domain in an area that had previously been considered the essence of what it meant to be human: art. Moles' introduction established a theme with ongoing important repercussions: that of an alleged historical break through the emergence of information.

As I have argued in my Introduction (pp. 28-30), narratives about a paradigm shift from an industrial society to one based on information technologies are relying on the twin tendency to use a fetishistic concept of information and to understand new technologies, in particular media technologies as agents of history rather than people.

26 The referenced image was probably *Mural* (1966) from the *Studies in Perception* series by Knowlton and Harmon (1966) from Bell Labs (Editor's note in. Rosen et al 2010, p. 266)

Moles, arguing along those lines, excluded the social conditions of the production of information to the point of naturalising them. Information which is socially constructed as a concept and actually produced by human labour became a property of nature. Behind this movement in thought stood the assumption that the computer made the separation between manual and mental labour complete. The following sections explore which role the emerging discourse on computer art played in this context.

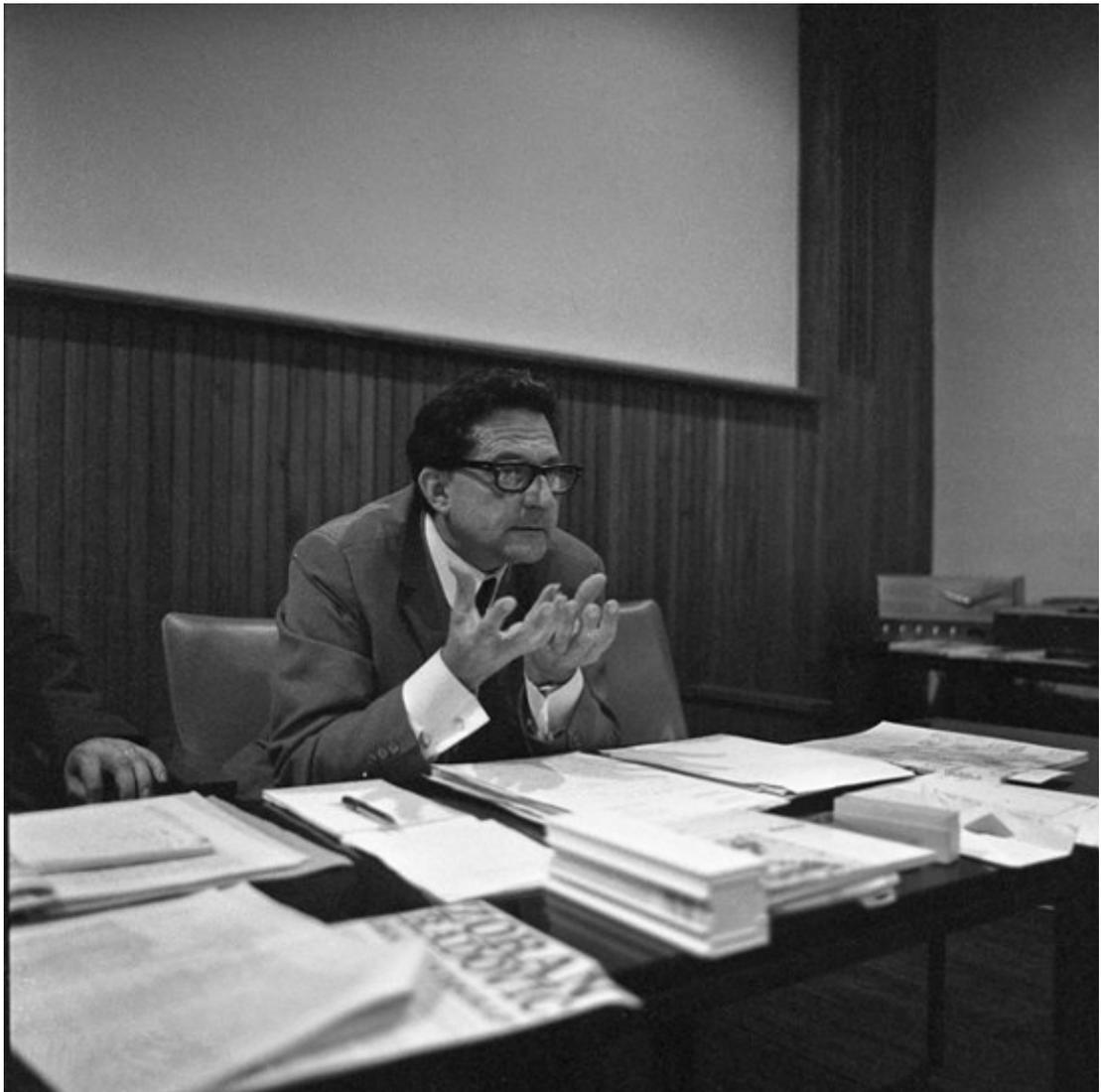


Illustration 33: Abraham Moles at Computers and Visual Research, (1968) photo MSU Zagreb

The Icons of early Computer Art

The colloquium *Computers and Visual Research* was accompanied by a small 'information exhibition' of computer graphics. The recordings of the proceedings allow us to listen to Herbert W. Franke leading the participants through this exhibition. The words he spoke are also contained in the magazine *Bit International* Nr.3 (Franke 1968) which was founded and edited by GSU.

According to Franke, until the arrival of the computer artists had used the same means as cave painters (Ibid., p. 117). He expected cybernetic art theory to be able to develop objective criteria about what was good art (Ibid., p. 118). Franke presented the computer as a superior instrument, because it could draw more complex curves than with ruler and compass, and could do things such as morphing – automatically creating transitions from one shape to another, or destroying a shape in successive stages (Ibid., p. 120-1). Franke's arguments posited computer art as a higher stage of art based on the superiority of the computer as a tool over all other tools.

After a while Franke handed the microphone over to Frieder Nake who made some more specific remarks about individual works on display. The information exhibition brought together some of the earliest computer generated images. Many of those works were simultaneously shown at *CS*²⁷. Through the catalogue of *CS* (Reichardt & Institute of Contemporary Arts 1968) and other books (cf. Reichardt 1971b; Reichardt 1971a; Brown et al. 2008; Franke 1985), these images acquired a kind of iconic status as early computer art connected to names such as Charles Csuri, Frieder Nake, Georg Nees, Michael Noll, Leslie Mezei, William Fetter, Kenneth Knowlton, Edward Zajec and a dozen or so other artists. Franke had celebrated the computer as an extension of the artist's intellectual and creative powers, a prosthesis. A similar approach was taken by many artists and theorists at the time.

27 Many of the works shown at CS have been preserved by the British Computer Arts Society. The Computer Arts, Contexts, Histories etc (CACHE) project has collected and digitised the works. The works were then acquired by the Victoria & Albert Museum which is in the process of cataloguing them and bringing them online (Victoria and Albert Museum 2011).

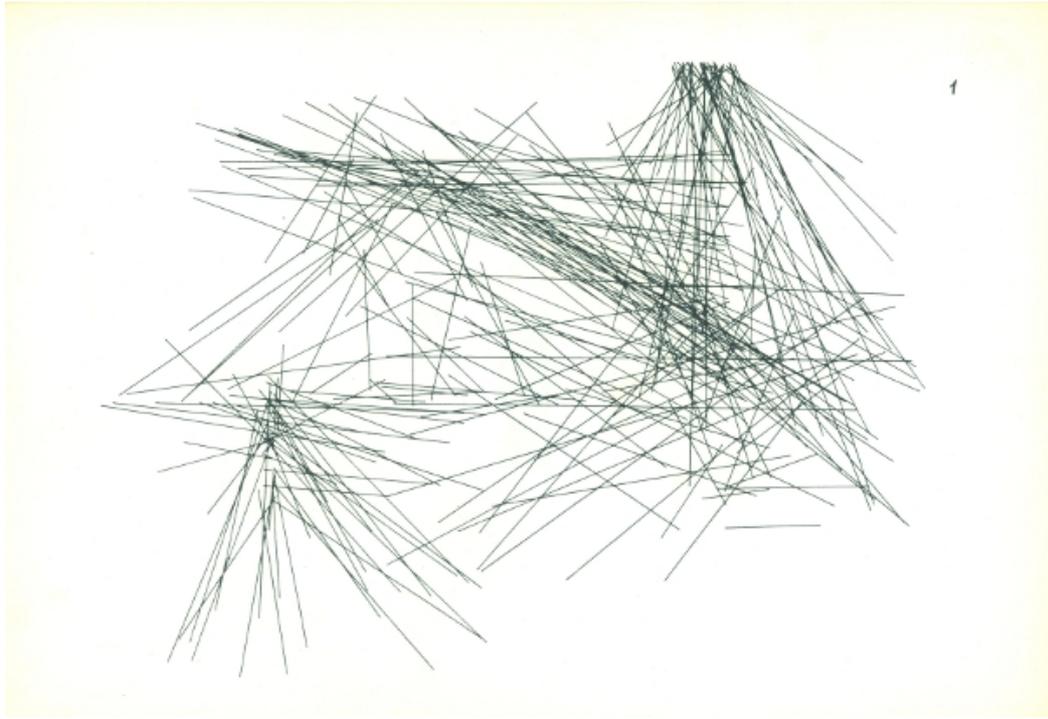


Illustration 34: Georg Nees, Untitled (1965-1968); computer generated drawing, ink on paper, Archive MSU Zagreb

The computer, seen through the lenses of commodity fetishism - was often described as an electronic brain and great hopes were put into artificial intelligence. Charles Csuri and James Shaffer, for instance, imagined a computer which would be equipped with all art historical knowledge and 'with every known technique about sculpture, painting and computer graphics [...] not to mention an ability to make judgements more logically than man' (Csuri & Shaffer 1968, pp.12-3). Through commodity fetishism, the computer became equipped with characteristics of a person. Typically then, the question was asked 'who is the artist?' (Ibid.).

The Visual Turing Test²⁸

This question was asked polemically by Michael Noll in what he called 'a crude approximation to Turing's experiment' (Noll 1968, p.57). Noll took Piet Mondrian's *Composition With Lines* (1917) and programmed a computer to produce an imitation of it, *Computer Composition With Lines* (1965). When reproductions of both images were shown to 100 people, 59 preferred the computer graphic over the Mondrian and

²⁸ for Turing test, see my Introduction p. 30.

only 29 could correctly identify which one was made with the computer (Ibid., p. 57). For Noll, this was evidence enough that the computer had passed the Turing Test in painting. 'In a sense, the computer with its program could be considered creative,' reasoned Noll (Ibid.).

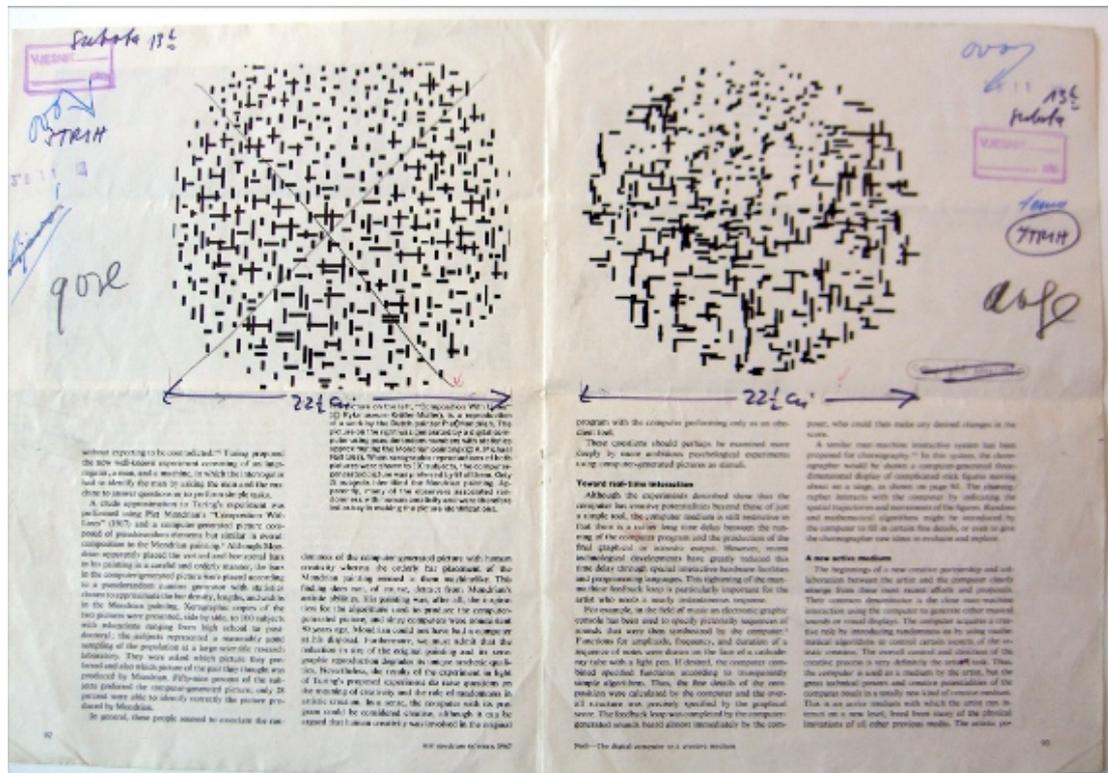


Illustration 35: Original double page of article 'The Computer as a Creative Medium' (Noll 1967), showing Michael Noll, *Computer Composition With Lines* (1965) with instructions for how to crop; Archive MSU Zagreb

Nake himself had produced a similar work, *13/9/65 Nr.2 "Hommage à Paul Klee"* (1965a) which imitated a drawing by Paul Klee. Those works were part of a polemic about 'the computer as artist' which was very powerful at the time. Rather than discussing the issues in the terms of an old debate as Christoph Klütsch (2007) did, we need to ask who started this polemic about the computer as artist and what function it had.

Michael Noll was working at Bell Telephone Laboratories' research centre in Murray Hill, New Jersey, as a summer intern in 1962 when a colleague showed him a plot of data that had gone astray. Noll interpreted it as abstract art because he had visited the Museum of Modern Art frequently in his youth. Soon thereafter, Noll started

producing such works deliberately (Noll 1994). Bell Labs were one of the key sites where the building blocks of informational capitalism were created through inventions such as the transistor, the operating system UNIX, and the C programming language. While Bell Labs gave its researchers a lot of space for free thinking, they were an important component of the military-industrial complex.

Inside the Organisational Complex

'Many followers of the NT have tried to give their work the habit of the machine or else they have based their procedures on the use of mechanical or electrical devices; they have all dreamt of the machines and now the machines have arrived. And they have arrived from a direction which was somewhat unexpected, and accompanied by people who were neither painters nor sculptors ...' (Putar 1970)

Many of those speaking at the colloquium were scientists or engineers, either from universities and public research facilities such as the Ruđer Bošković Institute in Zagreb, or from corporate research labs such as Bell Labs, Boeing, CalComp, IBM, or Siemens.

Noll, Schroeder, Knowlton et al. were corporate engineer-artists working within the *Organisational Complex* (Martin 2005). The works were enabled by, and carried within themselves the logic of corporate research which primarily demonstrated possibilities of the technology. They showed the potential of 'The computer as a creative medium', to paraphrase the title of a famous article by Noll (1968). They did not engage critically with the social function of the computer. On the contrary, they willingly allowed themselves to be instruments of a corporate discourse on the benevolence of computers.

According to Reichardt, Noll himself believed that 'the roles of the artist and the engineer were not interchangeable' and that the engineers role was to 'make techniques available and accessible' (Reichardt 1971b, p.25). Despite such a display of modesty, Noll went to great length to preserve his legacy as an artist by writing articles (cf. Noll 1994). The corporation Noll worked for had an institutional interest in giving its products the appearance of something benevolent and humanistic.

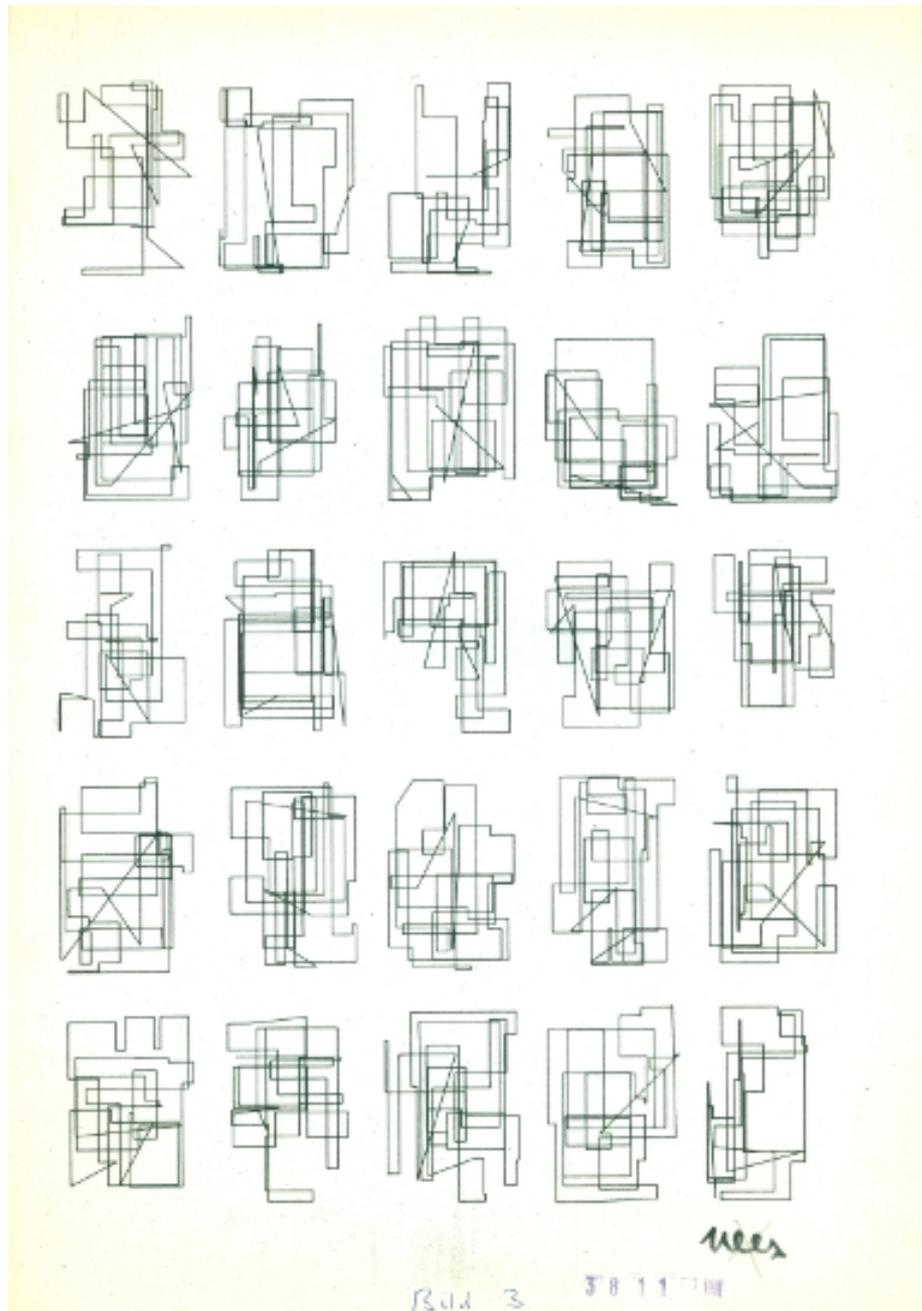


Illustration 36: Georg Nees, 23-Ecke (23-corner) (ca. 1965-1968); the image shows a 'collective of figures' achieved by drawing the same figure again and again without resetting the random number generator (Nees 1970); Archive MSU Zagreb

1968 was not just a year of revolts but also the peak of what computer historian Ceruzzi called the 'go-go years' of computing. Ceruzzi refers the term 'to the rabid chants of brokers watching their fortunes ascend with the daily stock ticker' (Ceruzzi 2003, p.159). 'Spurred on by Defense Department spending for the Vietnam War, and by NASA's insatiable appetite for computing power to get a man on the Moon, the late 1960s was a time of growth and prosperity for the computer industry in the United States,' explains Ceruzzi (Ibid.).

The first two decades of computing in the USA were almost entirely driven by and made possible through military funding. At first the context was provided by the beginning of the Cold War in 1948 and the explosion of the Soviet atom bomb in 1949 (Edwards 1996, p.88). If there ever had been a lull in defense related computer spending, the launch of Sputnik in 1957 put an end to it, shocking the USA into action by demonstrating to it that in some areas the Soviet Union was equal if not more advanced (Rheingold 1991, p.76).

One of the key consequences was the creation of the Advanced Research Projects Agency (ARPA). The MIT professor and psychoacoustician J.C.R.Licklider became director of ARPA's Information Processing Techniques Office (IPTO) in September 1962 (Rheingold op.cit., p. 81). Licklider's *Man-Machine Symbiosis* (Licklider 1960) influenced young MIT researcher Ivan Sutherland who developed Sketchpad, an interactive graphical software which opened up 'a new area of man machine communication' (Sutherland 1964, p.329). Projects such as Douglas Engelbert's *Augmenting Human Intellect: A Conceptual Framework* (Engelbert 1962), promised to increase the effectiveness of 'problem solving' through what he called a 'systems engineering approach' to the relationship between humans, language, artefacts and methods (Engelbert 1962, p. 15).

According to Edwards (1996) the US strategy towards containment of the nuclear enemy through centralised real-time command and control systems led, at the very same time, to a closed-world thinking among political, scientific and technological elites participating in the effort. In this world things could be tried out that were completely unimaginable under the competitive circumstances of economies under the dictate of the private market. For the researchers, living inside the bubble was

quite comfortable. Among the freedoms enjoyed there was a certain collaborative culture and openness to new ideas (cf. Turner 2006b).

The way those projects were set up, at public universities and research institutes, often carried out by young programmers and graduate students, meant that the results of research were kept in the public domain, not in closed military or corporate research labs. The influence of the military on the development of computer science is something that has to be carefully weighed up. While it makes no sense downplaying the influence of funding from military sources, it would be simplistic to interpret the history of computation as one completely determined by the dark secrets of the military. According to more nuanced interpretations, early computational technologies were shaped by a process of 'mutual orientation' between institutions such as the MIT and its military funders (Edwards *op.cit.*, p. 81). The potential military funders got educated about 'as yet undreamt-of possibilities for automated centralised command and control,' while the researchers could pursue high-flying and ambitious ideas which made interesting topics for PhDs (*Ibid.*, p. 82).

The go-go years of computing also saw the coming-of-age of graphical software as Moles had mentioned at the end of his introduction. In the 1950s and early 1960s, at places such as the Lincoln Lab at MIT, the basic routines for the manipulation of images were developed (Mahoney et al. 1989; Lambert 2003a; 2003b). During the 1960s graphical software made ever more rapid progress. The growing availability of software in general, and software for artists in particular, introduced a substantial problem into the discourse on art which remains little understood and investigated till today.

Software is the objectified intellectual work of another person or a group of persons. While art history knows many examples of artists working with assistants or having substantial parts carried out by master students, this had been a relationship with living labour. Relying on 'dead labour' embodied in software was an entirely different matter. An artist using such drawing routines actually used an industrially-produced ready-made. From an art-theoretical point of view such usage must not happen naively. Either an artist would thematise the use of software as a ready-made and make that acknowledgement a part of the work, or the artwork substantially relied on

software fetishism, a specific version of commodity fetishism. Artistic skill became based on the skillful manipulation of the labour of others.

Those issues became mystified through the way the discourse on computer art was led. The symposium did not go into those questions. The curators in Zagreb were driven by another belief that made them blind to the role of the military and corporations in early computer art. They thought that there were intrinsic relationships between the earlier art of NT and computer art. Curator Kelemen (1970, n.p.) thought that 'the calculations based on a programme, in other words on a statistical and geometrical structure composed from basic geometrical forms, which are often the basic problem for representatives of NT, can also be worked out with computers.'

What linked the earlier art of NT and computer art was also something else which may appear just as a linguistic analogy, but which hints to something deeper. Both participants in that discourse loved to talk about 'solving problems.' According to historian of science Douglas D. Noble (1989) the language of 'problem solving' was typical for this era, when cybernetic discourse began to intrude into psychology and education. 'Problem solving' was also a key term among the artists from a Constructivist and Concrete Art background in NT. This specific focus prevented them from looking into the larger implications of the computer for art.

The contributions of Yugoslav theorists to the Zagreb colloquium in August 1968 were not substantially different from their Western counterparts. Vladimir Bonačić felt the need to clarify the terms of discussion and demystify the computer (Bonačić 1968). He emphasised the enormous demand for resources necessary to foster significant innovation in the field, indirectly referring to the unmatched resources of the USA compared to Yugoslav research centers (Ibid., p. 56). Physicist Zdenko Šternberg from the Ruđer Bošković Institute first warned not to expect too much from scientific methods in art, then approached the subject matter of creativity from the side of the scientist (Sternberg 1968). Quoting Poincare (1908) and Hadamard (Liljedahl 2004), Šternberg emphasised the role of aesthetic sensibility in mathematics as a capacity to make meaningful selections from a great number of possible variations by intuitively grasping form (Sternberg op.cit.).

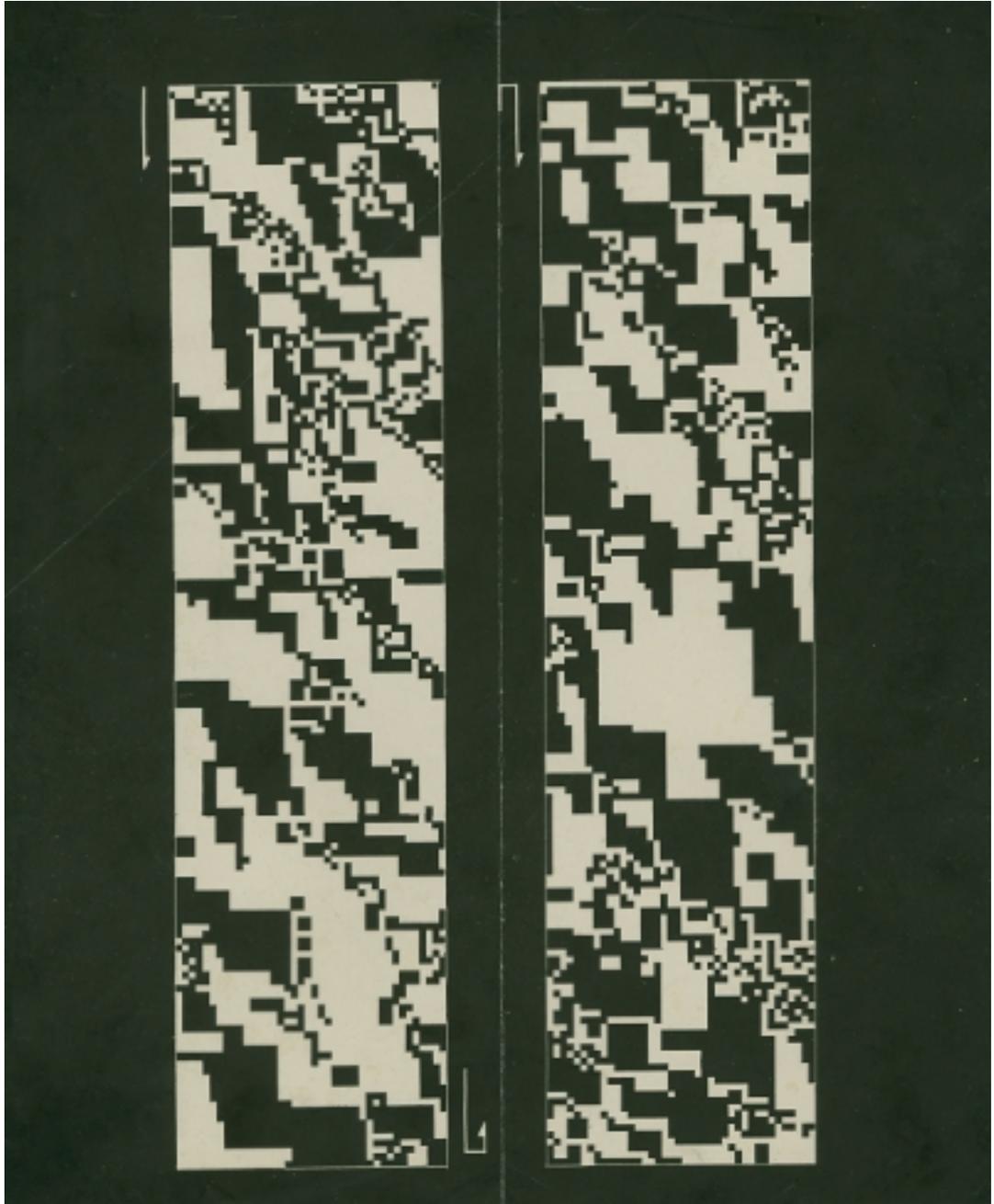


Illustration 37: Hiroshi Kawano, Series of Pattern: Flow (1964), computer-generated design, gouache on paper; Archive MSU Zagreb

Manglers of Computer Art

Peter Weibel (2007b; 2010) argued that there was an intrinsic logic of progression from analogue programmed art to programming artworks on a digital computer. Such a postulate should be treated with caution for a number of reasons.

Very few of the artists involved in the first phase of NT who produced programmed art switched to a computer-based practice²⁹. The collectives and artists who authored participatory and playfully interactive artworks and environments continued to do so. GRAV explicitly rejected the notion of working with 'cybernetics and electronics' thinking that the public would remain 'somewhat excluded from highly technical works' (GRAV 1998, p. 124 quoted in Rosen 2010, pp.36–7).

Richard Wright has identified some other intriguing reasons why constructive researchers did not become software artists (R.Wright 2008). Wright, reflecting on the reasons why British neo-Constructivists of the 1970s did not switch to computer art, pointed out the limitations of the computer. The programmer had to formulate his or her task in algorithmic terms, 'type in a large body of text that imposed some very unforgiving rules of syntax, and then painstakingly debug the whole thing' (Ibid., p. 130). 'Constructivists were by this time used to switching freely between different number systems, geometries, topologies, and all sorts of methods that were suggested to them [by their] concrete actions with matter,' states Wright (Ibid., pp. 131-2). Wright does not fetishise tactile experience but suggests that 'the inclusion of physical and analogue systems gave them a richer perspective on the whole formative process' (Ibid.).

The cultural producers showing work in the Zagreb information exhibition can rightly be considered 'pioneers', despite the unfortunate connotations of that word³⁰. Early computer artists had to struggle with hardware that had limited input and output options and could not rely on existing software routines for graphical functions. Many of those pioneers such as Georg Nees, Leslie Mezei, Frieder Nake,

29 The only artists from the first phase of NT who worked with computers, albeit with the help of technicians, were Marc Adrian, Zdeněk Sýkora, Waldemar Cordeiro and Ivan Picelj.

30 'Pioneers' is often used in a gendered way to describe male inventors or artists ; a negative example is provided for instance by Rheingold (1990, p. 73).

and Kenneth Knowlton had to write graphic routines from scratch in the programming languages ALGOL or FORTRAN (Dietrich 1986). Others, such as Charles Csuri, oversaw development work done by their co-workers.

'Programming' can mean different things and a variety of different relations between an algorithm and its materialisation exist. Rather than simply fetishising the art of programming, the works and methods of Herman de Vries, Zdeněk Sýkora and Hiroshi Kawano provide examples for a richer variety of contextual relations. They narrowed down the elements of the designing process to such a degree that they proceeded as if they followed an algorithm, but the work was still done by hand. The Dutch artist Herman de Vries first defined a 'program' - for instance that a line should be drawn or rectangles - and then used numbers from statistical tables to get random values for the variables, such as length of a line, or coordinates of a beginning point (de vries 1968; 2010). He wrote, his art 'could also have' been done by computer (Ibid.), but the fact remains that he had chosen to do it manually, and that the calculations performed were so simple that no computer was needed. Czech artist Zdeněk Sýkora and the Japanese Hiroshi Kawano also made algorithmic art through 'visual encoding by hand' as Kawano called it (Kawano 1971, p.99).

Kawano divided images into a grid of 40x40 picture elements (pixels we would say today) and assigned a value to each element. Those values were entered into a computer program which calculated transitions from one element to the next using Markov chains and the Monte Carlo method, a mathematical method based on repeated random sampling, first devised for the nuclear weapons project in the 1940s. With those methods a probability matrix was generated for the values of each pixel, and the results were then painted by hand by Kawano's students (Ibid.).

Zdeněk Sýkora started making abstract paintings which consisted of basic elements such as squares with an internal structure of triangles or circles (Sýkora & Blažek 1970, p.409). When considering other rules, Sýkora ran into combinatorial complexities which were beyond his grasp mathematically. With the help of the mathematician Jaroslav Blažek a program was developed which could calculate complex combinations of pictorial elements (Ibid). Sýkora then carried out the paintings himself.

The gap between analogue, 'hand encoded' algorithmic art and computer art needs to be explored, not glossed over. If the only aspect which is emphasised is that of programming by computer, basic differences between the works are ignored. Herman de Vries was a member of Zero group and thus close to the neo-Dada spirit. His works under the title *Random Objectivations* (cd. 1960 - 1975) developed over many years, engaged on a deep spiritual level with differences between randomness and chance (see Gooding 2006). Kawano started working with computers after reading about Bense's information aesthetics in the late 1950s. His work with Markov chains suggests a proximity to, and interest in, information theory and Bense's ideas about micro- and macro-aesthetics. Sýkora came from a neo-Constructivist and Concrete Art background where the objectification of the creative process through the creation of exact rules was desirable because of specific political, ideological reasons. Not by coincidence, his early works were close to those of Morellet (Valoch 1968a, p.93).

The fetishisation of the immaterial skills behind computer art is an affirmation of the dominant tendencies in capitalist societies - tendencies which emanate directly from the command towers of the military and corporations. Marx critique of technology in *Capital*, Vol. I (1976, sec. Appendix) was brought up-to-date in David Noble's study of the history of automation (1986). The guiding idea behind automation was and is reducing labour cost by replacing workers with machines. For management, automation also promised to gain total control over the labour process by separating the worker from any decision making about the working process. All the "mental" parts of the production process could now be monopolised by managers, engineers and programmers' (Noble 1986, p. 231). The whole of production could be planned on the computer, and the instructions fed into giant machine tools which would autonomously carry out the work (Ibid. p. 235). In reality this idea hardly worked out the way it was supposed to. The close attention and judgement of workers became even more important (Ibid., p. 245). In the long run, however, computer-controlled automation contributed to the decline of political power of labour (p. 249).

Noble's account highlights how certain predispositions by the Air Force and MIT mutually reinforced each other. Although simpler and more efficient technological alternatives had existed, the high-tech road was taken because of the military people's

desire for *total command* over the process, which in turn matched the '*predisposition* of the technical people for *abstract, formal, quantitative, deterministic* solutions' (Ibid., p.85, my emphasis). In order to achieve total command, the workers' decision-making capacity had to be reduced to zero by all the decisions being encoded in software. The goal became to develop a standardised 'three-dimensional vector based system' which 'would be compatible with any machine tool control system' and could automatically produce '*any mathematically definable contour*' (Ibid., p. 127, my emphasis). The result, a system going by the name of Automatically Programmed Tools (APT) is the forerunner of what is now known as CAD/CAM (Ibid., p. 142).

Ironically, some of the works in the information exhibition which look most perfectly like early computer art were *Mecchano-drawings* created by Zoran Radović using a so-called ornamentograph with pendulums (Radović 1970). Working out the technicalities of transforming a calculation done by computer onto some other format such as a print-out or screen was still at a relatively early stage.

Early computer-generated works were done with drawing machines, so called Graphomats. In 1963 Nike's department obtained a Zuse Graphomat, a drawing table with a mechanical arm. The Graphomat was delivered without a software to connect it to the mainframe computer, and it was Nike's task to write such a program in machine language. In testing his program he had the idea of not only using circles, squares, lines and other simple geometric forms, but started trying to program graphics for their own sake (Nike 1966; Klütsch 2007, p.131).

The Graphomat could be filled with four different Indian colour inks whose consistency was quite different, some drying up too quickly, others making drops. Moreover, the process was slow, some images took two to three hours to plot. While the drawing table was described as 'fully automated' by the manufacturer, it actually had to be 'watched all the time' (Nike 1968 quoted in Klütsch 2007, p.133). Klütsch mentions such details, but mainly discusses the artistic qualities of drawings and Nike's skills as mathematician, programmer and artist. Nike himself at the time emphasised the design of the algorithm over its execution (Nike 1966, p.3) and explicitly stated that 'only information aesthetics enables automata to produce art' (Nike 1968a, p.178).



Illustration 38: Frieder Nake with Zuse Graphomat; photo Frieder Nake, Archive MSU Zagreb

Rather than only considering high-brow intangible skills, the complete ensemble of men and machines should be taken into account: here is the computer-scientist-artist who is confronted with the problem of how to use abstract mathematical concepts to create interesting images. He or she is struggling with the physicality of complex machines which produce unexpected results precisely due to their properties as machines, as *real things* producing heat, making noises, breaking paper tape, spilling Indian ink. Instead of only seeing the abstract aspects of that artform, the real skill was not just to devise an algorithm, but to bring the ensemble of hard- and software, and the people connected to it, all to work together in the right way to produce something that finally could be shown as 'art.'

Dazzled by the Screen

For early computer artists it was not easy to have their work actually displayed. The computer screen, now so ubiquitous, had a long and slow development time. The computer screen originated from work done in the Radiation Laboratory of MIT during World War II (Manovich 1995). Some of the earliest screen-based work was created not with computers but with oscilloscopes by Ben F. Laposky from 1950 and by Herbert W. Franke from 1956 (Franke 1985, p.97). In 1960, using an analogue computer and a mechanical drawing installation, Kurd Alsleben and Cord Passow made the first computer graphics on paper (Ibid.). Oscilloscopes are made of a cathode ray tube (CRT) combined with reflector plates which direct a beam over a surface treated with some phosphorescent material.

Claus Pias reminds us that from the late 1940s until well into the 1970s, computer graphics were vector based (Pias 2001). The screen image was the after-image of the continually moving cathode ray beam. The problem posed for graphic programming was how to mathematically define such a continuously moving line. Oscilloscopes produced Lissajous figures known from 19th century drawing machines, 'interconnected curving figures that unceasingly return into themselves [...] guided by two different sinusoidal alternating voltages applied to the x- and y-axis (Franke 1985, p.11).

Early computer graphics often resembled some type of maze or polygon, a continuous line-drawing whose shape was defined by pairs of coordinates. The phenomenology of the oscilloscope imposed itself on the young genre of computer graphics, Pias suggests (Pias 2001 op.cit.). Works such as *23-corner* by Georg Nees (1965) and *Rectangular Random Polygon 25/2/65 No. 14* (1965b) by Frieder Nake clearly owe their shape to such constraints (see Illustrations 36 and 39).

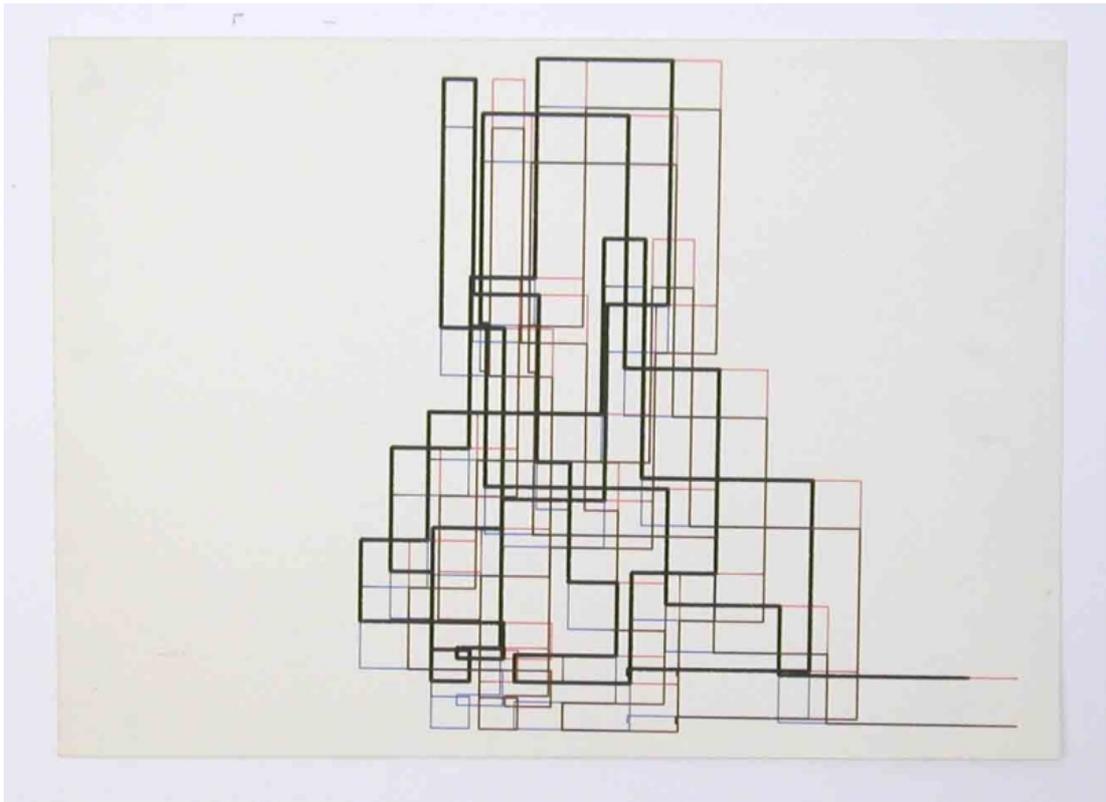


Illustration 39: Frieder Nake, Rectangular Random Polygon 25/2/65 (1965), MSU Zagreb Nr. 1505

Computer graphics as cartography, a 'science of places and paths', was also influenced by the origins of the screen in military research. A key location for early computer graphics was the highly secretive Lincoln Laboratory (Edwards 1996, p.93). A study group at Lincoln 'constructed a grand-scale plan for national perimeter air defense controlled by central digital computers that would automatically monitor radars on a sectoral basis' (Ibid., p. 94). The computer used to develop the prototype of this system was MIT's Whirlwind.

In 1947 Whirlwind had a visual display unit with a resolution of just 256 points which was used for error detection in vacuum tubes through the use of a so-called 'light gun' built by Bob Everett (Taylor quoted in Mahoney et al. 1989, p.20). This was increased to 1024 points of light in 1949 (Ibid.). The visual display attracted the interest of MIT's PR unit and of an important newscaster of the day. 'It was clear that displays attracted potential users, computer code did not,' concluded one of the

developers at a retrospective conference (Ibid.). This statement neatly summarises the history of the social acceptance of the computer. The public became convinced of the usefulness of computers as soon as they also could produce images.

Whirlwind became the prototype of computers used in project SAGE (Semi-Automatic Ground Environment) (Edwards 1996, p.90), a system linking radar stations along the northern perimeter of the American continent with control rooms. SAGE and its Soviet counterpart were not only prototypes of what would later become the net, it also produced 'a certain political iconography' for the Cold War through its control rooms, known as 'blue rooms.' In those giant control centers illuminated by dim blue light from consoles, dozens of operators used light guns to connect blips on video displays' (Ibid., p. 106). Each blip was potentially an enemy aircraft or missile and, as Manovich points out, 'the screen came to be used not only to display information in real time (as in radar and television), but also to give commands to the computer' (Manovich op.cit.). 'The program directing the beam of a cathode ray tube defined the coordinates of points which were joined together by the moving ray, thereby graphically "solving" the issue of missile defense,' argued Pias (op.cit). Without any hint of irony or critique, Herbert W. Franke reported that the early years of the computer graphics competition of the magazine *Computers and Automation* was dominated by the US Army Ballistic Missile Research Laboratories, Aberdeen, Maryland (Franke 1985, p.97).

Biasi Complains

The colloquium's *Computers and Visual Research* in August 1968 most memorable moment came when Alberto Biasi, founding member of group N from Padua, read out a statement titled 'The Situation of 1967' (Biasi 1968; Biasi 2010). The first part of the statement reckoned with NT's past as a movement. Biasi criticised its didactic approach and what he called a 'neo-metaphysics of the object' (Biasi 2010, p. 268). According to Biasi, in 1965 the movement virtually 'ceased to exist' for economic reasons and due to a lack of common goals. Biasi, claiming to speak also for other Western artists who had been part of the movement NT 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 mechanisation 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 rationalise exploitation." (2010, p. 269).

The colleagues in the West, Biasi claimed, had turned towards revolution, 'a root and branch struggle against capitalism at the ideological, political, and cultural levels.' According to Biasi those artists from the previous NT exhibitions 'who were more aware' had not come to Zagreb because they were 'engaged in supporting the student struggles in their respective countries' (Ibid., p. 269).

Nake was apparently so shocked that he could not read his prepared paper and improvised a response. Nake demanded that "we should not demonise automata" and suggested that it would be a mistake "to run away from computers," and that it would be much better "if we brought as many leftists as possible together with computers" (Nake 1968d, pp.270–1). Nake also proposed that while *CS* "addresses mainly the individual's instinct to play" the Zagreb exhibition planned for May 1969 could address "the social consciousness [and] take positions with regard to the problem of the computer and automation" (Ibid., p. 271). Meštrović pointed out that while the rebellions of 1968 were sparked by young people, NT had also been a youthful movement. Although it was separated only by 10 or even just 5 years, NT had followed a different vision of the future. NT had "intuitively recognised 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" (Meštrović 1968b, p.43). 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" (Ibid., 43).

Denegri thought that both Nike and Meštrović had lost touch with reality. He found it incomprehensible how, after the student and youth unrest, Nike could speak of 'rationality in service of humanity,' and how Meštrović could see the computer as a technical means to achieve the unity of the world. 'Never before had the world been so shaken in its scientifically based rationalism ...' (Denegri 2004, p. 190).

As Biasi had mentioned, some of the earlier participants of NT had abandoned art and were directly involved in political projects. In Italy, Biasi himself, other members of N, and Enzo Mari gave up art for good to support the students. Davide Boriani of group T got also involved with the student movement. Helge Sommerrock of the Munich-based group Effekt was involved with SDS (main leftist German students organisation), and later became co-founder of *Arbeiterbund für den Wiederaufbau der KPD* (Workers Association for the Rebuilding of the German Communist Party). Walter Zehring, another member of Effekt, started to work in factories with the idea of infiltrating passive German workers³¹.

Paris based members of GRAV Julio Le Parc, Francisco Sobrino and Hugo Demarco acted in solidarity with the radical younger artists who had occupied the Ecole Des Beaux Arts and opened an *Atelier populaire* (people's studio) where everybody should be able to study art (Egbert 1970, p.367). 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, since they were Argentinians and did not have permanent residency status in France. In solidarity, 10 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' (Egbert op.cit., p. 377). Students had already shut down the Cannes film festival and Milan Triennale, and what remained

31 The source for this is Rudolf Kämmer, participant of NT the movement, in a personal conversation with the author, on the eve of the opening of the 50 years retrospective exhibition of NT at MSU Zagreb, 14th of April 2011.

of the Venice Biennale that year needed heavy police protection (Ibid.).

While the early phase of NT as a movement had helped to revolutionise the way people saw the world through art, and while many of the artists involved in this movement actively supported '68, the art of NT did not become the art of the revolution (Feierabend & Meloni 2009, p.13).

1968 as a Paradigm Changing Moment

'68 can be read as simultaneous political, economic, social and cultural revolutions which were all connected and mutually re-inforced each other leading to crises of the overall political systems in East and West.

The years 1967-68 came at the end of a long postwar boom and marked the beginning of a deep structural crisis of Keynesian-Fordism (Brenner 2002, pp.7–47). The USA in the 1940s and 1950s had created and always maintained since 'a permanent arms economy' (Mandel 1978b). Funding of expensive research depended on an 'acceleration of technological innovation' which necessitated a high level of extraction of surplus value from the economy (Mandel 1978a). 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 increased and profits shrank (Brenner 2002).

Furthermore, the USA maintained a balance of payment deficit throughout the postwar long-boom which was caused by the specific ways in which it sought to maintain hegemony. The Vietnam war served no practical purpose except to demonstrate the USA's will to defend its hegemony. The US 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 to be based on political decisions, 'a fundamental shift in the military stance' and the positions regarding 'overseas political and economical expansion' (Block 1977, p.162), but such a shift did not happen.

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' (Barbrook 2007, pp. 228-230) and 'power from a distance' (Edwards 1996, p. 139). The project *Operation Igloo White* was a virtual defence system comprising thousands of sensors, mainframe computers, surveillance by air and automated bombing all linked together in an 'electronic battlefield' (Barbrook 2007, p. 231, Edwards 1996, p. 3). Centrepiece of the operation was the Infiltration Surveillance Centre at Nakhom Phanom in Thailand, built after the example of the SAGE control room, where operators stared at screens connected to banks of mainframe computers connected to sensors thousands of miles away (Edwards op.cit., p.3) on the Ho Chi Min Trail.

The so called Tet Offensive, a major offensive inside South Vietnamese cities by the the North Vietnamese Army (NVA) on the third day of the Vietnamese New Year, Tet, in 1968 became the first televised super-battle (Katsiaficas 1987, p.30) and brought home the point to Western television audiences that the war was unwinnable while war crimes were committed. Tet caused a dramatic turnaround of US public opinion about the war and helped catalyse oppositional forces everywhere against fossilised systems (Katsiaficas op.cit., p. 32-33). The protest against the Vietnam war was also strongly linked with the rise of an anti-technological sentiment (Katsiaficas 1987, p.17).

The nature of the revolts of '68 signalled a rejection of the dominant civilizational model by a large number of people. 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 (Seed 1992). The false consensus started to be undermined from within either by those politically opposed to capitalism on principle such as the New Left (for a definition see my Introduction), or by groups whose collaboration had been assumed without their viewpoints having been taken seriously, such as women and ethnic minorities.

Feminism and the US civil rights movement challenged the sexism and racism of society (Katsiaficas op.cit., p. 23). Other groups formed a so called counter-culture

and formulated their political dissent as a difference in life-style choices and as a desire for transformation of the self. This could take many different forms, from West-Indian Rastafarians and Mods in London (Green 1989), to the Hippie movement in San Francisco and NYC with an emphasis on drugs, mysticism and ecological ideas (Anderson 1996, p.172).

According to Katsiaficas '68's significance was to try and 'transform everyday life and to politicise taken-for-granted patterns of interaction.' This cultural revolution, an '*inner reworking of the psyche and human needs* [...] lays 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' (Katsiaficas op.cit., p. 23, my emphasis). Suddenly 'overthrowing capitalism started with addressing the ethics of the interior and subjective life and the discovery of a new psyche' (Louvre 1992, p.66; Moore-Gilbert 1992).

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 which were seen as produced by and *constitutive for* capitalism (my emphasis).

The universities had been at the centre of the uprising not just because students tended to be more rebellious, but because this was the place where the development of the latest phase of industrial societies, both in their capitalist and real-Socialist version, encountered their strongest contradictions. Societies needed students in ever greater numbers but did not offer them a place which 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' (Katsiaficas op.cit., p. 17). 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. Leftwing 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 which escalated in the 'hot autumn' of 1969 (Katsiaficas 1987, pp.49–51).

'68 in Eastern and South Eastern Europe

'68 was not just a Western phenomenon but also affected the states belonging to the Eastern bloc. In 1968 in Warsaw, students protested after a play by the Polish national poet Adam Mickiewicz was banned (Templin 2008). Students in Poland had been encouraged by student protests in Prague which went unsuppressed. In January 1968 a reformist government with Alexander Dubček as head of state took over in Czechoslovakia (Tůma 2008, p.23). Over a period from January to August 1968 the so called Prague Spring added a very specific flavour 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 and Brno were closely watched in Yugoslavia where '68 had taken a very specific form. After an incident at a student dormitory in Neo Beograd (Popov 2008), an organised protest movement formed quickly, Belgrade university was occupied and renamed Red University Karl Marx, while within a day protests had spread to Zagreb and other regional capitals (Kanzleiter & Stojaković 2008, p.13). After seven tense days Tito made a television speech in which he described student's demands as 'justified' (Ibid., p. 14). The very specificity of '68 in Yugoslav was that students' demands were not *against* the official ideology but *for actually realising* it. Students and professors at the Faculty of Philosophy at University of Belgrade declared what they wanted was the 'immediate implementation into practice' of the goals of the League of Communists (quoted in Kanzleitner & Stojakovic, p. 18, my emphasis).

Self-management, Yugoslavia's official doctrine, was what students in Paris and Frankfurt in May '68 made their central demand. Members of the party leadership³²

32 Veljko Vlahović, a leftwing member of the regime.

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 Dubcek in Prague (Kanzleiter & Stojakovic 2008, p. 15). Yugoslavia, it seemed, was on the right side of history.

The reality however was not as positive. Yugoslavia had gone through testing times since the early 1960s. The years leading up to '68 had seen an economic reform program which liberalised the economy to the point of turning it into a form of Market Socialism (Rusinow 1977b, p.138). Attempts for an active economic modernisation had been slowed down by institutional resistance to change (Ibid., p. 178). The result was 'economic stagnation, growing unemployment and emigration, stagnant or declining real incomes for most people' (Ibid.).

Those all too visible economic realities were exacerbated by political problems (Kanzleiter & Stojakovic 2008, p. 17). The withering away of the party – as the official doctrine worked out in 1953-4 had proclaimed – had never happened and a widening gap between the theory and practice of self-management appeared. Tito's declared support for the demands of the students 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 (Kanzleiter & Stojakovic 2008, p. 32).

Such accusations were largely unjustified since 'the political engagement of the group,' despite its near mythical status in the 1960s, 'never exceeded the limits of theoretical explanation' (Kolešnik 2010, p.219). *Praxis'* theoretical engagement focused on issues around self-government and self-management. The economist Branko Horvat, the philosopher Mihailo Marković and the sociologist Rudi Supek edited *Self-governing Socialism* (1975) which brought a deep historical and philosophical dimension to the subject while not sparing Yugoslavia's specific development from critique. Stojanović (1975) for instance 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' (S. Stojanović 1975, p.460). A similar critique of statism in

Yugoslavia was elaborated by Krešić (1975) 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' (Krešić 1975, p.447).

Praxis had been allowed to exist in that contradictory way which was typical for 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 (Kangruga 2008, p.137). After June 1968 however, the student opposition and *Praxis* were slowly ground down. In 1974 both the *Praxis* magazine and the 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 (Kanzleiter & Stojakovic 2008, pp. 34-5).

'68 was a turning point for Yugoslavia. Although economic and political reforms continued, which in their basic outline were liberal, leading to the new constitution of 1974, the regime showed an incapacity to reform itself and power remained centred in the League of Yugoslav Communists presided by Tito. After 1968 slowly, and maybe quite invisibly, the 'Yugoslav experiment' 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 had 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 between science, technology and society had emerged.

The team led by Radovan Richta, head of the philosophy department at CAS, and consisting of a further 59 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 exploit this chance. 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* (Richta 1969). 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 (2007, p. 167).

The optimistic aspect came with many 'buts' and caveats. The team undertook a thorough and comprehensive literature review which brought together literature on automation and cybernation, on the leisure society and the third sector which dealt with those issues from a purely industrial, i.e. capitalist point of view; but the team also considered critical strands of Western Marxism such as Marcuse's critique of the *One-Dimensional Man* (1964), and new strands of *Socialist Humanism* (Fromm 1965) and Marxist Anthropology which had been 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 neighbouring countries such as the German Democratic Republic. The vast body of literature which included several surveys of the topic undertaken by other groups such as *The Triple Revolution* (Fromm 1965b) was filtered by the team at CAS through a rigorous re-reading of Marx.

The gist of their 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 much 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, however, such a renewal could take place Socialist societies could make much better use of the scientific and technological revolution than capitalist ones.

According to CAS's scientists, the ultimate goal of harnessing the scientific and technological revolution was not purely economic but a much more radical transformative process at the centre of which was the 'development of man himself, growth of his abilities and creative powers - development of man as an end in itself' (Richta 1969, p.43). This idea - in tune with the aspirations of the New Left - 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 centre of life. Moreover, if human development was not at the centre of the scientific and technological project, Communism would remain a 'far off dream' (Richta 1969, p. 160).

Richta et al imagined that information technologies would have to be greatly expanded to include data bases 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' (Ibid. p. 242, my emphasis). Such ideas were interspersed with a lucid, and sometimes harsh, critique of the lack of human and social development in Czechoslovakia (Ibid., pp. 96-99). Richta's introduction was signed 'Prague, Spring 1968' (p. 21).

At this historic juncture in the summer of 1968 Meštrović attended Korčula Summer School, the annual meeting of socialist humanists organised by the Praxis group. The topic was *Marx and Revolution* and high-profile participants included Ernst Bloch and Herbert Marcuse, when on the morning of 21st August 1968 summer school co-organiser Vanja Sutlić announced to other participants that "world communism has just ended" (Meštrović 2010). He had listened to the radio and heard that Warsaw Pact tanks had rattled into Prague and thereby ended the Prague Spring. While it took a further 20 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 most to de-legitimise Soviet Communism in the East. Only two weeks earlier Tito had travelled to Prague to personally express his support for the Dubcek government. After that, Tito was quoted as saying he would rather send his own troops to quell any unrest in Yugoslavia than have Warsaw Pact troops invade (Rusinow op.cit., p. 299).

Had the reformist course in Czechoslovakia been allowed to continue, the scientific, technological and cultural revolution which 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 really existing Socialism. The crushing of the Prague Spring had thus a far greater significance than just the suppression of a

cry for freedom of another Soviet satellite state. Czechoslovakia and Yugoslavia may have set an example for a genuine attempt of building Communism on the basis of the scientific and technological revolution, and a non-Stalinist, critical and humanist Marxism.

From Autumn 1968 to t-4

Recent scholarship has produced a perception of *Cybernetic Serendipity (CS)* as a 'technological funfair' (Usselmann 2003) while t-4 is in comparison seen as the serious, hard working exhibition and symposium (Klütsch 2005). Although a simplification, reports from London by NT participants themselves have contributed to such a viewpoint. Frieder Nake described his London experience in vivid terms: 'When entering, I was quite surprised. Everything so full of sound, people, music, movement, laughter, joy, curiosity, play. [...] The arrangement [was] more coincidental than planned. [...] There were many different machines, which react to some buttons being pushed, a small computer which understands a whistled song, analyses it, reproduces and varies it' (Nake 1968b). Marc Adrian also reported: 'London was interesting but apart from that it has to be said that the exhibition was very mixed. Max Bense in his opening speech rightly criticised that only a minority of works (about 45%) needed the computer and programs to be produced: there were also a lot of meaningless little machines and other such things' (Adrian 1968).

Radoslav Putar, a member of the core group in Zagreb wrote a review of *CS* for *Bit International*, the new magazine GSU was editing (Putar 1968). Putar noted that many of the works shown were not made by artists but by scientists. In the introduction to *Cybernetics, Art and Ideas* Reichardt (1971a) emphasised that 'at no point was it clear to any of the visitors walking around the exhibition, which of the various drawings, objects and machines were made by artists and which were made by engineers [...] nothing intrinsic in the works themselves to provide information as to who made them' (Reichardt 1971a, p.11). Reichardt appeared to celebrate that characteristic as an aspect of the democratisation of art through new technologies. At *CS* there were only 'forty three composers, artists and poets,' but 'eighty seven engineers, doctors, computer systems designers and philosophers' (Ibid.).

Putar complained that 'there were no obvious ties between certain elements presented within the framework of the exhibition (Putar.op.cit. p.94), and that visitors 'were thus subjected to the disorganised influence of certain objects and documents,

without any reliable means of orientation between many divergent cases' (Ibid., p. 96). 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 that 'the average visitor could do no more than suspect the enormous possibilities of methods of computer projecting for the needs of design in industry' (Ibid.).

CS was a big organisational effort with work of 325 participants shown in 6500 square feet, supported by dozens of multinational corporations, research labs, university institutes and companies. It was very successful, attracting 60.000 visitors (Reichardt & Institute of Contemporary Arts 1968; 1971a). The English press celebrated CS as an event that was 'guaranteed to fascinate anyone', from 'toddling age to the grave', 'hippies' as well as 'school-boys' and 'computer scientists' (Usselman 2003, p.390). While CS was sponsored by, among others, IBM, Boeing, General Motors, Westinghouse, Calcomp, Bell Telephone Labs and the U.S. Air Force research labs, NT struggled to attract any sponsors at all except the Ruder Bošković Institute.

The ICA itself stimulated a positive perception of computer technology as its spokesperson Leslie Stack declared 'happy accidents can happen between art and technology' (Leslie Stacks quoted in Usselman 2003, p.391). Unsurprisingly, for the English press, CS became 'a veritable Luna Park' (Mario Amaya, quoted in Usselman 2003, p.391). Jasia Reichardt acknowledged that CS could only happen in London since the same exhibition "in Paris would have needed police protection" (Reichardt 1968 quoted in Usselman 2003, p. 392).

Artist Gustav Metzger wrote in *Studio International* that 'at a time when there [was] a widespread concern about computers, the advertising and presentation of the ICA's "Cybernetic Serendipity" as a 'technological fun-fair' [was] a perfectly adequate demonstration of the *reactionary potential of art and technology*' (Metzger 1969a, p.108 my emphasis). According to Metzger, artists were led into a 'technological kindergarten' and that there was a danger that - attracted by the 'gadgetry of modern life' - they would be completely 'overwhelmed by the tremendous opportunity, challenge, excitement and power of the new media' (Ibid). 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' (Ibid.).

Putar's critique of *CS* appeared in *Bit International*, a new magazine which was initiated in the context of all the efforts which together constituted *t-4*. Between 1968 and 1972 nine editions of *Bit* appeared, whereby issues 5-6 and 8-9 were 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' (GSU 1968e). They clearly also wanted *Bit* to be 'an instrument of international cooperation' since they believed 'the results of efforts based on an organized division of work on all levels' was superior to 'individual and isolated activity' (Ibid. p 5). The editors believed in the 'creation of universal platforms for progressively orientated action' (Ibid.).

The first issue of *Bit* was almost completely dedicated to the information aesthetics of Moles and Bense. Meštrović's introduction to Moles' work, 'L'observateur observé' (1968) quoted extensively from Wiener's *The Human Use of Human Beings* (Wiener 1950), and hinted at a critique of Moles' neo-positivism (op.cit. 12), asking if Moles' ideas on the socio-dynamics of culture were not 'a bit simplistic' (Ibid., p. 15). Yet on the whole, Moles was accepted as a leading expert on computer art and information aesthetics. *Bit International* Nr. 2 and 3 presented material of historical importance on computer art and materials from the colloquium and information exhibition in summer 1968. As the discussion of the content of the colloquium and information exhibition above has shown, the attitude regarding technology was rather narrowly focused on a new information aesthetics.

Apart from the available financial means and in-kind sponsorship, the main difference between *CS* and *t-4* may have been that while *CS* was a one-off event, the organisers of *t-4* hoped to initiate an international research network. Throughout autumn and winter 1968-9 organisers in Zagreb tried to give substance to their announcement that their effort was about launching such a network. The first issues of *Bit International* were prepared. At the same time preparations were running high for the manifestations of *t-4* in May 1969. In November 1968 two *Programme Informations* appeared, *PI-10* (GSU 1968a) and *Programme Information 11 (PI-11)*

(GSU 1968b), which announced the competition for *Computers and Visual Research* and the symposium to be held from May 5-7 1969 (1968b). The Programme Informations were distributed in English, French, German and Serbo-Croat.

The secretariat of GSU took on a gigantic workload, communicating in all those languages with a by now fairly global and growing group of participants. While Kelemen as acting secretary of GSU played a central role, other members of the organisational committee all contributed with 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 was organising a large scale programme bringing together artists with corporations (Bek 1968), and the Art - Science Newsletter edited by John Holloway at Aberdeen University (Holloway 1968a; 1968b). Friendly relations were maintained with the British Computer Arts Society almost as soon as it had founded itself (Sutcliffe 1969). In between all that GSU found time to organise 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 furthering artist's access to computers. Kelemen, who took charge of that received encouragement in a letter from Nake who was teaching as a guest lecturer at the Department of Computer Science, University of Toronto. Nake wrote 'try and make more artists use the generous offer of computer time in Zagreb. [...] Yugoslav artists with their background in Concrete Art (Gestaltung) should have *great potential* [...] because the Japanese group and Csuri/Schaffer seem to be the only ones coming from the realm of art. [...] What is produced here is maybe a "naive" computer art' (Nake 1968c my emphasis).

Yet while NT used the tool of the future to create art, the future of art was not to be determined by the tools used. Just before *t-4* opened, in February 1969 the Slovenian group OHO exhibited at GSU, 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, roof tiles; the works had

eccentric titles such as *Embryo of Albin Gessner's Elephant* (Tomaž Brejc 1978, p.14; Tomaž Brejc 1978, p.n.p.). This 'first exhibition of Arte Povera in Yugoslavia,' according to Slovenian art historian Tomaž Brejc, marked the arrival of a new art at GSU. Misko Šuvaković presents OHO as an alternative to the 'elite culture of socialist modernism' (Šuvaković et al. 2010, p.40), whereby NT would be the 'elite culture.' According to Šuvaković NT were 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 *t-4*, expressed the new sensibilities of the '68 generation.

Exhibition and symposium t-4: May - August 1969



Illustration 40: Exhibition view t-4 (1969) Jonathan Benthall studies works by Peter Milojević; photo MSU Zagreb

On 5th of May 1969 a multiplicity of activities started including several exhibitions at different locations and an international symposium: the exhibition *Computers and Visual Research* at GSU, from May 5 to August 30; the exhibition *New Tendencies 4* at the Museum of Arts and Crafts, from May 5 till June 30; the exhibition *Typoetry* at Student's Center Gallery, from May 6 till 24; the symposium *Computers and Visual Research* on May 5 and 6 at Moša pijade Worker's University; an exhibition of books and publications at Permanent International Exhibition of Publications (ISIP); and film screenings at the Centre for Culture and Information on May 5. A significant

number of institutions collaborated to make this possible, plus an organisational committee of no fewer than 16 people, and an executive committee of seven. Part of the whole festival was also the *Pictorial Loop* (1969) by Boris Bućan and Josip Stošić (Denegri 2004, p. 193), 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 NT.

The exhibition *NT4*, which was dedicated to the continuation of the constructive approach in art, was separated into two parts, a retrospective *NT1-NT3* consisting of 34 works which the gallery had acquired for its permanent collection, and 141 new works in the section *NT4* 'recent examples of visual research.' This section showed that the field was very much alive. Yugoslav artists such as Koloman Novak and Alexander Srnec showed their mature luminokinetic work. Srnec's *Light object 2* (1967) consists of cylindrically arranged rotating metal rods at which are thrown light patterns from a film projector (Srnec 2008). Srnec had been part of Exat 51, the group that broke the path for abstract art and neo-Constructivism in Yugoslavia (see my Chapter 1, pp. 48-9).

At *NT4* a relatively large number of artists from (former) Czechoslovakia was present, with Milan Dobeš, Štefan Belohradský, Jiří Bielecki, Jarmila Čihánková, Jiří Hilmar, Tamara Klímová, Radoslav Kratina, and Miloš Urbásek, while Zdeněk Sýkora was showing work in the *Computers and Visual Research* exhibition. The curators at GSU had 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 Hlávacek. All three were involved in Klub Koncretistu (Club of Concretists) founded in 1967, which was both the name of an artists' club and of a major exhibition of neo-Concrete Art held at several venues in 1968 (Piotrowski 2009, p.132). The catalogue, with an introduction by Pohribny, reveals the breadth and depth of that exhibition which brought together Czech and Slovak artists with international NT artists such as Morellet, Le Parc, and von Graevenitz (Pohribny 1968). As is evident from the catalogue, and as Piotrowski also states, Czech and Slovak artists brought an unconventional open-mindedness and sensibility towards neo-Concrete Art, some of them inspired by Restany's *Nouveau Realisme* (2009, pp.132–137). Jiří Valoch, also a member of the Club of Concretists,

was an artist who created visual poetry and who was increasingly drawn to a direction which would become labelled conceptual art. Valoch had organised the first computer art exhibition in Czechoslovakia, which was shown in Brno and several other cities in 1968 (Valoch 1968b). The flourishing of those activities was possible during the Prague Spring but soon fell victim to so called 'normalisation,' the re-introduction of a Stalinist regime (Piotrowski op.cit., p. 132). During preparations for *t-4* in spring 1969 Pohribny, writing from Florence, Italy, apologised that he could not attend the exhibition since he was 'living in poor circumstances' (1969).



Illustration 41: Paolo Scheggi, Opla Stick Spectacolo (opla stick spectacle), Performance, Students' Centre Gallery, May 6 1969; photo MSU Zagreb

The exhibition *Typoetry* (1969) at the Student's Centre Gallery was independently curated by Željka Čorak, Biljana Tomić and Želimir Košćević. The English art critic Jonathan Benthall did not see the point of having an exhibition of visual poetry in the context of an exhibition and conference on computers and visual research (Benthall

1969a). Benthall dedicated his regular column on art and technology in *Studio International* to a review of *t-4*. There are, however, several angles from which the connection between visual poetry and computer art looks justified. Denegri observed that visual poetry was the catalyst for the 'New Art' - new artistic practices which emerged in the late 1960s which for lack of a better word were first just called New Art, and later were subsumed under conceptual art. Lettrism³³ and concrete poetry³⁴ had played an important part in the postwar neo-avant-gardes to whom NT had originally belonged. Marc Adrian personified that link between typographic experiment, concrete poetry and computer art. Furthermore, in the double issue nr. 5 and 6 of *Bit International* Vera Horvat-Pintarić made clear the links between visual poetry and computer art in the wider civilizational context.

Horvat-Pintarić provided a critical introduction to Marshall McLuhan's main works, *Understanding Media* (1964) and *The Gutenberg Galaxy* (1962). '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' argued Horvat-Pintarić (1969, p.18). She kept the basis of McLuhan's argument according to which media have an influence on cognition. Her account, however, provided more nuanced relationships between modern media such as photography, film, telegraphy, and the way we see and understand the world. Horvat-Pintarić investigated how commercial image culture influenced the innovations of the avant-garde and vice-versa, starting with 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 paradigmatic statement of Horvat-Pintarić' text was: '*A brief history of modern and contemporary visual arts is in fact the history of a revolution in the means and systems of communications*' (Ibid., p. 59, my emphasis).

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 through societies becoming computerised. The computer has a deep and profound

33 Lettrism was founded by the Romanian artist Isidore Isou in Paris in the 1940s and was a strong influence on Situationism.

34 Concrete poetry is an umbrella term for practices that combine poetry with visual arrangements of letters. The Wiener Gruppe (Vienna Group) to which Marc Adrian belonged practiced concrete poetry.

effect on art which 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 the 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 behaviour*, feeling, and thinking possible' (Ibid., p. 59, my emphasis).

NT1 to *NT3* had already shown the way to such *open* and *participatory* formats where art took on a new meaning within a society shaped by mass production, mass consumption and new communications media. The main exhibition at *t-4* did not continue such an approach. Most of the 177 works by 46 artists shown in *Computers and Visual Research* (1969) were computer graphics, i.e. flat works on paper, produced by plotter, microfilm or photographed from 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 was right when she wrote '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' (Rosen 2007, p.84).

There were two three-dimensional works, one by Robert Mallery 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 computerised automation as developed at the MIT. Csuri showed an illustration of a computer sculpture made with a 3 axis continuous path milling machine (Csuri 1971). That approach was technically advanced while 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 endeavour to overcome the new technology and use it for new result in the visual field' (Kelemen 1970). Many of the works had already been shown at the 'information exhibition' alongside the colloquium in August 1968, and thus need no further discussion here.

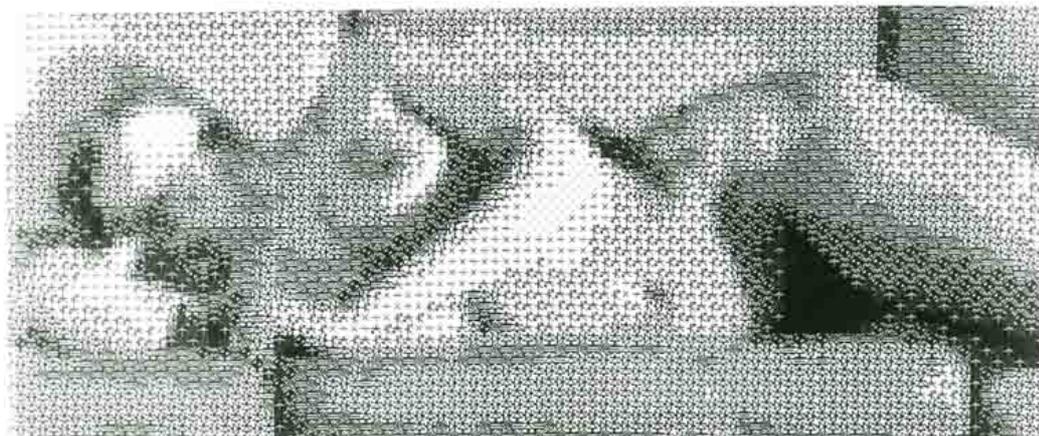


Illustration 42: Leon D. Harmon and Kenneth C. Knowlton, Mural (1966)

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, and the works of Bell Labs researchers Leon D. Harmon, Kenneth C. Knowlton, Michael A. Noll, Manfred R. Schroder were ranked first and 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 technics and programming of visual phenomena' (GSU 1969, p.2). In the introduction to their judgement, the jury had argued that 'due to the experimental nature and completely open domain' of the works entered, they felt unable to formulate criteria such as 'aesthetic quality, complexity of programming or mathematical ingenuity' (Ibid. p. 1). Moreover, it would have been 'authoritarian' to formulate any criteria due to the newness of the field which was expected to 'suggest new aesthetic parameters in the future' (Ibid.).

By awarding first and second price to the corporate artists of Boeing and Bell Labs the jury set an unfortunate precedent for the future of media art by handing awards to corporations, and by excusing itself from formulating qualitative criteria to differentiate between corporate research and art. The jury ignored the contextual relationships or what I call the *machinic unconscious* of the works. The term machinic unconscious refers to the complex ensemble of social relationships which are part and parcel of the technology. The meaning of the term is related to, but not identical with and not derived from the 'technological subconscious' as defined by Nigel Thrift (2004; 2005). For Thrift the technological subconscious is constituted by actor-network relations between humans and such type of artefacts which work discreetly in the background, such as large infrastructural technology, so that we tend to forget their existence.

This is only a limited part of the meaning of the term machinic unconscious. The technological subconscious postulates that the technological as part of an actor-network can be forgotten. The machinic unconscious on the other hand is the sum of the social relations which get mystified through the fetishisation of technologies. Once a fetishised understanding of technologies prevails, the social relations of their production are cut off and become a repressed reality, an unconscious. A criterion for the progressive nature of media art could thus be how it relates to the machinic unconscious: does it further a fetishised understanding of technology, does it mystify and exclude the social relations included in it? Or does it demystify, enlighten, provide clues for a non-fetishistic, better understanding of the real meaning of technology and thereby offer viewers a possibility for self-emancipation?



Illustration 43: Bozo Bek and Umberto Eco at t-4 (1969); photo MSU Zagreb

When the jury awarded the first prize to *Seven-system Human Figures in Cockpit* (1968) by W.A. Fetter, in collaboration with Kenneth Frank and Robert Fee, it ignored the reality that those graphics were created in a defence-related research project by Boeing. Far from being merely a neutral form of 'visual research', Fetter's team provided the cutting edge of 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 CS, and discussed in Jasia Reichardt's book *The Computer in Art* (1971b). The image has been used in many other publications, from Reichardt's *Cybernetics, Art and Ideas* (1971a) and *The Story of Cybernetics* (Trask 1971) to *Franke's Computer Graphics - Computer Art* (Franke 1985). 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 optimise the location and design of instruments. To

the best of my knowledge, this is the first instance of a digital graphical simulation of a human body. In issue nr. 4 of *Bit International* in the article 'Science and Design', Maldonado and Bonsiepe argued that regarding this type of ergonomic research it was 'hard to distinguish between ergonomics and military psychology;' the 'central task of this discipline was not only 'to adapt weapons to soldiers' but even more often 'adapt the soldiers to the weapons' (Bonsiepe & Maldonado 1969, p.44). Reichardt's description of the work vaguely but unapologetically refers to 'Air Force data' (Reichardt 1971b, p.16).

The creation of a virtual human figure constituted an important step in the creation of the cyborg. As Donna Haraway has written 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' (Haraway 1991a, pp.151–2). 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 cyborg imaginary entailed the military's power fantasy of being able to control production and human action on the macro-scale of the social, as well as on the individual level. This analysis only serves to give an example of the machinic 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* (Harmon & Knowlton 1966), 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 tone designed to generate the image (see Illustration 42). The image, when looked at from close, falls apart into many separate pattern-images, but results in the meta-pattern of the lying nude, when looked at from a distance (Knowlton & Harmon quoted in GSU 1970 no pagination). Bell Labs were the research facilities of AT&T, the US' largest telephone carrier company. Today, it is obvious that those experiments were about splitting up images into small signs suitable for transmission via electronic networks. For the use of scarce bandwidth the transmission of images had to be optimised.

But 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 had believed that humans were nothing else but patterns of information (see my Introduction p. 35), works such as *Mural* appeared to provide visible proof. The work insinuates that the human image, and thus by definition, once technology will have become improved, humans as a whole, can be 'communicated' via digital electronic networks. The essence of what it means to be human becomes accessible to computers. *Mural* was shown at CS and another key exhibition, *The machine as seen at the end of the mechanical age* (Hultén & Museum of Modern Art (New York) 1968).

The jury awarded 3rd, fourth and fifth place to Vladimir Bonačić, Marc Adrian and Compos 68 respectively. Those works, together with works by Otto Beckmann and ars intermedia, Art Research Center group and Gustav Metzger, were works shown at *t-4* which presented themselves as alternatives to the narrow definition of visual research as computer graphics.

Alternatives to Computer Graphics

The artists Jan Baptist Bedaux, Jeroen Clausman and Arthur Veen together formed the group Compos 68 which was based in Utrecht. Their award winning work *Compos Hobby Box* (1969) points to the potential of the computer for participatory artworks. The *Hobby Box* was a do-it-yourself kit for art making whereby unique rules for each set were generated by a computer (Bedaux et al. 1969). The box contained cardboard in the primary colours and black, and 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. The computer was to objectify the process of composition and eliminate any 'disturbances' brought into the process by a human (Bedaux et al. 1971).

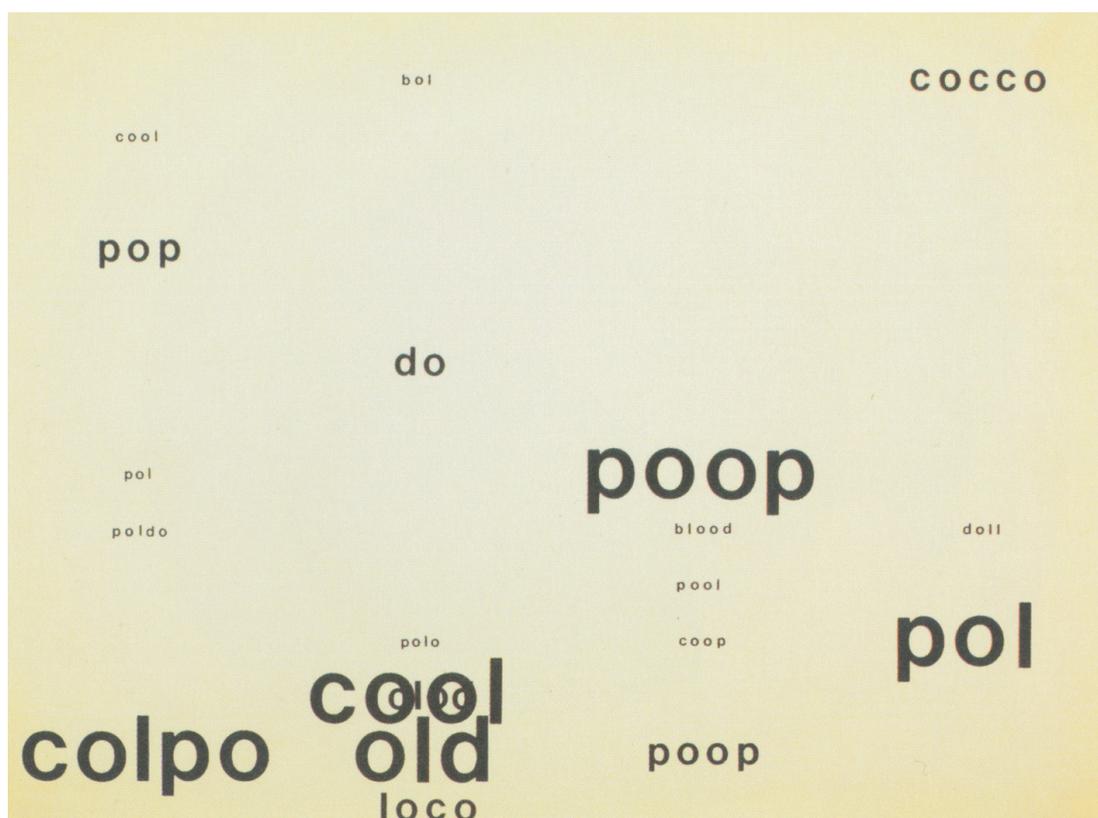


Illustration 44: Marc Adrian, 2/66 (1966); Computer-generated visual poetry, Letraset on paper; photo MSU Zagreb

Marc Adrian was one of the few NT artists involved from the very start, who carried over his pre-computer concerns into work with computers (Weibel 2007c). Adrian's three key concerns which he developed in the 1950s, the formative period of his career, and which he maintained throughout, were the interest in movement, the factor time, and the de-individualisation of the artistic process (Bogner 2007, p.33).

With the help of the Institute for Advanced Studies in Vienna in 1966 or 1967, Adrian created works such as *ct/2-66* (1966) one out of a series of similar works created between 1966 and 1968 which were exhibited at *t-4*. Adrian also submitted the play *Syspot* (1968/69), one of the first theatre plays written by computer. *Syspot* was the command used for printing at the Institute for Advanced Studies (Adrian et al. 1968, p.1). *Syspot* was created by computerised montage using texts from popular magazines and characters taken from partner adverts in newspapers. The stereotypical language was used to create templates which were then filled randomly

with phrases characteristic of advertisement and mass media language. The resulting play was not intended to offer any aesthetic pleasure but only mirrored the irrationality of society and its structure of consumption (Adrian et al. 1968). Adrian thought that computers were particularly useful in art for 'assemblage' in the broadest sense of the word. What Adrian envisaged was a kind of montage of world-views aimed at the 'restructuration and disorganisation of the given intellectual and ideological heritage, the destruction of traditionally and conventionally determined conceptual systems' (Adrian 1969; 2007a).

Vladimir Bonačić

When Putar wrote that with the advent of machines in art a new type of people also arrived, he may have had in mind Vladimir Bonačić. For Bonačić, whose work as a scientist had already had a visual aspect, *t-4* became a career changing experience. Shortly before *t-4*, Bonačić met Ivan Picelj, founding member of Exat 51 and NT's primary graphic designer at Ruđer Bošković Institute, and they started to collaborate on an electronic object using light (Fritz 2008b, p.177). During *t-4* no less than 17 works by Bonačić were shown. Those consisted of animated light patterns displayed either on screen and photographed, or on various display units which 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' (Bonačić 1971a, p.138). Bonačić used Galois-field polynomials to determine the different states of the light objects and their transitions. Galois-fields are a branch of mathematical field theory and group theory named after Évariste Galois (1811-1832). Some of the devices also contained controls which allowed the viewer some level of interaction. Bonačić' 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' (Ibid., p. 140).



Illustration 45: Vladimir Bonačić, DIN. PR 18 (1969); photo MSU Zagreb

One of the highlights of *t-4* was the realisation of *DIN. PR 18* (1969), a large scale public artwork on the façade of Nama, Zagreb's leading department store. 'The 36-m-long installation consisted of 18 elements; each element had a 3 x 5 grid light matrix,' which flickered according to Galois-field polynomials (Fritz 2008b, p. 179). A local art critic compared the message of the work favourably with the then rapidly increasing number of commercial messages using light (Ibid.).

Otto Beckmann and Ars Intermedia

At *t-4* Otto Beckmann and the engineer Alfred Graßl submitted work under the identity *Experimentalarbeitsgruppe Ars Intermedia* (experimental working group ars intermedia) (Otto Beckmann & Graßl 1969a). Beckmann and Graßl used special noise generators from the Institute of Low Frequency Technics at the Technical College Vienna which were capable of producing true randomness as opposed to statistical randomness, because the signals were the result of unpredictable changes on an atomic level (Otto Beckmann & Graßl 1969b; Graßl 1969). The artist and the engineer at first used those noise generators to create sound-tracks for Beckmann's *Cinematic Films* (Graßl 1969 op.cit). In 1968 Beckmann and Graßl started to use the method to produce graphics on an oscillograph which could be influenced in real time through switches and potentiometers. Beckmann made screenshots by photographic camera and printed them on aluminium (Graßl 1969 op.cit). The electronically produced images allowed the creation of a magic, enchanting image-world of electromagnetic ghosts - human-like shapes but also line-graphics which resembled a totemic virtual architecture. A selection of those works was shown at *t-4*.

Otto Beckmann was already 60 years old when he started to produce computer art in the mid 1960s. Beckmann combined an interest in modern art, mathematics and mysticism and occultism. 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 (Weibel 2008, p.11).

In 1968 Otto Beckmann and his son Oskar Beckmann started working on an *Ateliercomputer* (a studio computer), a special purpose machine for artistic use which was finished in 1970 and thus became called *a.i.70* (ars intermedia 1970). In a 1973 conference paper for *t-5*, Oskar Beckmann argued that commercially available computers were not really suited for the production of art (Oskar Beckmann 1973). The studio computer was optimised for the aesthetic requirements of Beckmann senior who in the 1970s focused on *Imaginary Architecture*.

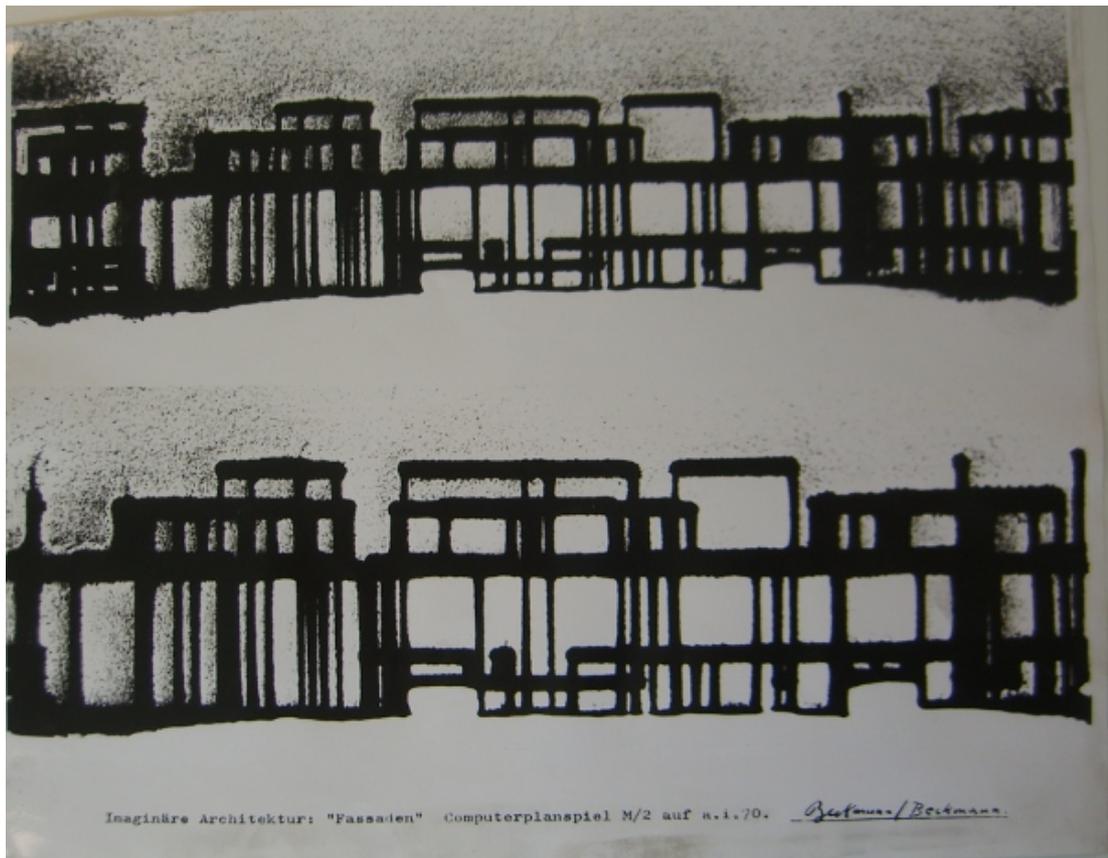


Illustration 46: Otto Beckmann and ars intermedia, *Imaginary Architecture* (1971), realised on studio computer a.i.70/71, screenshot from oscilloscope, photo Archive MSU Zagreb

The work of the group Ars Intermedia opens up interesting discussions relating to 'the social shaping of technology' and art. On one hand the studio computer is an illustration of theoretic positions in science studies which postulate that during the early phase of a new technology a variety of possibilities may exist none of which is 'objectively' superior to any other (Bijker et al. 1987). It is only through a number of social selection processes and other influences, none of which are strictly technical, that technological lock-in happens – when a certain usage of a technology and its social form together become the norm.

The specific version of the computer we have now was strongly influenced by the agenda of the military which preferred a high-level of abstraction, total control and an extreme division of labour. The studio computer was a special purpose *instrument* which suited the particular needs of an artist. The artist-engineer team created a technological system which was designed to maximise their artistic autonomy. The

studio computer should thus be seen as an authentic artwork in its own right, an example of *autonomous computing*.

Art Research Centre

Art Research Centre (ARC) Group from Kansas City, Missouri, 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. The group ARC was founded in 1964 by Thomas Michael Stephens as a follow up project to a communitarian gallery project, and made its first exhibition in 1966.

At *t-4* the group's members³⁵ showed in a group room; the individual contributions were still 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 raise socially relevant problems through aesthetic systems and processes involving feedback (ARC 1972).

The group's unique contribution was to merge a Constructivist interest in new media, artistic collectivism, and sixties communitarianism, with cybernetics and the computer. ARC applied, in their own words an 'wholistic, gestaltic' approach to the understanding of the life of the group itself (ARC 1972; N. A. Stephens et al. 1969). ARC member Gary Rice presented at *t-4* a cybernetic proposal for the programming of group activity (Rice 1970). A few years later ARC member Joseph Ziegler published a number of graphical sub-routines with the intention of making life easier for artists whose grasp of programming may not have been as advanced as his own (Ziegler & ARC 1973).

35 John F. Abbick, Peter Clapp, Nancy A. Stephens, Thomas Michael Stephens, Jon B. Thogmartin, and Philip J. van Voorst

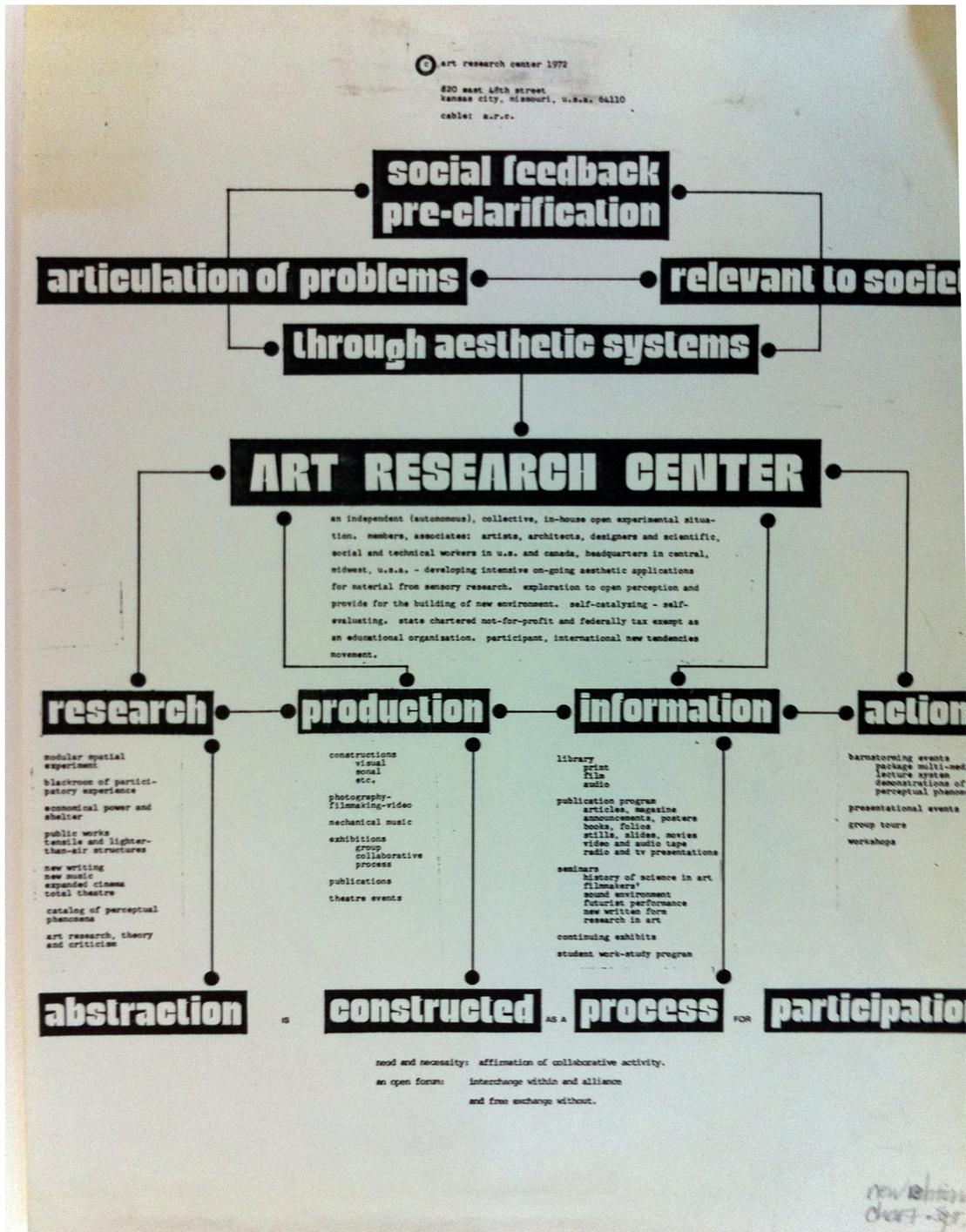


Illustration 47: ARC, Diagram (1972), Archive MSU Zagreb

ARC's communitarian spirit foreshadowed the open source movement, and was an early example of bringing together collaborative practices and creative computing. Their work provides a different nuance in what Turner (2006a) investigated with the example of Stuart Brand and the *Whole Earth Catalogue*. In the late 1960s computers, which for a long time had been perceived as part of the military-industrial complex, suddenly could be 'cool' and 'counter-cultural.' This became possible

through the merging of the collaborative culture of the *Closed Worlds* (Edwards 1996) with the communitarian spirit of the late Sixties, and of psychedelic experiences with drugs and light shows such as those made by New York based group USCO with Marshal McLuhan's ideas about a new tribalism in the electronic global village (Turner 2006a, pp.41–69). ARC's existence suggests that those connections between computing, creativity and counter-culture were not restricted to California and New York City, and that there existed Constructivist leftist tendencies in early US computer art.

Gustav Metzger

Zagreb was the first place in the world where Gustav Metzger's *Five Screens With Computer* (1963) was shown. It seems that Metzger's initial proposal had been rejected, and only by protesting he managed to get his work into the exhibition. In his letter Metzger complained 'it strikes me as being very sad that you should limit your programme to what is already a fairly well established, and relatively easy application of computers to art, i.e. *computer graphics*' (Metzger 1968 my emphasis).

It is not well known that Metzger considers *Five Screens With Computer* (1963 - 1972) 'his most important work' (Metzger 2011). This is because it was 'the most elaborate project that has emerged from the theory of Auto-Destructive Art' (Metzger 2005a, p.253). The concepts of auto-destructive and auto-generative art, formulated in a number of manifestos starting in 1959 (cf. Phillpot 1996, pp.86–89), 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' (Brougher 1998, p.15). Metzger's theory of auto-destructive art (ADA) understood it as 'a coherent, a necessary phase in the development of modern art' (Metzger 1996a, p.25).

Metzger's work as an artist was, and is, driven by his critique of capitalism, and a deeply felt anger about the destruction it causes (Metzger 2011). The most destructive technology for Metzger was the computer: 'Today, death is fed into, processed and administered by computers' (Ibid., p. 31). It was thus logical for

Metzger that the computer should be at the heart of a large scale public sculpture that embodied all the ideas about ADA (Metzger 1996b).

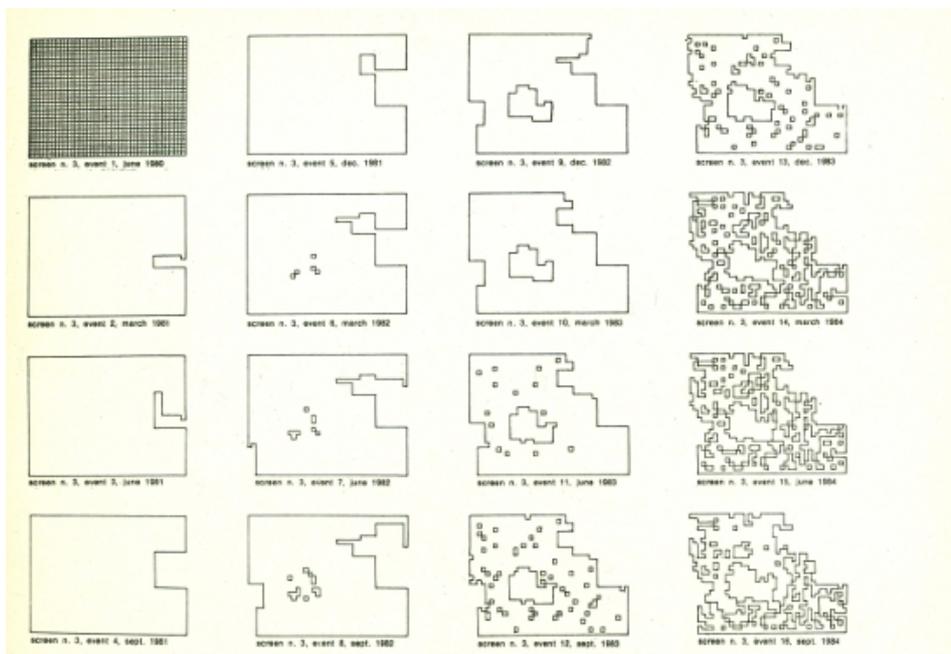


Illustration 48: Gustav Metzger with D.E.Evans, Design study for Five Screens With Computer (1969); computer-generated drawings, print, IBM 7094 II, Calcomp plotter 536; Arte y cibernética, exhib. cat. Buenos Aires 1971, Archive MSU Zagreb

Five Screens was the realisation of all the theoretical ideas that Metzger had hatched in the years from 1959 to 1965, and driven by his desire to realise large projects (Unterdörfer 1999, p.33). Five large walls or screens each consisting of 1200 uniform steel elements about two feet long would be positioned 25 feet apart. Using computer controlled timing the steel elements would get ejected. With each ejection the sculpture would not only slowly disintegrate but also create different views, different plays of light and shadow. The computer, Metzger thought, was necessary for the design, 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 computer generated graphics of the screens³⁶ in various stages of ejections were exhibited (GSU 1970; Metzger 2005a).

³⁶ The graphics were produced in collaboration with Beverly Rowe, D.E. Evans and R.J. Stibbs.

Metzger wanted to use technology not as an affirmative gesture, but as a critique from inside the system. Metzger 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' (Metzger 1969a, p.107). Metzger's critique spared nothing and no one, for instance arguing that Bauhaus 'helped cement capitalism, helped the rise of the designers, stylists, media manipulators' (Ibid. p. 108). Metzger also suggested E.A.T should refuse to cooperate with firms producing Napalm and bombs for the war in Vietnam (Ibid.).

Metzger's critique of CS in the same article has already been quoted. But Metzger also saw other, positive perspectives in art and technology. Artists should connect with those scientists who were 'fighting the system from within' (Metzger 1969c; 2005b), such as the British Society for Social Responsibility in Science and the Union of Concerned Scientists, a US initiative. In the second article Metzger dreamed of 'technologies of paradise', referring to childhood memories from Nurnberg, a town dotted with medieval fountains, as well as works by Arab and Indian garden designers and Ptolomean automata (Metzger 1969b).

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 the possibility of an alternative, of technological art as a kind of critique from within. Metzger did not travel to Zagreb. His computer generated plans and sketches of *Five Screens ...* were shown and he submitted two texts to the conference: a text which presented some of his ideas about art and technology in general and about 'Five Screens ...' (Metzger 1971), and another text called 'Zagreb Manifesto' jointly authored by Metzger, Jonathan Benthall and Gordon Hyde (1969e; 1971d).

Symposium t-4



Illustration 49: Symposium Computers and Visual Research, Moje Pijade Workers' University, Zagreb May 5-7 1969, photo MSU Zagreb

The *Zagreb Manifesto* (Metzger et al. 1969e) was read out by Benthall in a fairly theatrical tone at the conference *Computers and Visual Research* on May 5 1969 (Benthall 1969c). Was this the dawn of the era of the computer in art? Or, as Charlie Gere has remarked, its early peak and decline (2004)? The contributions to the May 1969 symposium, most of which were collected in *Bit International Nr. 7* (1972), were dominated by the Franco-Germanic discourse on information aesthetics following in the tracks of Bense and Moles. Jonathan Benthall in his 'Report from Zagreb' wrote that 'the translation was garbled [which] made one feel constantly on the threshold of new insights that were seldomly attained' (Benthall 1969a). Benthall

admitted 'prejudice against theoretical aestheticians of whom there must be a heavy concentration in Germany' (Ibid.).

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' (Krampen 1971), and in 'About the Interpretation of Programmed Art' by Josef Hlaváček (1971). 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' (1971, p.71).

Hlaváček argued that Umberto Eco continued where Bense had stopped, with a structuralist semiotics of art (Ibid.). True, between 1962 and 1969 Eco had increasingly turned to semiotics (Robey 1989) and thus it may not be wrong to see that continuity. Yet Eco had well understood that the events of '68 'outflanked' his own position on the political aspects of formal innovation by demanding that art became directly political (Ibid., p. xx). Eco's own conference contribution was very different from that of the Franco-German aesthetic-semioticist school. 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 NT should completely shift their focus. Rather than organising exhibitions of computer art, they 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 NT to organise a 'true happening' which 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 (Eco 1969; 2010b, p.418).

Horvat-Pintarić' speech addressed the funding problems *t-4* had encountered and complained about a backward mentality of bureaucrats (Horvath-Pintarić 1971, p.12). Horvat-Pintarić advanced the view that 'crucial transformations' would soon be taking 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' (Ibid.) The reason for this she saw in the rise of the 'technetronic age,' a term coined by Zbigniew Brzezinski (1971) who later became President Carter's national security advisor. Brzezinski's term and book was one among a number of conservative prophecies of an electronic, post-industrial society, the most well-known of which appeared in Daniel Bell's *The Coming of Post-Industrial Society* (1973).

Zagreb based artists and intellectuals who formed the circle around GSU combined unorthodox humanist socialism with inquiries in cybernetics, computer art, advanced environmental design, and mass communication. This effort was an attempt to formulate an adequate response for art in a world experiencing a qualitative transformation through computers and media technologies. This effort by the curatorial team and others in Zagreb was a continuation of the modernising impulse which had informed NT from the start, but had changed its shape. Initially NT had been an avant-garde movement where, 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. In 1968/69 there was no NT movement anymore, but there was still a modernising impulse. Art was still part of the picture but not, in the way the avant-garde movements had seen it, *leading* a profound transformation of the world.

Now that there was no movement anymore it was difficult to say what linked all those activities, and if there was still a kind of 'project,' a unifying vision. If there was such a project then it was not expressed explicitly. What *was* said concerned expectations that some form of dialogue was possible between the work that had characterised the earlier movement of NT and visual research by computer. But even curator Boris Kelemen admitted 'However justified and logical it might have been, the discussion did not offer the results anticipated' (Kelemen 1973).

In the short run, *t-4* was seen as a great success both by the organisers and visitors. Kelemen reported to those participants who had only sent work and not travelled to Zagreb, that 'our symposium and the exhibition were a great success, 200 people came from all around the world' (Kelemen 1969b). One visitor of the exhibition from Canada wrote that the exhibition had been 'very beautifully done' and was

'considerably ahead of everything that has been done so far in Canada' (Rowan 1969). 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* (Benthall 1969b).

In July 1969, *Programme Information 14 (PI-14)* published a summary of the reception of *t-4* including local and international press reactions (GSU 1969). 10,000 visitors had seen the exhibition and lots of reviews had appeared in the daily press and electronic news media of Yugoslavia. Media of German speaking nations 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 specialised media such as art magazines and newsletters (Ibid.).

By the end of 1969 things should have looked good for a continuation of NT. Kelemen sent out a volley of letters to artists from whom GSU bought works. In one such letter Kelemen told Nake that he had an interest in continuing talks with him about *t-5*, that the gallery in principle had agreed to have it, and that in spring 1970 a meeting should be organised in Zagreb in preparation (Kelemen 1969a). Thereafter, however, plans must have gone off-track. The idea that *t-4* should initiate an international research network on computers and visual research did not materialise.

NT had always been supposed to be a Biennale, held in tandem with the more reliably organised Music Biennale. But *t-5* in 1971 was skipped and it took two more years, until 1973, for it to happen. The evidence that has been available to me does not give any clue why *t-5* was not held at the regular interval in 1971. But it could have something to do with what came to be called the 'Croatian Spring'. Initially this appeared as a post-68 movement which linked progressive Croatian politicians with parts of the student movement. But the movement became hijacked by nationalists which resulted in an intervention by the federal government in 1971. Key figures at the top of Croatian party and government were sacked, hundreds of people arrested and special police patrolled the streets of Zagreb for a while. Tito argued once more that he had to intervene before the Soviets did (Rusinow 1977a, chap.7).

Colloquium 1971



Illustration 50: Hiroshi Kawano and Abraham Moles at Art and Computers (1971), photo MSU Zagreb

In 1971, only a two-day colloquium was held at Moje Pijade Worker's University, together with an exhibition at GSU under the title *Art and Computers*. It must have been a bit like a meeting of the class of 1968/69. Hiroshi Kawano came from Japan, Herbert W. Franke attended, Jonathan Benthall gave a talk and Abraham Moles moderated. Frieder Nake sent a statement to be read out, so did Lev Nusberg of the Russian kinetic art group Divizenje. A new discovery was Group Art et Informatique de Vincennes (GAIV) consisting of Fanie and Jaques Duprié, Jean-Claude Halgand, Hervé Huitrić and Jean-Claude Marquette.

As Kelemen later reported, at *Art and Computers* in 1971, some participants had made specific recommendations on how to improve the situation. Franke had made a

number of suggestions such as 'using computers for creating didactic and educational means, of applying computers for the design of consumer goods, for the promotion of scientific aesthetics, and of using experiences with computers for organizing man's leisure time' (Kelemen 1973). Jonathan Benthall made the crucial suggestion to discuss 'the *relation between conceptual art and computer research*' (Ibid., my emphasis). Maybe there were other influences too, but it seems that it was this initial suggestion which led to the specific concept of *tendencies 5* in 1973.

CHAPTER 5: *The Rational and the Irrational in Art (t-5, 1973)*

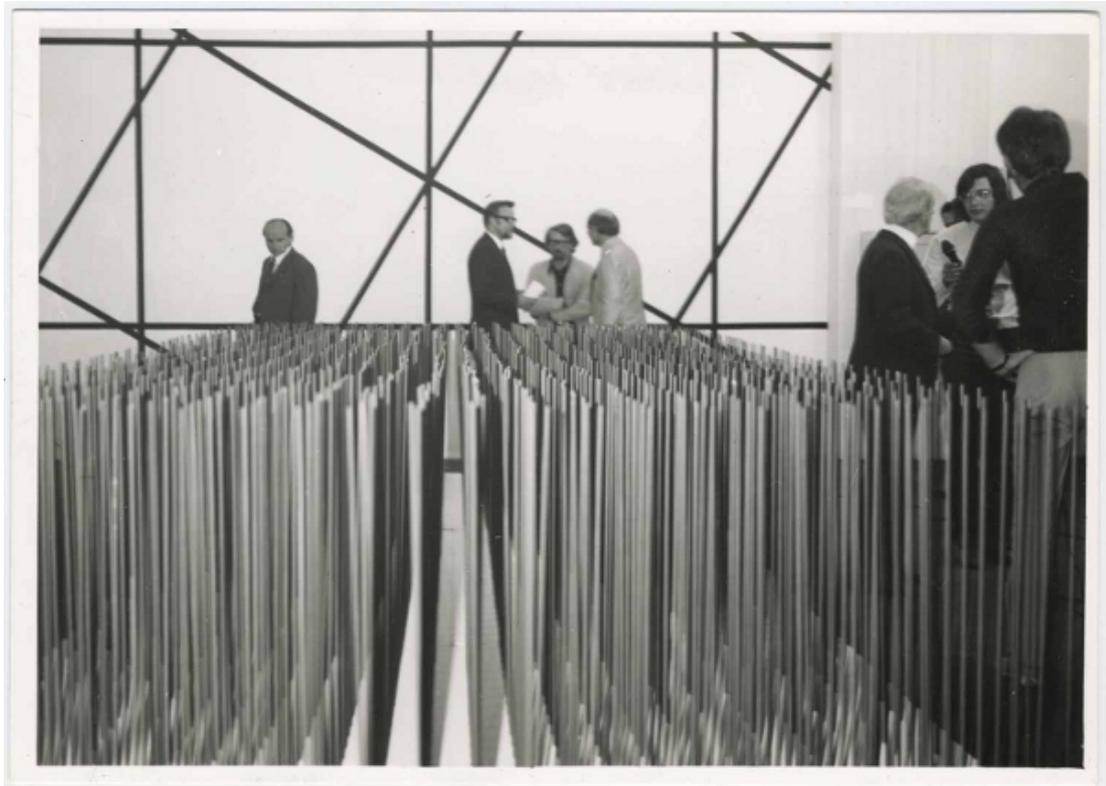


Illustration 51: Exhibition view, *t-5* (1973); (foreground) Jesus Rafael-Soto, *Orange extension* (1968/1970); (background) François Morellet, *Two rows of unequal lines* (1973), photo MSU Zagreb

When *tendencias 5 (t-5)* was realised the structure of GSU had changed. Radoslav Putar had become head of the City Galleries of Zagreb, the umbrella organisation to which GSU belonged. Putar had been involved with NT from the very start and took a more active role in *t-5*. Marijan Susovski now worked as a new curator at GSU. As usual, the plan for *t-5* was ambitious and this was also expressed in the organisational set-up. The organisational committee consisted of 17 people (GSU 1973b). It included many of the usual members working with GSU and NT over the years, such as Abraham Moles and Herbert W. Franke, and new members of the committee such as British Computer Arts Society founder Alan Sutcliffe; and there were also a number of new members whose participation signalled a change of direction: the leading Hungarian art critic Laszlo Beke connected with a new generation of artists making conceptual art (Piotrowski 2009, p.11); the Italian art critic Germano Celant

who had coined the term *Arte Povera* (poor art) in the catalogue of the exhibition *Arte abitabile* (1966) at the Sperone Gallery in Turin (Denegri 1978, p. 5) which, together with *Eccentric Abstraction* (1966) at Fischbach Gallery in New York, was seen as birthplace of the 'new art' (about this term, see below) (Denegri 1978, p.5); Ryszard Stanisławski, director of Museum Sztuki in Lodz, Poland, a museum which had been an important place for Constructivism before Second World War, and which had regained recognition as Poland's most progressive museum through Stanisławski's work (Piotrowski 2009, p.14); and Nena Dimitrijević, curator, critic and wife of Slobodan Braco Dimitrijević, a Croatian conceptual artist from Bosnia-Herzegovina who quickly rose to fame in the 1970s.

Software

Beke, Celant, Stanisławski and Dimitrijević were among the most knowledgeable people about conceptual art in Europe at the time. The organisers of *t-5* made an audacious move. They tried to bring together Constructivist, computer and conceptual art in one exhibition. Their attempt came three years after *Software* (1970), the exhibition curated by Jack Burnham at the Jewish Museum, New York. Burnham had tried to show the conceptual overlap between computer software and conceptual art. Edward Shanken has worked on *Software* and the relationship between computer and conceptual art (Shanken 1998; 2002; 2001). Darko Fritz has analysed the relationship between the exhibition *Software*, conceptual art and *t-5*. (2007) In this chapter I will use *Software* to contextualise *t-5*, highlighting different relationships between artistic labour and new technologies.

As Fritz wrote, 'for Burnham *Software* stood [...] for the mythic structure of art, the aesthetic principles, concepts, or programs that underlie the formal embodiment of the actual art objects'. Burnham, furthermore used the notion of software 'to describe the set of rules, carried out by a machine *or* by the audience, which follows the instructions formulated by the artist' (Fritz 2007, p.4).

Software was perceived as a failure by contemporary critics and even by its curator (Burnham 1980). So was *t-5*. The neo-Constructivist and kinetic artists who had

formed the core of NT since 1961 were not impressed by the New Art (Fritz 2011). The young artists who made the new art did not like the idea either. They did not want to be seen locked into a conceptual framework with positions which they dialectically opposed. The public at large was not impressed either, if one article in the local press can be taken as an indicator, with a review under the headline 'Nove Tendencije - Nisu Više Nove' (New Tendencies - Nothing New Anymore) (Anon 1973a). Just like *Software*, however, *t-5* needs to be rediscovered and reclaimed as an important juncture in the early history of media art.

Shanken argued in 'Art in the Information Age' (2002) that *Software* gave reason to rethink the relationship between art and technology practices and conceptual art as 'constituents of larger social transformations from the machine age of industrial society to the so-called information age of post-industrial society' (Ibid., p. 433). Both conceptual art and art-and-technology are defined by Shanken as meta-critical processes which perform critical investigations into infrastructures of knowing. Thereby conceptual art is concerned more with the 'networks of signification and structures of knowledge (that enable art to have meaning),' (Ibid., p. 434) while art-and-technology 'challenges the systems of knowledge (and the technologically mediated modes of knowing) that structure scientific methods and conventional aesthetic values' (Ibid.). Shanken adds that, art-and-technology also 'examines the social and aesthetic implications of technological media that define, package and distribute information' (Ibid.). The real link between the two practices, however, was expressed through the title. Burnham introduced the concepts of 'software' and 'information technology' as metaphors for art,' explained Shanken (Ibid.).

Shanken argued that 'through the proliferation of mass media, knowledge became a second-hand mental experience of simulations and representations,' which he equated with software as opposed to hardware, the latter understood as corporeal experiences of actual objects' (Shanken 2002, p. 434). What united artists working with computers and conceptual artists was the preference and heightened importance both gave to 'software' defined as '*the expression of an idea that becomes reality by simulating it,*' (Ibid., emphasis in the original).

Exhibitions t-5



*Illustration 52: Daniel Buren, realising *Five Paintings Zagreb June - July 1973* (1973); photo MSU Zagreb*

The curators of t-5 did not spell out in great detail where they thought the similarities between constructive art, computer art and conceptual art were. In the catalogue, each section was introduced by one curator.

Radoslav Putar explained that 'the problems which cropped up at the first New Tendencies have not been resolved, nor have they disappeared; they have now become even more significant and more fateful' (Putar 1973). Putar was asking

whether 'the field of constructive visual programmes [was] exhausted' or whether 'a sufficient number of current tasks still remains to be fulfilled' and also 'whether there [was] a general public need [...] or only an illusion [...] created through commercial demand' (Ibid). Putar was looking for a 'phylogenetic link' between constructive research and visual research by computer. He believed that 'the interpretations and fundamental statements made by a number of representatives of conceptual investigation largely coincide, at least with some of the statements and programmes of representatives of constructivism'. The linking term was 'data processing' which according to Putar was also happening in conceptualism (Ibid.).

The introduction to the catalogue section on constructive visual research was written by Božo Bek who had been director of GSU since 1960. Bek summed up the situation of NT as a mature movement beyond its peak. Besides art historical questions, what interested Bek was 'formulating more precisely criteria that would allow us to select those structures which contain the greatest quantity of aesthetic information' (Bek 1973). For Bek, the most urgent problem was still 'solving problems.' 'Behind each visualised structure composed of a series of identical or different elements, there was always a numeric structure clearly indicating whether they were dealing with the system of permutations, combinations or variations,' he explained (Ibid.). As examples for new or ongoing research, Bek quoted a number of recent publications from the first wave of NT artists such as Mavignier, Mari and Le Parc, who provided insight into mathematical systems behind their work. From that point of view there was an unbroken continuity from Max Bill's 1949 text 'The Mathematical Approach in Contemporary Art' (1996).

The selected works in the exhibition showed works of the most important participants of the movement NT such as Mavignier, Morellet, and Le Parc. Also shown was a room installation with metal rods *Orange extensions* (1970), a so-called 'penetrable' by Jesus Rafael Soto, which GSU had commissioned in 1970 in the context of a solo exhibition by Soto. Penetrables extended the field effect to whole spaces by using strings or metal rods. At *t-5*, some of the work did not easily fit into any category. Enzo Mari showed variations on the hammer and sickle theme with works from the 1950s and the 1970s, probably trying to demonstrate to younger artists that he had been a radical then and was a radical now (Fritz 2011).

A large selection of photographs was shown from the history of exhibitions and projects of the Russian cybernetic art group Dvizjenije by Lev Nusberg and collaborators. The availability of those photographs, as well as long texts describing in detail the steps and projects of Dvizjenije's career, made evident that theirs was not an exact aesthetics. While based on cybernetic concepts and the use of electricity, light and electronics, Nusberg's aesthetics was more fairy-tale than rationality, more Chagall than Malevitch, and, in its eclecticism, comparable with the early Soviet science fiction movie *Aelita* (Protazanov 1924).

Boris Kelemen's introduction to the computer section acknowledged that in 1968/69 the search for 'possible links between Constructivist aspirations on the visual level' and "computer art" which at the time had seemed 'justified and logical,' [had] not offered the results anticipated' (1973). He made 'differences between generations' and 'the laws of consumer society' responsible for that (Ibid.). The new exhibition of computer art, Kelemen explained, did not try to show everything from 1965 to the present. It did not show computer works of a spatial dimension and also not 'work known as events' (Ibid.). Computer graphics were even more dominant than at *t-4* in 1968-69. The exception to the rule was provided by Jose Luis Alexanco's 3D works and *GF. E/16 O/NS VB 1971 (1971b)* by Bonačić, a computer controlled sound and light object with interactive features.

The range of computer graphics shown revealed incremental change rather than any paradigmatic breakthroughs. The exhibition demonstrated that it had become easier for artists to produce qualitatively better prints, use colour and more complex structures; it also demonstrated a widening of the geographic and demographic circle of participation. There were several new participants from Yugoslavia such as Miljenko Horvat, Sergej Pavlin with Borut Dobobisek and Zdene Briska, Vilko Ziljak, Tomislav Mikulić and Edvard Ravnikar; there was a number of works from Grupo de Arty Y Cibernetica, a branch of Centro Arte Y Comunicacion, Buenos Aires, with Luis Fernando Benedit, Antonio Berni, Ernesto Deira, Eduardo McEntyre, Mario Mariño, Rogelio Polesello, Osvaldo Romberg and Miguel Angel Vidal.

Waldemar Cordeiro's *People* (1972) is a photograph of a large group of people which had been digitised and its resolution brought down so that they are only just still recognisable. The idea behind this work was programmatic. Although Cordeiro had been an important advocate of Concrete Art in post-war Brazil, by the late 1960s he began to dismiss all variations of Constructivism as 'paleo-cybernetic' (Cordeiro 1973). In his subsequent work with computers, Cordeiro tried to provide examples for a socially engaged art in societies he believed would increasingly be transformed by computers and telecommunications (Fabris 1997; Kac 1997).

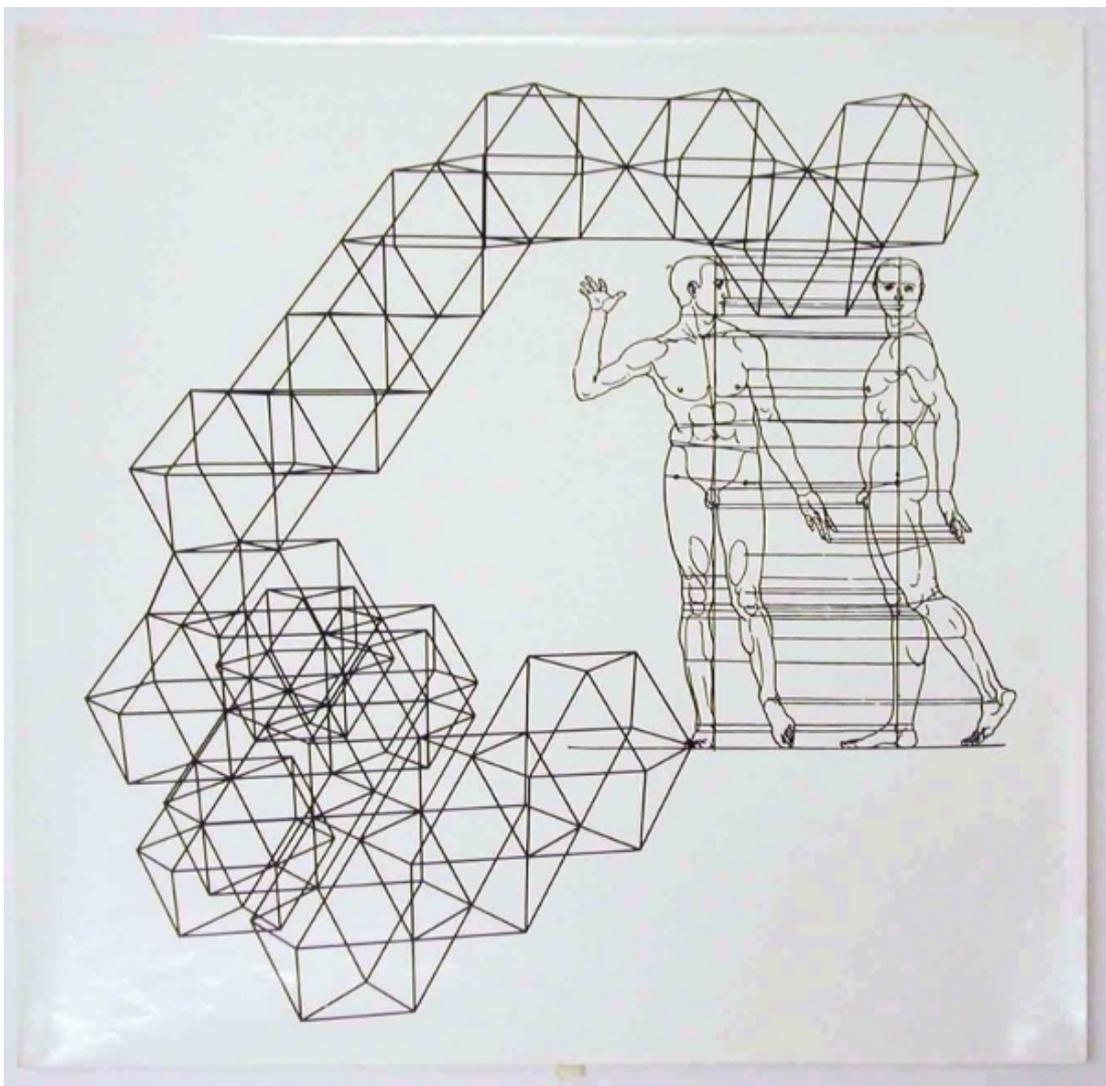


Illustration 53: Ludwig Rase and Georg Nees, Cuboctaeder (1972), computer-generated image, print on paper; MSU Zagreb, Nr. 2150

At *t-5*, the US American corporations who had so dominated the competition in 1968/69 were absent. But there was a large number of works from the computer graphics department of the German high-tech defence company Messerschmitt-Bolkow-Blohm. Ludwig Rase and Georg Nees produced a series of graphics for the design department of German industrial conglomerate Siemens illustrating the idea of *Cubo-Octaeder* (1971). Those were octagonal spatial structures which could be used as a kind of plug-in elements for living, and get modified by the inhabitants (see Illustration 53).

The New Art



Illustration 54: Exhibition view t-5, subsection 'Canvas', curated by Nena Dimitrijević; works, from left to right: Howard Selina, *Earth Paintings* series (1972); Daniel Buren, *Five Paintings Zagreb June - July 1973* (1973), Barry Flanagan, *August 1, 1969* (1969), Braco Dimitrijević, *One of my most recent paintings* (1972), John Latham, *One Second Drawing* (1973) (back right); photo MSU Zagreb

The young curator Marijan Susovski put a long quote from the catalogue of NT2 in 1963 at the beginning of his introduction to the conceptual section of *t-5* in 1973. The first part of the quote declared that 'matter is by no means any longer the bearer of particular descriptive values and neither are its distinctive features appropriate any longer to carry the main or one of the main themes of the work.' Since 'the charm of the accidental occurrence in the course of execution [was] no longer desirable [...] execution [...] is realized by specialists in workshops or else in factories' (GSU 1963 quoted in Susovski 1973). Susovski was trying to accommodate the legacy of NT, but in reality it seems there was a kind of struggle or rivalry going on. NT started to be seen as belonging to an 'elite culture of socialist modernism' to which conceptual art 'offered itself as an alternative,' argues Šuvaković (2010, p.40). Šuvaković thinks

that the 'student movements and activist or mass manifestations culminating in 1968 represented the ultimate border of the last artistic avant-gardes' (Ibid., p. 41).

The viewpoint presented here by one of the leading art historians from former Yugoslavia complies with an art historical narrative which has become dominant. According to important Western representatives of conceptualism such as Harald Szeeman and Charles Harrison, in the late 1960s conceptual art established itself as the 'new art.' It is claimed that since the historic avant-gardes this had been the *only* further important *paradigm shift* in art in the 20th century, and that it had also been the *last one* (Rattemeyer et al. 2011). Internationally the 'new art's' rise had began in 1966 and manifested itself in two seminal exhibitions, *When Attitude Becomes Form* (1969), and *Op Losse Schroeven* (1969). In Zagreb, GSU organised a kind of retrospective exhibition as early as in 1978 looking back at 12 years of the development of *The New Art Practice* (Susovski 1978) in Yugoslavia. According to Šuvaković

'post-avant-gardes followed the last avant-garde movement, the New Tendencies and the corresponding cultural ideology of the *progressive* and technical *development* of modern society. It criticised the fundamental values and horizons of artistic and aesthetic expression of institutional high and late modernism, primarily the aesthetic formalism of late abstraction and the fetishisation of the culture of industrial design in the New Tendencies.' (Šuvaković 2003a, p.121)

It is urgent to re-open the sarcophagus which has been placed over the 'contaminated' technological art by the advocates of conceptualism. In particular the alleged docility of NT in relation to master narratives of modernity, a favourite theme of postmodern conceptual art theorists, has to be met with great caution. This is usually coupled with the insinuation that conceptual art was more socially aware than NT.

In more nuanced versions of this story it is at least acknowledged that at first NT was a strong influence. In Zagreb NT and the Gorgona group were accepted as a 'positive factor' (Denegri 1978, p.9). The rise of the new art, which was connected to '68 led to NT being 'dialectically contradicted' by young artists, just like NT had defined itself in dialectical contradiction to Informel. This does not mean to completely negate something but to produce an antithesis in which some of the original features are contained.

The new practice in art in Yugoslavia was closely linked to '68 not just ideologically but also through the institutional infrastructure which it used. It happened at places such as the Students' Centre Gallery in Zagreb, the Youth Tribune in Novi Sad, the Students' Cultural Centre in Belgrade, and GSU Zagreb as one of the few established art institutions which was part of those networks. In 1969-70 the Students' Centre Gallery organised a competition for artists to produce environments. Works were realised by Dalibor Martinis, Slobodan Braco Dimitrijević, Sanja Iveković, Janez Segolin, Dean Jokanović, Gorki Zuvella and Jagoda Kaloper (Matičević 1978, pp.21–22). This exhibition shows clearly that some of the artists were not that far apart from NT and environments which had been produced by, for instance, GRAV. Dalibor Martinis' *module n z* (1969) clearly showed neo-Constructivist influences, while Sanja Iveković' work with bent plastic ropes was closer to NT than her own later work. Braco Dimitrijević' differently coloured cans 'offered the audience a ludic structure with which they could play' (Matičević op.cit.p. 22) which was only a very slightly different ludicism than the one adopted by NT by the mid 1960s (see my Chapter 3, pp. 145-153).

The international participants in the conceptual art section in *t-5* brought together artists who, meanwhile, have become some of the most highly recognised Western artists of the second half of the 20th century: John Baldessari, Douglas Huebler, Sol LeWitt, Daniel Buren, Gilbert & George and On Kawara, to name just a few. Yugoslav conceptual artists who participated in *t-5* were László Kerekes, Slavko Matković, Laszlo Salma, and Balint Szombathy, all members of group Bosch + Bosch, but showing work as individuals; the painter Radomir Damnjanović-Damnjan who after already having been successful as a painter turned to conceptual art; Croatian artists Braco Dimitrijevic and Goran Trbuljak; the Slovenian couple Nusa and Sreko Dragan; and the curator Želimir Koščević from Student's Centre Gallery.

The 'new art' took place 'at the scene that lies behind the principle of hope promised by the Marxist utopia,' wrote Šuvaković (op.cit. 2003, p. 121). Artists such as Braco Dimitrijević and Goran Trbuljak performed a meta-linguistic critique of art, questioning it's meaning and possibilities. In a text about Dimitrijević and Trbuljak in

1978, Nena Baljković³⁷ criticised 'neo-Constructivism based on the Bauhaus utopia of the far-reaching possibilities that artists have in changing living conditions by beautifying the environment.' According to her, the critical new practices' 'starting point was the Dadaist ironic destruction of the image of the representativeness and aesthetic qualities of the art object (Baljković 1978, p.31 Footnote 4). Later, the same author stuck to the narrative. According to Nena Dimitrijević, artists such as her husband Braco Dimitrijević, 'defined himself in opposition to these schools, setting conceptual art's emphasis on the idea/concept against the *retinal dogmatism* of kinetic art, and nihilism and poetic anarchism against the New Tendencies' constructivist-derived project of improving of life by aesthetically ameliorating the urban environment' (N. Dimitrijević 2006, p.24).

By questioning the conventions of art, the art of Dimitrijević and colleagues in the early 1970s pointed towards the utopian idea of a more radically egalitarian society. Dimitrijević' breakthrough came with a series of works called *Casual Passers-by I met at ...* (1971 -) wherein the empty part would be filled in with the name of a person whom the artist had accidentally met on the street. Dimitrijević would take a picture of the person and, with their consent, reproduce it on a big canvas in a prominent location outside a building. The work was first realised in 1971 as part of a commission of public art works in Zagreb called *The possibilities of 1971*. It was then shown at the Biennale of Young Artists in Paris in 1971 and has since been made in new versions in many places till today. At the Paris Biennale of Young Artists in 1971 conceptual artists from Yugoslavia made a very strong entrance (Milenković 2005, p.1 footnote 1).

Dimitrijević *Casual Passers-by I met at ...* continues to attract interest because it addresses the rules behind the production of public images. In Eastern Europe the work had a special significance, because 'it inscribed ordinary people into portrait conventions normally reserved for the leaders or dictators' (Piotrowski 2011, p. 309).

At *t-5*, a special selection and show called *Canvas* was curated by Nena Dimitrijević, which exclusively showed works of conceptual artists realised by using canvas, the most traditional of media. Dimitrijević' curatorial choice did not signal a return to

37 The author of this text was Nena Dimitrijević writing under her maiden name.

painting, but tried to demonstrate that conceptual art was not determined by the media it used (N. Dimitrijević 1973a). In this section there were works by Anselmo, Buren, Dias, Dimitrijević, Flanagan, Kounellis, Paolini, Ruthenbeck and Selina. Although all those works used canvas, the results were so dramatically different that it can be said that this part of the thesis - that art is not determined by the carrier medium - has been confirmed.

Braco Dimitrijević' contribution to this section was *One of My Most Recent Paintings* (1972) which was a painting he had made himself in the style of Jackson Pollock. In a text about this work, Dimitrijević stated that because of the context of the art gallery, viewers would almost automatically be drawn into making the wrong conclusion that his own painting *was* by Pollock (B. Dimitrijević 1973, p.1). The work addressed the price of the work as intrinsic to its message and criticised the notion of originality of the art work. In *Tractatus Post Historicus* (1976), Dimitrijević formulated a critique of art history as series of styles where 'each new style is an improvement in the previous one, and in a Hegelian sense leading to an absolute ideal' (Dimitrijević B. 1976 quoted in N. Dimitrijević 2006, p.35). Basing the theory strongly on Barthes' mythologies, Dimitrijević 'used a strategy of counteracting myth by creating an artificial myth ' (Ibid, p. 36).

The canonisation of Dimitrijević' work, in particular the recurrence of the theme of post-historicism, only throws light on the current dilemmas in art and social development. Post-historicism may have been progressive in 1973, because it promised liberation from the dominant master narrative of modernism, in particular from the master narrative of modern art with its strong inclusions and exclusion schemes and mechanisms, has by now become a symptom for the stagnation of societal development and of the arts in neoliberal informational capitalism.

Vojvodina Conceptual Avant-Garde



Illustration 55: Bálint Szombathy, Lenin in Budapest (1972), photo; collection Marinko Sudac

Some of the most radical conceptual work took place in the autonomous province of Vojvodina in Serbia, in the cities Novi Sad and Subotica. In particular, the venue Youth Tribune in Novi Sad had a strong role in supporting the art of groups such as the Slovenians OHO, KÔD from Novi Sad and Bosch+Bosch from Subotica. Places such as Youth Tribune were, according to Šuvaković, 'reservations' 'where student, or youth, or experimental, or neo-avant-garde, or post-avant-garde art was being created' exactly because, as a whole, the system went into a period of stasis. 'Those spaces were 'spaces of the simulated,' explained Šuvaković, 'freedom in reservation, opposed to the rest of society' (Šuvaković 2005 quoted in New Media Center_kuda.org 2006, p.57).

Bosch+Bosch represented by László Kerekes, Slavko Matković, Laszlo Salma, and Balint Szombathy participated in *t-5*. Bosch + Bosch had been formed in 1969 by Matković and Szombathy in Subotica as the art section of the Youth Forum (Milenković 2005, p.38). The group is often mentioned together with KÔD³⁸ from Novi Sad and Slovenian group OHO with whom they closely collaborated in some projects in the early 1970s. Those groups developed 'art as an integral part of the criticism of the social praxis, in other words, a revolutionary mechanism for the introduction of qualitative changes into the social praxis' (Todosijević 1975, quoted in Susovski 1978, p.3).

A key role at that time was played by Bogdanka Poznanović, an artist of a slightly older generation who was curator at Youth Tribune and who, together with her husband Dejan Poznanović, ran their combined studio space and flat like an informal gallery, where young artists could come and browse magazines, read books or listen to new music. It was through them and their studio space, DT20, that a lot of information from outside came to Novi Sad. It was most likely there where young artists encountered NT catalogues and issues of *Bit International* (Lukić 2011).

KÔD means code in English and was chosen to signify the group's interest in 'systems of signs which enable communication, the transmittance of the message from one system into another' (Radojičić 1978, p.39). KÔD and Bosch + Bosch shared an interest in linguistics, language philosophy (Wittgenstein) and information theory (Ibid.). Although the computer was at the time more mythical than real, the artists had picked up the terms and concepts of information theory from *Bit International*, the magazine edited by GSU. This interest almost naturally coincided with a strongly dematerialised concept of art. Slavko Matković submitted a text 'Conceptual Art' for the *t-5* conference where, he stated that the proposition of an idea was a work of conceptual art, not understood as a final result; but 'a momentary logical state in the development of an idea as an idea' (Matković 1973, p.1).

Szombathy together with Matković a core member of Bosch+Bosch, described its 'conceptual matrix' as 'a consciously developed practice and improvement of a given

38 KÔD members were: Slavko Bogdanović, Slobodan Tišma, Mirko Radojičić, Miroslav Mandić and partly Janez Kocijančič, Peđa Vranešević, Branko Andrić, Kiš-Jovak Ferenc

attitude, view of the world and way of thinking' (Szombathy 1978, p.51). Their approach led members of Bosch+Bosch to experiment in quick succession with 'Land Art, Arte Povera, Project Art, concrete poetry, conceptual art, visual semiology, new strip, Mail Art' (Ibid.) whereby the artists consciously separated themselves from the American and English conceptual art scene (Ibid.). A key interest of their research-based approach was dedicated to interventions in space and visual mappings or 'markings,' later turning to the 'psychophysical conditions of existence of the "ego"' (Ibid.).

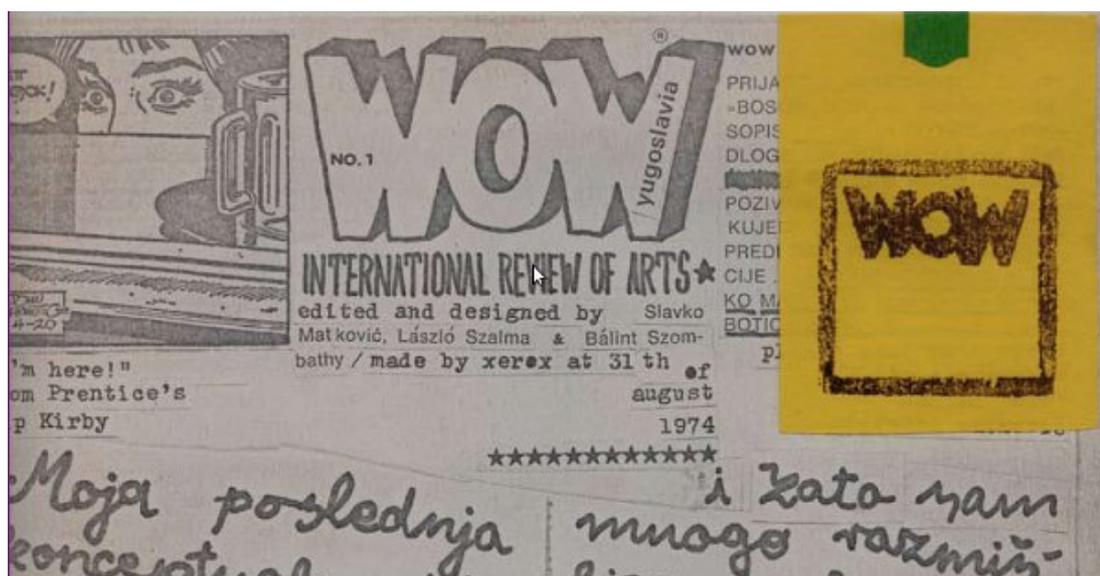


Illustration 56: WOW magazine, Bosch+Bosch (1974), Archive Kuda.org

It is, however, also important to understand that those interests were mixed into a subversive engagement with pop culture and other issues pertaining to the culture of everyday life, and a consumerist media culture also now developing in Yugoslavia. The group made cartoons and produced graphical work for magazines as well as, after 1974, its own fanzine WOW (Unterkofler 2009; 2010).

KÔD made conceptual works such as *Coordinated Sensitivity* (1970) where the members of the group imagined and drew different geometric shapes which they then compared. Members of KÔD, OHO and other artists from the conceptual art scene organised *Public Art Class*, held on the quays of the river Danube on October 18, 1970, where a series of land and river art projects were realised (Radojičić op.cit).

Like KÔD and Bosch + Bosch, OHO made increasingly ephemeral art works. According to Denegri, OHO's exhibition at GSU in February 1969 demonstrated that they were consciously moving away from 'the art of primary geometrical forms realized in industrial technology' (Denegri 1978, p.5). OHO were invited to participate in the *Information* (1970) exhibition at New York's MoMA where they explored 'transcendental conceptualism' and carried out telephatic art works (Tomaž Brejc 1978, p.17). As a self-produced OHO brochure showed (OHO 1970), those works, such as *Intercontinental Group Project* (1970), were rationally conceived and carried out with meticulous methodicism. The associated graphics were line drawings made with compass and ruler, and one text in diagrammatic form explained 'we are working with concept, science, media, mystery' (OHO 1970, p.6). While the concept of those works was dealing with something that natural science could not explain, the methods used were 'rational' and using modern but cheap media.

Marko Pogačnik of OHO group first politely declined the invitation to participate in *t-5* arguing that when he was filling out the entry form for the exhibition he recognised how little this had to do with his current life (Pogačnik 1973). He then submitted a handwritten letter as work to be shown at *t-5*. Bosch+Bosch were quite happy to participate and accepted NT as important predecessors to their art, although their own development was taking them into significantly new terrain.

Szombathy showed *Creation and Examples* (1973), a series of 100 slides taken by other artists according to his instructions. At the time he was conducting a 'visual semiology of surfaces' which could be understood as 'analogous with abstract paintings' (Szombathy 2011). Matković contributed a series of visual poetry works which questioned links between image and text, in particular the commercial language of advertising. One of Szombathy's most well-known 'semiological experiment' was *Lenin in Budapest* (1972), where the artist carried a placard of Lenin in an act of over-affirmation of the ruling logic of visual representation (see Illustration 55). The Vojvodina avant-garde attacked the underlying structures of the ruling powers in the visual and semantic domain, whether they were of a commercial or political order.

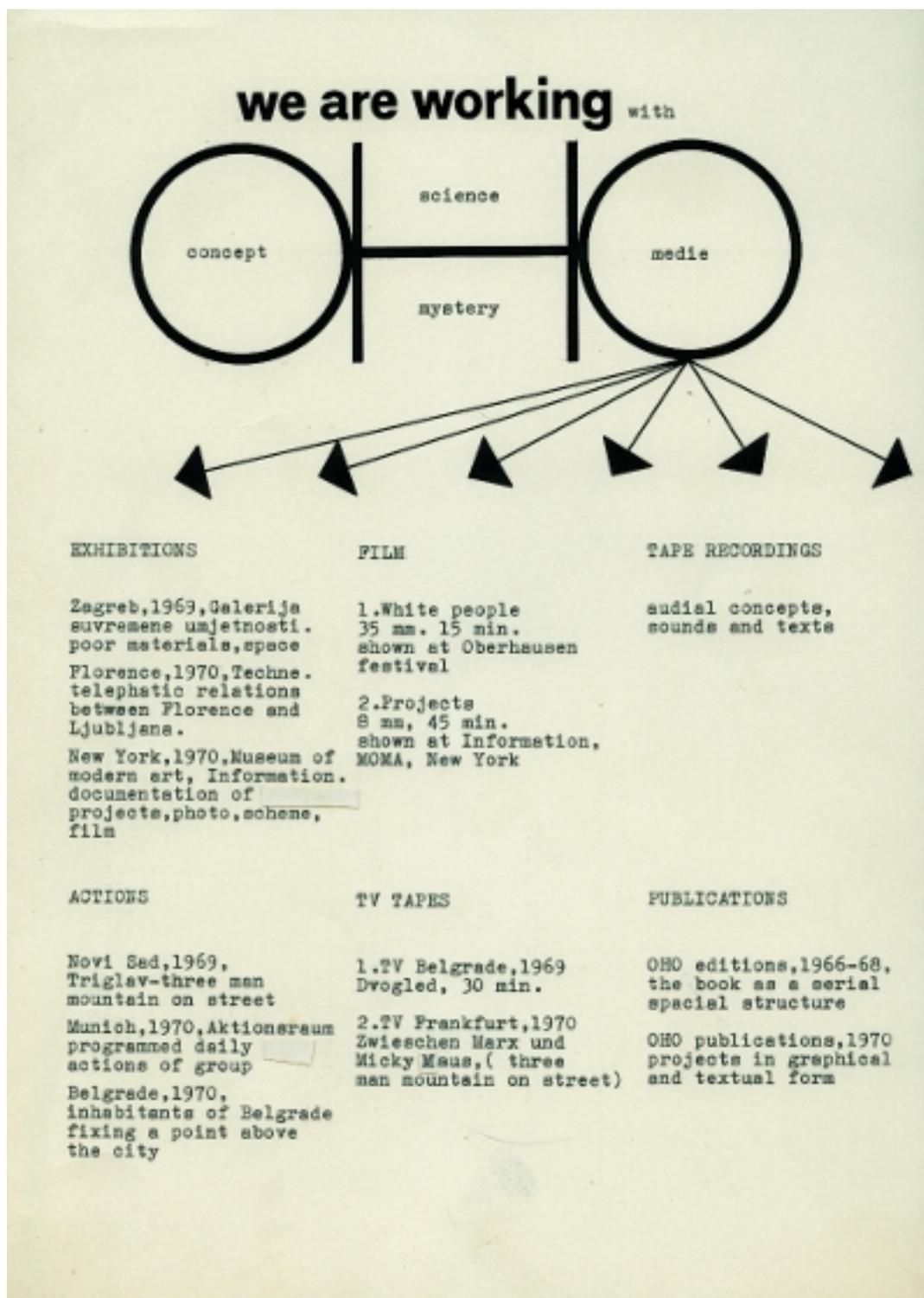


Illustration 58: OHO group, *We Are OHO* (1970); brochure, image Moderna Galerija Ljubljana

KÔD, Bosch + Bosch, and OHO developed their type of conceptual art at almost exactly the same moment as their international colleagues, there was no time-delay or the 'transmission' of ideas from a centre to a periphery. There are correspondences between Kawara's *I am still alive* (1973), a series of five telegrams sent to the exhibition, and the distant interaction projects of OHO and KÔD. What is astounding, however, is that artists in relatively small towns in rural surroundings developed an interest in *codes* and *messages* quite simultaneously with their colleagues in New York. Sol LeWitt's contribution to *t-5 Wall Drawing* (1973) consisted of an instruction sent by letter to draw one single line connecting three points.

The Vojvodina conceptual art scene constituted a neo-avantgarde which sought the unity of art and life. Their understanding of art as political activism was strongly inspired by Lajos Kassák, famous Hungarian leftwing artist of the historic avant-gardes, who died in 1967. Vojvodina is a multi-cultural area with a strong Hungarian minority. Szombathy and Matković were at home in both cultures and, in particular, Szombathy provided connections with the Hungarian conceptual art which was also present at *t-5* (Unterkofler 2009).

The Hungarian curator Laszlo Beke was responsible for the selection of Hungarian conceptual artists. Since the invitation to co-curate *t-5* reached him late, Beke suggested that he would put together a kind of documentation of conceptual work by Hungarian artists (Beke 1973b). As it turned out, in the end, Beke brought materials about a large number of Hungarian artists with him, arranged as a book which was placed in the exhibition. The work was shown at *t-5* under the fictitious group identity Anonymous Collective which was invented for this occasion (GSU 1973b). The cultural regime in Hungary at the time was far more repressive than in Yugoslavia and there were hardly any possibilities for Hungarian conceptual artists to show work. They resorted to private exhibitions in flats and studios, but even this was too much for the regime which forced many artists to emigrate (Unterkofler 2010, pp.5–7).

In Yugoslavia the cultural regime was far less centralised and there were big discrepancies in the way different artforms were regulated. According to Szombathy

artists could more or less do what they wanted but Tito and the party were sacrosanct (Szombathy 2011). Some of those groups from Vojvodina knowingly broke those taboos, they 'openly and publicly attacked the cultural and political establishment and even sent an open letter to the Yugoslav public in 1971, which they also sent directly to Tito' (Lukić & Pantelić 2005, p.19). The result was that 'between 1972 and 1974, the government was strongly antagonistic' towards the Novi Sad conceptual avant-garde (Carl 2005, p.27). Filmmakers experienced much stronger forms of cultural control since their art had much bigger audiences. *Black Wave* film maker Želimir Žilnik recalls that after 1971, "very unusual things started happening: banning, mass firing of editorial boards, banning films, where the situation deteriorated even further in 1972 and partly in 1973, when a number of people from the world of art were arrested and sentenced" (Žilnik 2005, quoted in New Media Center_kuda.org 2006, p.55).

Novi Sad artists Slavko Bogdanović and Miroslav Mandić got sentenced to prison terms for crimes in the name of art (Pantelić & Lukić op.cit., p. 19). Some artists went abroad, others moved sideways, towards 'invisible' artistic practices. From 1972 to 1977 Slobodan Tišma and Čedomir Drča met every day at a certain time to drink Coca Cola and Kvas, a popular Russian drink, in front of a local store on a public square (Ibid., p. 18). In 1971 OHO turned their backs on the art system by founding the Šempas Family, a spiritual agricultural community where working in the fields, meditation and making art became all part of one great art-and-life project.

Some of the conceptual artists who participated in *t-5* such as Dimitrijević became internationally successful, and their work has become part of the art canon. Yet some of the other conceptual artists from Yugoslavia vanished from public life and would have almost remained in obscurity if it were not for projects such as *Omitted History* by Kuda.org (2006). The projects of the Vojvodina conceptual avant-garde clearly show influences of NT. Those works can rightly be claimed for the pre-history of media art. The practices involved do not neatly fit into the categories of constructive art, computer art and conceptual art, and the way those categories are perceived today. A deeper engagement with the works and lives of artists such as Bosch+Bosch, KOD and OHO would lead to a substantial reassessment of the history of art, and in particular the balancing of viewpoint on East and West.

Symposium Match of Ideas



*Illustration 59: Symposium *The Rational and Irrational in Arts*, Hotel Esplanade, Zagreb (1973); photo MSU Zagreb*

No proceedings of the conference *The Rational and the Irrational in Visual Research* were ever published, but contributors were asked to send in their texts in advance and those texts were published as a collection of copied papers and made available at the conference. There exist audio recordings of the conference and a list of all the tapes (GSU 1973a). There is a big discrepancy between the large number of papers submitted and the much smaller number of people who actually gave talks.

The symposium happened on 2nd of June 1973 in the Grand Emerald hall of Esplanade Hotel as part of the 25th conference of AICA. The idea to have a *Match of Ideas* was not falling on fertile ground, not as far as a reviewer in the magazine of the Students' Center Gallery was concerned. 'Ideas do not box, they do not play football, they do not compete,' wrote the anonymous reviewer. The format of a 'match' did not allow a constructive dialogue, according to this reviewer. Abraham Moles, in the role

of moderator, was accused of 'persistence in not allowing a constructive discussion' and treating conceptual art as if it was a 'naughty, irrational, undisciplined child to whom a spanking must be dealt'. And the organisers were not spared critique either, accused of having 'lost all connection with current, open, experimental, vital arts developments' (Anon 1973b).



Illustration 60: László Lakner, The Spectator's School, after René Magritte, University of Economics, Budapest (1971); detail from Anonymous book, curated by László Beke (1973); Archive MSU Zagreb

The wording of that review was polemical but in essence the assessment was right. A big problem was that the announcement of the conference had associated 'rational' with Constructivist and computer art, and 'irrational' with conceptual art. The Hungarian art critic Laszlo Beke objected to this classification and said at the conference that he believed that "conceptual art's greatest achievement [was] that it performed a critique of art and created a metalanguage." Beke stated that art was

"about freedom, not only the freedom of the artists but also other members of society" and that art's task was to "directly address the consciousness of people, to demystify and to intervene." Such a critical role of art was "to provide alternatives for the world" and that this enjoyed a much higher priority "than solving problems of a merely aesthetic character." Such a definition of the role of art was not "irrational" argued Beke, but "the kind of rationality the world needed" (Beke 1973a).

Želimir Košćević also complained about the association of conceptual art with irrationality and asked for a critical attitude as a way of instituting change (Košćević 1973). Nena Dimitrijević argued, like Beke and Košćević, that the debate was founded on completely wrong premises. She also criticised that computer art was not conceptualised in any interesting way at this symposium (N. Dimitrijević 1973b). Artists doing constructive research were hardly present at the conference, and the computer artists who were there did not respond to this notion of a critical meta-reflection of the role of art. The Brazilian artist Waldemar Cordeiro accused computer artists of being conservative because they only discussed how an algorithm could be written to produce an image, and did not consider the wider implications of computers and images in a modern media world (Cordeiro 1973).

Art in the Informational Paradigm

In the catalogue of *t-5* Susovski explained that in conceptual art the artwork 'no longer carries a theme: primary importance is given to the idea or to the design itself' (Susovski 1973). For this, as Susovski called it, post-object, or post-visual view only the 'formation of the idea' counted, 'while the actual technical elaboration has been set aside and the imaginary conceptual realization is achieved by the receiver of the message' (Ibid.). Conceptual art, as Susovski wrote, 're-examines itself, and through such meta-linguistic investigation it explores art itself' (Ibid.). 'By passing from the purely visual aspects of the work to the mental aspects,' argued Susovski, 'conceptual art has set out to play among other roles the role of an *art theory*.' Susovski also claimed that conceptual art allowed the viewer to participate in its creation, not just its realisation, and that the key concern was involvement on this level of the idea - the 'idea can further develop in the consciousness of its receiver on the basis of his earlier experience, memories, imagination and his own intellectual capabilities' (Ibid.).

For Lucy Lippard, conceptual art meant, 'work in which the idea is paramount and the material form secondary, lightweight, ephemeral, cheap, unpretentious and/or "dematerialised"' (1973, p.vii). Alexander Alberro contested the dematerialisation thesis, showing that the artists on whom it was built were engaged in 'persistent experimentation with novel methods and materials coupled with an unprecedented careerism' (Alberro 2004, p.1). According to Alberro 'the idea that the political economy of conceptual art sought to eliminate the commodity status of the art object, while highly provocative, is mythical' (Ibid., p. 3).

Many of the conceptual artists showing work in *Software* worked with Seth Siegelaub, a highly active person who switched from running a gallery to becoming something like a chief publicist and virtual agency of conceptual art. Siegelaub found ways of satisfying a 'collector's desire to own an authentic art object' by inventing ways of how to transfer ownership simply through the signature of the artist, or a 'certificate of ownership' (Ibid., p. 4). Daniela Plewe has characterised such artforms as 'Transactional Art' because the transaction, the deal-making becomes the

condensed content of the work. According to Plewe, Duchamp was the arch-transactional artist (Plewe 2010).

Sabeth Buchmann (2006) made clear the important link between *Software*, conceptual art and the paradigmatic change from Fordism to informational capitalism. *Software* needed to be understood in the context of the transition from the Fordist assembly line to a new mode of production which required new characteristics such as 'flexibility, mobility, just-in-time production' (Buchmann 2006, p. 57).

Alberro and Buchmann are both quoting Negri and Hardt's *Empire* (2001) to underpin their conclusion that conceptual artists were among the first to invent and rehearse the new skill sets necessary in the informational economy (Alberro 2004, p. 3; Buchmann 2006, p. 59). As Alberro points out, this was not cynical but a result of 'the inherently contradictory nature of this art movement - in which the egalitarian pursuit of publicness and the emancipation from traditional forms of artistic value were as definitive as the fusion of the artwork with advertising and display' (Ibid., p. 5). Benjamin Buchloh's earlier findings back up Alberro's viewpoint that conceptual art, despite its critical intentions, inevitably ended up miming 'the operating logic of late capitalism and its positivist instrumentality' (Buchloh 1990, p.144).

The analyses of Shanken, Fritz, Buchmann and Alberro converge on one point: that there is an affinity between paradigm change from Fordism to informational capitalism and the tendency towards dematerialisation in art. Can those artforms shown at *t-5* – constructive art, computer art and conceptual art – be viewed as articulations of paradigm change? And is there some intrinsic relationship between the economy starting to become being based on information and the dematerialisation of art? The three art forms shown at *t-5* each, in a different way, emphasised the process of artistic creation as the making of a set of rules. The ways how those artforms articulated the relationship between concept and execution, between an algorithm and its materialisation, or a set of rules and their implementation, always implied qualitative and political differences in the relationship between manual and mental labour.

All those strands came together in Frieder Nake's text 'The Separation of Head and Hand in Computer Art' (1973) submitted to *t-5* but not publicly read. The text built on Sohn-Rethel's analysis of the philosophical consequences of the separation of manual and intellectual labour (see my Introduction, pp. 36-7). Nake wrote that since it is all too easily recognised that 'reason' is made to work for capital, 'it was easy for artists, art critics and other petit bourgeois to denounce it and praise the irrational. They did and do so with the strong subjective conviction that they are contributing to the fight against the total control of life by capital' (Nake 1973, p. 2). Nake argued that the kinetic artist, while separating planning from execution, was still in full personal control of the production process. Some artists who were particularly successful, such as Vasarely, had to employ people to comply with demand. Thus, Vasarely 'became something like a white collar manager of a small factory' (pp. 4-5).

In computer art, Nake claimed, the separation of hand and head became complete. The artist was only occupied with intellectual labour while the manual part was replaced by the machine (pp. 6-7). In the previous chapter on *t-4* I have shown that this idea was based on the fetishisation of intellectual labour. The social relations involved in the production of those machines which then 'automatically' produced commodities or artworks are relegated to a machinic unconscious. The conceptual artist was not interested in the physical manifestation of the work at all. 'He sells an idea as an advertisement of his own labour power, because he does not own the means of production,' was Nake's interpretation (pp. 8-9). Nake concluded that in all those art forms we saw 'the appearance of the economic laws governing the capitalist way of production. [...] My conclusion is that we will be able to understand the development of art in general, and computer art in particular, only if we come to see this development as a special case of general principles of capitalism' (p. 11).

But what are those 'general principles of capitalism'? In order to investigate the dematerialisation tendencies of art we need to return to historical narrative to look at the transformation towards the new informational techno-economic paradigm in more concrete terms. Otherwise, there is the danger that this thesis also becomes just one more affirmation of capitalism's tendency towards the fetishisation of immaterial labour to the detriment of real living labour.

As the oil crisis of 1973 struck, the 1970s turned into the permanent crisis decade. The postwar order was shaken up and a profound transformation began. At the beginning of the 1970s the development of the informational paradigm started to accelerate. The Big Bang for informational capitalism was, according to Carlota Perez, the production of the microprocessor (see my Introduction, p. 28). David Harvey (1989; 2005) has pointed to the fact that at the beginning of this transformation stood the crisis of the monetarian world order, the breaking-up of the Bretton Woods system and a changing of the rules which enabled the return of financial speculation. In 1971 US president Nixon suspended Dollar-Gold convertibility, in 1973 this move was made permanent. As Harvey has argued, the new postmodern cultural logic started to take off in 1973 at exactly the same time as fixed exchange rates were abolished (Harvey 1989, fig.2.5).

As the first steps towards a neoliberal political economy were made, mass production of microprocessors began, and capital intensified the export of industrial labour to poor countries (Froebel et al. 1980). At this very point in time, in 1971, Toni Negri recognised that Marx' prediction of the 'general intellect' was fulfilling itself and, in the process, the Keynesian-Fordist 'Planner State' became untenable (Negri 1988).

In *Grundrisse*, Marx (1993) had argued that once science and technology were brought to bear on production in an organised and systemic manner, that once knowledge became the main factor of production, the 'surplus labour of the mass ceases to be the condition for the development of general wealth;' and 'labour time ceases to be the measure of value' (Ibid., p. 705). In Marx's view, science and technology make possible the reduction of necessary labour time to a minimum. This opens in principle the possibility of a utopian society where the development of the free individual in arts and sciences becomes the main goal (p. 706). Yet capitalism tries to maintain the social relations of old - the system by which people are paid for labour time - although it created 'the material conditions to blow this foundation sky-high' (Ibid.).

The autonomous Marxists such as Negri, Hardt, Virno and Maurizio Lazzarato have drawn important consequences from this fragment for the understanding of informational capitalism. Marx had already glimpsed the 'affinity between the pianist

and the waiter,' explains Paolo Virno. Both were 'virtuosi,' performers of a skill rather than producers of a good. According to Virno, in informational capitalism virtuosity became a 'general mark of the time' (2006, p.195). Under the new conditions created by informational capitalism, artists are not so much creators of works but performers of creativity, producers of constant flows of creative acts. The virtuosity of the artists becomes now, in informational capitalism, a requirement for all workers who perform 'immaterial labour' (Lazzarato 1996; 2006). In a long transformation that began in the early 1970s, work became defined as 'the capacity to activate and manage productive cooperation' argues Lazzarato. Thus, while on one hand work gets liberated from the factory discipline of old, and the dichotomy between manual and mental labour gets dissolved, it gets 'reimposed through political command' (Ibid., p. 134).

Those general social developments became visible to the avant-garde of political writers exactly at the time of *t-5*. Workers started the 'exodus' from the factory and the factory regime as such, they left behind the whole mentality of industrial labour (Virno op.cit, p. 193). Or, and that's the other side of the coin, they were made to exit, either because of investments into increased automation, or because new information and communication technologies allowed coordination of production on a global scale so that a *New International Division of Labour* (Froebel et al. 1980) developed. The development of computers and telecommunications since the 1970s conspired to allow automation to reach ever higher levels and enter into ever new domains to create a *Jobless Future* (Aronowitz & DiFazio 2010) in the rich countries.

Thus, while it is right to say that conceptual art invented a new role for the artist as immaterial worker, those theories of immaterial labour insufficiently address the dark side of informational capitalism, such as the destruction of jobs, or their relocation to poor countries under conditions of increased exploitation. Any one sided theoretical emphasis on immaterial labour ideologically comes to the aid of capital since it excludes from view, and thereby discriminates against, manual labour and other forms of non-immaterial labour which remain necessary.

The neo-liberal counter-offensive which began in the early 1970s led, in the long run, to the establishment of informational capitalism in the 1990s. Nothing exemplifies

this historical turn better than the fate of the so-called Opsroom. This was a management centre for the whole of the national economy of Chile under its Socialist president Salvador Allende. It was conceived by British management theorist and cyberneticist Stafford Beer and an international design team amongst whom was HfG Ulm's Gui Bonsiepe. The project, developed and implemented in 1972-73 tried to combine cybernetics in the service of a Socialist national economy with the most advanced approaches in visual communication. The Opsroom, located in the government palace in Santiago, was destroyed by one of the first bombs dropped when a putsch by Augusto Pinochet, supported by Henry Kissinger and the CIA, began on 11th of September 1973. Afterwards, the Chicago Boys moved in, a team of neoliberal economists led by Milton Friedman who made Chile a test-case for a completely privatised neo-liberal economy (Bonsiepe 2009a). Not everywhere did the new general dynamics of development take on such a violent form, yet the broad movement led to a direction which undermined the possibilities of a progressive socialist humanism.

Ignoring the verdict of the time that *t-5* was a 'failure,' the facts that were established show that *t-5* was a major event whose art historical significance was that it brought together constructive, computer and conceptual art at exactly this historical juncture. In the early 1970s the shape of post-industrial society started to become visible for the most anticipatory forces in society. *T-5* brought those artforms into an interplay with each other which produced different visual models of the new emerging paradigm. *T-5* helped to illustrate - in a non-trivial sense - the new paradigmatic ways of thinking and being. The art of the first phase of NT had invented an information aesthetics without computers and rehearsed a new participatory relationship with environments that started becoming responsive. Computer art used the tools of informational capitalism to make art; and conceptual art invented a new role for the artist as immaterial worker.

NT made another effort in 1977/78 to organise *tendencias 6 (t-6)*. Initially the idea was to organise a big exhibition and conference on the theme of *Art and Society* in 1977. It seems that preparations were at an advanced stage but in the end many of the people invited could not or did not want to come to Zagreb in October 1977. The materials available in the archive on *Art and Society* show that it was another

ambitious attempt at addressing questions about the relationships between art, technology, and social change through an exhibition and symposium. In autumn of 1978 the symposium was held in Zagreb, but no exhibition. It can thus be legitimately said that, for the purpose of this thesis, NT ended in 1973.

Conclusion

Each of the five main manifestations of NT – the exhibitions and symposia held from 1961 to 1973 – was a distinct effort to articulate an adequate curatorial and artistic response to the challenges of the time. In accordance with my chosen method (as outlined in my Introduction, pp. 31-3), the findings of this research are not abstract and ahistorical, but arise from this relationship of the evolution of NT with the overall historical development.

Drawing on the method of historical and dialectical materialism in an undogmatic way, facts about NT gleaned from archives, catalogues, images, recordings, bulletins and letters were set into relation with the overall cultural, political and economic developments of the time. Published sources were combined with new material from a range of archives – most of all MSU, Zagreb –, to throw light on visual research.

The research has brought into play a range of disciplines – art, art history, science studies, political science and history, economics, psychology and computing – not in an arbitrary way, but as a logical consequence of the chosen method. The decision to use exhibitions as sites of research, and map out their relationships with a wider socio-historic framework, has provided new insights into the potentials and possibilities of progressive practices in media art.

NT was progressive in how its politically informed ideas on the role of art necessitated formal innovation. In a first phase from 1961 to 1965 NT tried to overcome the notion of art by defining it as visual research. Research was carried out as an experimental practice whose immediate result were the artworks (and not secondary works such as research papers). The participation of the viewer became a central concern. A new relation between author, work and viewer was created, whereby the content of the work was defined through this relation. Jack Burnham has called this an aesthetics of the relational field. During this first phase NT saw itself as a movement. It organised itself as a network and constituted a neo-avant-garde (see Chapters 1 - 3).

The second phase of NT in 1968-69 turned first to the computer as a means of carrying out visual research, and then also opened up to conceptual art in 1973. By that time it did not exist as a movement anymore. The new people who came to show work made with the new medium computer were often not artists but scientists or engineers. GSU in Zagreb was the organisational headquarter which provided continuity. Curators directly employed by GSU, and a circle of people working with it, still carried on with a vision. They sought to create connections between the legacy of the first phase of NT with first computer art, then conceptual art. The exact nature of those connections was not formulated in great detail, but the fact that the connections were thought to be important was made explicit in the setting of themes and curatorial choices.

Behind that engagement stood leftist ideas – broadly speaking a liberal socialist humanism similar to the spectrum offered by *Praxis* journal – and the idea that contemporary artistic practice needed to engage with the latest technologies as part of an emancipatory social project. While it would be problematic to apply the term Socialist Modernism to NT, it had something to do with both; socialist currents in political thought and artistic modernism. NT was driven by leftist ideas about civilizational development through the combination of arts, sciences, technology and related disciplines, ideas that go back to Saint-Simon and Constructivism. NT was trying to realise those ideas in Yugoslavia, a peripheral nation involved in a catch-up process of modernisation. Already since the mid-1960s, more visibly after '68 and quite openly after 1974, this modernisation process encountered problems and then stalled. NT's own modernisation impulse was thus increasingly running against the tide.

The events of '68, and the subsequent ideological developments, made it increasingly difficult to share NT's understanding of progressive practices. The social imaginary of '68 produced new subjectivities with a new outlook. The new art forms most directly responding to these new attitudes were called the 'New Art' which was largely synonymous with 'conceptual art.' '68 marks also the intensification of a deeper transformation of societies, a paradigm shift from Fordism to informational capitalism. Alongside that transformation neoliberalism became the dominant

ideology. These developments together undermined the social base and political context for an emancipatory project involving art and technology. The possibilities for progressive and socially engaged media art practices were shrinking while its potential, theoretically, remained intact but became ever more utopian.

Formal Innovation, Political Motivation

When NT appeared in 1961 it did not just propose a new style in painting and/or sculpture, but formulated a new idea for the role of art in society. NT objected to the notion of the artist who created out of the depth of individual genius. The political motivation was summed up in the phrase the 'ethics of a collective life' (see above, p. 66). This went in two directions, meaning collective creation – working in groups and exchanging ideas, knowledge and processes –, and also working *for* the collective, for the greater social good, for a broad range of people of all classes, genders and backgrounds rather than privileged art connoisseurs. The role of the artist was defined as that of a visual researcher who made a contribution to the collective infrastructure of visual perception.

Objectification of the Creative Process

Visual research implied that artists tried to define the creative process as precisely as possible. The artist defined a set of rules or steps to be taken which were then carried out without any further spontaneous intervention.

Earlier abstract avant-gardes had resolved the dichotomy of form and function by eliminating any reference to the external world and making pure form the content of the work. Yet the arrangement of those forms was still an intuitive decision taken by the artist, and the abstract geometrical forms themselves became charged with meanings. The works of NT were deliberately based on the most anonymous elements which in themselves had little or no aesthetic appeal. The task was how-to define a way of organising these elements that made it interesting. The dichotomy of form and function became resolved in a new way as a relationship between an organising principle and visual structure; or between code and its materialisation.

The organising principle or 'rules of play' could also be defined as an algorithm. In that sense, NT's poetics provided an analogy with software. That analogy, however, needs to be treated with caution. This research has looked at the relationship between manual and immaterial labour as a principle which underpins the class structure of capitalism and which also reproduces itself on the level of art and ideology. A key criterion is how an artform expresses this relationship within its own practice.

The desire for objectification of the creative process followed logically from NT's political persuasions. Objectification was not meant as in objectively true but as in intersubjectively verifiable. The viewer, the public, the critics should be able to establish a relationship between what they saw and the algorithm behind its production.

The art of NT intrinsically suggested a new relationship between the work and the viewer. The artistic value of works was not the result of self-contained form, but only realised itself through the relationship with the viewer. Chapter 1 contains a typology of ways how works relate to viewers, from paintings to objects and environments (pp. 71-73).

Information Aesthetics

Behind the objectification of the creative process stood NT's desire for the final demystification of art (Chapter 2, pp. 92-98). Morellet expected 'a revolution in art as great as the revolution in science.' A key subject of the first phase of NT was the grid, which according to Krauss, is the ultimate modern artistic device. As it excludes myth from art, it opens art to the myth of science. NT's specific types of grids, however, can also be read as an anticipation of the electronic grid of the net. According to Michel Serres, the only pure myth is the myth of science devoid of any myth (Serres 1974 quoted in Latour 1993, p.93).

The objectification of the rules of play also pointed to the possibility of a new type of art criticism which would be based on objective criteria. Theorists Max Bense and

Abraham Moles thought that with a combination of information theory, mathematical statistics and social sciences, the content of an artwork, its 'aesthetic measure' (Bense) or 'measure of originality' (Moles) could be established objectively, or rather, with the precision of natural science. They called this 'information aesthetics.'

Although Moles and Bense influenced artists involved in NT and vice versa, the term information aesthetics can also be used more freely and in a more metaphorical sense not intended by Bense and Moles. Working without computers, in the early 1960s the art of NT explored basic structural and combinatorial possibilities of an algorithmic art, a minimalistic visual structuralism which has since become a widespread digital aesthetics. NT anticipated both the aesthetics and basic modal forms of the current paradigm, of informational capitalism.

Art as Visual Research

NT conducted visual research within a slightly utopian framework. The involvement with the optical phenomena of Gestalt psychology had a political background. For NT, the highest political engagement was at the level of a human universalism as a species being. In accordance with Gestalt psychology it was recognised that seeing was inextricably linked with knowing, with memory and interpretation. An engagement on the structural level of the processes of perception could potentially bring new insights. There was a didactic idea behind this. By making people sensitive to new ways of seeing, they would also gain new understandings of the world and themselves.

NT's involvement with perception on an infrastructural level created 'unforeseeable potentials of new knowledge' (see Chapter 3, p. 156). Waldemar Cordeiro, in a critique which was more widely shared by others, complained that NT reduced the viewer to a retina. Yet the modernistic emancipatory idealism of NT made it indispensable to operate on such an infrastructural level. NT did not deny viewers' subjectivity, but, in today's terms, opened new horizons for the self-empowerment of the multitude.

The multitude is an important concept for autonomous Marxists since it allows for the conception of a new social subject beyond class, civil society or the state. Virno related the creativity of the multitude as productive workers to their species-being, as the capability to partake in the commons of language (2004; 2006). NT was working on the level of a visual commons, trying to find through practical research new visual relations and constellations in which new knowledge was embedded. The art of NT can thus be seen as an investment in the *visual commons*, trying to enrich the perceptual and cognitive capacities of the multitude.

Arte Programmata

In 1962, an exhibition of NT artists in the showrooms of electronics and office equipment company Olivetti introduced the term 'arte programmata.' Umberto Eco explained the programmed artwork as one that was not completely controlled by the artist but oscillated between randomness and order, between chance and determination. The meaning of the work did not consist of a pre-conceived message, but in a situation between work and viewer where some of the components had been defined by the artist while others emerged from interactions with the viewer. This temporal relation was part and parcel of a belief in the emancipatory potential of those artworks to counter alienation.

At the same time, activist political researchers infiltrated Olivetti to pioneer a form of sociological research they called 'conricerca' (co-research). In a near-miss of art and political history, two different forms of social engagement played themselves out. The artists of NT defined themselves as cultural workers who devised objects through which viewers - other producers, a non-specialist audience - would become aware of their situation and activated. Yet this activation was to be the indirect result of formally innovative artworks which facilitated a participatory situation. The activists who carried out co-research at the factory gates of Olivetti wanted a more direct form of political activism. Through their research they aimed at finding out the weak spots of the Olivetti regime, and then making workers to organise themselves.

The two projects' trajectories did however remain connected. The activist researchers started the seed of what would later become an oppositional movement and theoretical strand called 'operaismo' (workerism). In 1969, workerists almost managed to link student protests with the concerns of workers which would have created a truly revolutionary situation in Italy. In the early 1970s, Toni Negri, a leading activist-theorist of workerism, analysed the crisis of Keynesian-Fordism and drew important conclusions which were foundational for workerist theories about new forms of work and political subjectivities in informational capitalism in the 1990s and 2000s. Both groups, the workerists and NT, anticipated key aspects of informational capitalism.

Art and the Techno-economic Paradigm

In the early 1960s the art of NT related to the industrial paradigm of automation through the notion of participation, and through its structuralist visual aesthetics. The art of NT created different models which incorporated basic properties of the structure of interactions in environments shaped by automation and cybernation. Each artwork was an *exercise in participation* which explored a different structure of engagement. There existed formal analogies between the type of interaction with the artwork and interactive situations in the world. NT experimented with participation when societies were increasingly understood as cybernetic control loops.

The works also provided examples of an information aesthetics without computers. The aesthetics of NT offered the viewer a way of adapting to the environment. The works spoke a 'cool' language through their patterns and their material aesthetics. This line of thought goes back to Moholy-Nagy, Giedion and Kepes and a discourse on art's role in restoring a 'dynamic equilibrium' (see Chapter 1. p. 58). That discourse deplored how the rapid progress of the forces of production was not matched by an equally rapid advance of art and culture. The role of artists and designers was to bring order to a world shaped by anarchic market forces and high-technology. At the same time the works were a symbol of a future society which, through the help of advanced information technologies and art, would be more well

organised and more humane because of its higher degree of scientific organisation.

Like the political activists with whom they crossed paths in 1962, the art of NT had long-term consequences in that it invented some of the basic modes of participatory works. Its aesthetics, although working without computers, explored the possibilities of mathematically definable structures for a permutational and generative aesthetics. NT provided possibilities both for better adaptation to the environment, and for a transgression of its political limitations. It contained elements of a transgressive avant-garde and of a modernist reformist art.

The type of order envisaged by NT was not identical with interwar functionalism. It had already taken on board new images of the world shaped by new insights in the foundations of matter. It was an image of the world in which indeterminacy, instability, chaos and probability were already structurally integrated. In other words, a worldview arrived at after quantum physics. It achieved equilibrium on a higher level than functionalism had been capable of, having passed through Dada, Surrealism, the gestural and the expressiveness of 1950s painting.

The aesthetics of this early phase of NT has – after a lull in the 1980s and 1990s – re-emerged in the 2000s, and has become a new hyper-modernistic computer-designed aesthetics which can be found in many public buildings which form the urban infrastructure.

The progressive aesthetics of NT has been recuperated by neoliberal capitalism. Leftwing artists and critics, some from their own midst such as Massironi, foresaw by the mid-1960s that recuperation was a strong possibility (see Chapter 3, pp. 131-35). The 'unforeseeable potentials of new knowledge' can always be captured and fed back into the valorisation cycle of capital.

Tracing NT, Un-curating a Movement

The first exhibition in Zagreb in 1961 served as a medium for the emergence of the movement NT. It cannot be said that the curators consciously created a movement,

this was rather an unintended consequence of their action. The conservatism of the Biennale of Venice in 1960 motivated them to show that there was something new in the studios and storefront galleries of young artists.

In Chapter 1 I have highlighted the reasons why the birth of NT, the movement, could only have happened in Zagreb at the time. Key conditions were Yugoslavia's independence from the Soviet bloc, the absence of close political control of art, and the existence of certain pre-dispositions to Constructivism.

After NT had discovered itself as a movement, it actively tried to define its terminology and working agenda. The struggle for coherence and the development of a language of art as visual research was characteristic of the phase from 1961 to 1963. The exhibitions with Olivetti gave the movement further public exposure and impetus. The movement has also been retrospectively described as a network by Fritz (2009a). A large number of people made a significant investment into building cooperations without any visible hierarchical structure. GSU in Zagreb provided an organisational infrastructure, a hub for information and people. Its main tool was the pre-electronic office, processing letters, making carbon copies, administrating the movement of people and materials.

GSU acted as a clearing house for communications. Its method was one of curation by committee. Everything needed to be transparent. Therefore GSU was profligate in the production of forms and circular letters. Artists had to fill out forms which were then checked and signed by at least three curators each, and yet the office of GSU was not just a mechanistic organisational machine: individuals contributed their contact networks, language skills, their ability of judgement; and they acted as agents in networks, often without direct financial reward, weaving together people, artworks, and institutions.

NT's internal development peaked at *NT2* in 1963. Then it struggled for greater cohesion by excluding artists and formulating written rules. But NT's 'Breton Moment' (Chapter 2, pp. 126-130) backfired. Social ties and networks of trust were undermined. After 1963 NT was quickly absorbed by the art market, but only on the level of its most superficial characteristics. As NT was associated with labels such as

kinetic and Op Art, the entire socially progressive agenda behind it was relegated. Because NT had failed to form a cohesive international movement, it was incapable of getting its message across and thus withstand the subversive influence of market forces.

The chosen theme and method of organisation for *NT3* in 1965 was an attempt to rescue the spirit and content of the movement. The name was changed from the plural to the singular *New Tendency* to signal conceptual cohesion. The theme *Divulgence of Visual Research* implied that there were results of visual research which only waited to be disseminated. Yet the competition organised by Enzo Mari under that title was a failure. The question how best to disseminate visual research already implied an answer: by producing limited editions of multiples. *NT3* was the apogee of NT as a movement. It raised the question of the relation of visual research to mass production, but failed to find good answers.

By the mid 1960s it became clear that utopian ideas about a new society had not materialised. Instead, consumer capitalism consolidated itself. The symposium in Brezovica in 1965 revealed that NT was lacking adequate structures to carry out its programme of art as visual research. This definition of art would have needed institutional backing which allowed systematic research without producing for the art market. Such institutions did not exist at the time.

NT countered the crisis by launching a new offensive under the title *Computers and Visual Research* in 1968-69. The people working at, and with, GSU in Zagreb attempted to link the organisation of an exhibition, a conference and a competition with the launch of an international research network on computers and visual research. Contact with Zagreb-based research institutes in the natural sciences were made and NT tried to organise computer time for artists. The journal *Bit International* was founded and dedicated itself to topics such as computer art, information theory and information aesthetics, the design approach of HfG Ulm, typographical poetry, media theory, and television and video art. The exhibitions and conferences held in Zagreb between 1968 and 1969 on the topic of computers and visual research were conducted on an uncompromisingly high intellectual level and avoided the concessions to an 'intellectual fun fair' made at *CS* (1968) held at the

same time in London.

T-4 in 1968/69 was together with *CS* one of the first major international exhibitions of computer art. Yet at the time NT was not a movement any more. On the contrary, former participants of the movement represented by Alberto Biasi complained about the uncritical approach to high-tech. The global social protest movement of '68 saw high-tech in general, and the computer in particular, as tools of repression. Yet Zagreb held a colloquium on computers and visual research as if nothing had happened. In the conferences and publications a critical attitude towards the role of the computer in society was largely absent. In the exhibition, it was mostly computer graphics that were presented.

As shown in Chapter 4, these graphics presented at *t-4* and *CS*, which have since become icons of computer art, need to be seen as part of a powerful discourse whose main purpose was making computers more socially acceptable. This happened at the very moment when the computerisation of society changed from being a hidden, almost secret, process to one becoming more publicly visible. US based corporations which belonged to the military-industrial-research complex – places such as Bell Labs and Boeing – employed engineers and creative practitioners who produced the most advanced computer generated images of the time. The jury of the competition *Computers and Visual Research* at *t-4* in May 1969 awarded them first and second prize. The jury found itself incapable of distinguishing between results of corporate research and works of art.

Those award winning works pushed forward a very specific narrative about computers as creative tools which could produce results equal to or even better than those of humans. Through fetishised thinking the computer became equipped with the characteristics of a person, an artist. As the computer mastered the production of art, the domination of manual through mental labour supposedly became complete. The computer theoretically took the separation of intellectual and manual labour to its conclusion, yet in practice this remains part of the foundational myth of informational capitalism.

My research has highlighted the gaps between the ideological narrative of a purely algorithmic art and reality. The computer was seen as the embodiment of the myth of complete rational control, and of optimistic assumptions about formulating ever more areas of human activity by algorithms. Behind that 'dream' actually stood the mutual interest of high-ranking military chiefs, corporate managers and ambitious scientists at institutes like MIT. Their interest drove the development of computer technology into the direction of ever higher levels of generalisation and abstraction. The computer as the embodiment of the ultimate control fantasy carried the dream of the perfectly rationally organised cybernetic society.

The instrumentalisation of art only contributed to the mystification of real social relations. As the social relations involved in the production of the computer and of software were rarely addressed openly in *t-4*, and even less so at other events such as *CS*, they became part of a repressed, a 'machinic unconscious' (see Chapter 4, pp. 207-211). A potential criterion for the progressive nature of a media art work could be how far it adds to the machinic unconscious; if it creates more mystifications or if it clarifies, informs and creates potentials for further emancipatory processes.

I have highlighted a number of artists whose work was present at *t-4* and which would have presented itself as an alternative to the genre of computer graphics. The potential for a possible different path for computer art was not recognised. The main focus of attention was directed at the potential overlap between the rules of play in constructive art of the first phase of *NT* and the visual structures created by computer.

Although *t-4* was successful with over 200 international participants at the symposium and 10.000 exhibition visitors, the international research network on computers and visual research which organisers had had in mind, failed to materialise. The follow up event *Art and Computers* in 1971 was also dedicated to computer graphics. The conference was chaired again by Abraham Moles who had a distinctly technocratic vision of computer art.

In 1973 *GSU* made another attempt at making a large scale exhibition and conference, one which would define the moment by bringing together visual

research, computer art and conceptual art. The organisers were convinced that these three art forms had something to say to each other, but the conference failed to produce a productive dialogue. The format of the conference as a 'match of ideas' and the unfortunate title *The Rational and Irrational in Art*, prevented such a discussion from happening. Conceptual artists and curators rightly complained that their artform was no less 'rational', but that their rationality was directed at a critical analysis of the role of art in society.

Conceptual art drove the separation between manual and mental labour even further than constructive and computer art, since it was claimed that the material realisation of the work was not important, only the idea mattered (Chapter 5, p. 236-240). The tendency towards the dematerialisation of the artwork was originally understood as a critique of its commodification. Recent scholarship has understood conceptual art as the rehearsal for new forms of immaterial labour. The artists invented a new role for themselves which would become a significant type of labour for much larger social groups, and not just artists, in the paradigm of informational capitalism since the 1990s.

The push for the dematerialisation of artwork occurred at the period when the transition from Fordism to neoliberal informational capitalism got under way in the late 1960s, early 1970s. While it is right to make such a connection between an epochal transformation and its anticipation in the arts, the thesis of immaterial labour in informational capitalism needs modification. Any one-sided preference for immaterial labour is always an ideological affirmation of the given class structure in capitalism.

T-5 was an important exhibition because it brought together three artforms of great significance for their time, constructive art, computer art and conceptual art. Although it failed to establish a dialogue between those artforms, their real correspondences await further evaluation.

Extro

Each of the five main exhibitions and adjoining events such as conferences served as

a container to make visible the motivations of artists and curators in producing a new type of art. The first phase of NT had a desire to merge art and life in the manner of the Constructivist avant-gardes but in a technologically and ideologically upgraded way. Through visual research, the basic patterns should be identified which could then be applied in the shape of objects, in design or on an architectural scale. After the movement broke apart, a loose affiliation of people working with and around GSU continued to try and redefine an adequate role for art under changing conditions. While '68 marked the social limits of a one-dimensionally understood modernisation, science and technology kept progressing at a stepped-up pace, and curators recognised the rise of a 'technetronic' age.

Curators continued making exhibitions as a collective effort and tried to find an adequate role for art under these conditions, emphasising computer art and visual poetry. The curators always tried to make much more than just an exhibition. They aimed at raising a discourse, launching international collaborations and research networks, and changing the world through art. The Constructivist legacy however, of working with the latest tools in art to construct a new society increasingly became an uphill battle as the possibilities for such a utopian society became ever more remote. The crushing of the Prague Spring in 1968, and the backlash against progressive forces in Yugoslavia in the early 1970s, de-legitimised not only Soviet-style Communism, but also undermined the Yugoslav path to socialism.

The example of NT has shown that there are limits to a progressive new media practice. Any practice or movement can only be as progressive as the society in which it acts allows it to be. As Frederic Jameson wrote, 'a truly new culture could only emerge through the collective struggle to create a new social system' (1991, p.xii).

The distilled findings of this research are that while the fetishisation of technologies should be avoided, so should be any totalising critique of it. The possibility of progressive practices lies in a critique from within, by taking and using those technologies, with their emancipatory potential firmly in mind. Such a practice would try to pull the machinic unconscious into the open and expose it to the searchlights of public argument. This work would carry on with the demystification

of art, but without turning to a new myth such as science or technology.

But most importantly, a progressive media art practice cannot be stuck in false dichotomies. The idea of universal emancipation is not in any way in opposition to the interests of minoritarian or repressed groups. Societies need to be capable of saying 'we' without that 'we' expressing only the particular interests of the dominant class. A 'we' word needs to be discovered which does not gloss over difference but offers solidarity between people of different backgrounds, in a progressively understood internationalism and universalism.

APPENDIX A: The Exhibition Waves (2006; 2008)



Introduction

This Appendix A presents the *Waves* exhibitions which form one major part of my practical work in the context of my PhD.

The exhibition *Waves* was conceived as part of a long term research project with the aim of developing a bottom-up materialist theory of media art.

The exhibition was designed to test the thesis that analogue and electromagnetic waves are 'a principle material of media art' and that making an exhibition on that theme will produce new knowledge in the field of media art.

History and Context of Waves

One starting point for making *Waves* was that waves are 'fundamentals' for any activity that falls into the field of media art. Every artist who works in media art needs to consider and know about waves. They constitute a material layer without which media art is impossible because analogue and electromagnetic waves are always involved, either as sound (modulations of air waves which can be received by the ear drum), light (electromagnetic waves in the TerraHertz range) and electronic signals (em waves modulated by electronic components in analogue devices or computers).

It is one of the paradoxes of bourgeois society that while it values technology highly as means of production it wants its art free from it, or rather, if art depends on technics, this fact has to be carefully concealed (cf. Huyssen 1980, p. 159). The most bourgeois art forms, opera and theatre, nowadays use the most high-tech production machinery. In those productions, however, technology is denied any agency (as defined by Actor-Network-Theory).

In a similar way, radio and television have been the two most influential mass media of 20th century. Yet while they are entirely based on electromagnetic waves, the waves as such have been excluded from the discourse. EM waves are used as transport medium but are not allowed to come to the surface.

Waves reversed this tendency. Rather than focusing on the content of the signal, it presented artists working with electromagnetism as a material.

The exhibition *Waves* looked behind the screens to build a new theory of media art, as a first step of what was imagined as a long term research project *Waves, Code and Voices*. *Code* was considered another fundamental of media art, while *Voices* addressed the issues of voice and representation.

To investigate *Code* I had started a research project into the motivations and ways of working and thinking of free and open source software programmers. To investigate *Voices* I carried out the public art projects *Hidden Histories / Street Radio*, Southampton (2008) in collaboration with Hive Networks (see APPENDIX B).

While I have not given up on *Waves, Code and Voices*, the possibility of bringing everything together under the roof of one theory seemed increasingly remote. This means that I am going to pursue those ideas and projects individually.

Steps Leading to *Waves* Exhibitions

The interest in electromagnetism has a deep background in my work, from my earliest works in radio art in the 1980s to the present. An important more recent step has been the book *Freie Netze (Free Networks)* (2003), a book on wireless free community networks such as Consume, London.

Wireless Free Community Networks are networks built and maintained by their users using free software and often donated or cheap hardware. While there are substantial differences between wireless community networks which exist now literally all over the world, the London based networks Consume and Free2Air were socially and intellectually close to media art. I have explored this connection in writing, as a curator and activist in various smaller projects in the first half of the 2000s.

In 2004 I wrote a text on 'Not Just Another Wireless Utopia' for a reader on media art edited by Marina Grcinic (2004). This text gave me the opportunity to reflect more deeply and in a historic perspective on wireless networks and art. Out of this reflection process emerged the concept of *Waves*.

At a workshop in Riga organised by Riga Centre for New media Culture - RIXC, preliminary ideas were discussed. RIXC organised an excursion to the Irbene radio telescope, an abandoned Soviet listening station built during the Cold War. In 2001 RIXC had organised art projects using recordings and live signals from the largest remaining telescope.

In December 2005 a further meeting took place in Riga where the project was discussed and took concrete shape. .

In August 2006 *Waves* was opened at Arsenal, Riga's exhibition centre for contemporary art.

This exhibition coincided with RIXC's 10 year anniversary of their festival Art+Communications (which allowed them to have a bigger budget which enabled them to do a large scale exhibition). RIXC are an artist led small institution which emerged in 2000 from a number of predecessor organisations such as Riga E-Lab, founded in 1996.

In the 1990s Riga E-Lab was very active in areas such as streaming media through the x-change network and the Art+Communication festival. Since 1998 the Acoustic Space Reader has been published in conjunction with the annual festival.

Waves, Riga 2006

The show under the full title *Waves - electromagnetic waves as material and medium of art* was launched on 24th of August 2006 at Arsenal's exhibition centre for contemporary arts in Riga and stayed open till 17th of September 2006. The days after the opening were followed by a two day symposium and an evening programme of film and video screenings and performances. The exhibition was jointly curated by Armin Medosch, Rasa Smite and Raitis Smits after an initial concept by this author. The film and video program was curated by Erwin van't Hart, film curator of De Balie, Amsterdam.

The exhibition was held at Arsenal's, Riga's main space for contemporary art exhibitions, and was seen by over 5000 visitors, more than 1000 alone in the *White Night of Museums*, a night when all museums in Riga stay open all night.

The conference and evening programme were a substantial part of the programme with a valency of their own. Conference and evening programme were filled up to capacity with about 200 people and more,

Waves in Riga realised the research interest by arranging for the first time a survey of art works using electromagnetism as a medium and not just as a carrier of messages. This was expressed through the subtitle 'electromagnetic waves as material and medium of arts.'

The Arsenal's exhibition centre allowed for a panoramic survey showing 38 works by 70 artists. As far as possible within the limits of the budget the project sought to identify and invite artists from outside core European regions showing for instance the work of the Russian media art pioneer Bulat Galejev and works from Japanese, Korean, Canadian and Australian artists.

Except for meetings mentioned above, the curatorial process was facilitated by email and other internet services such as Skype. There were no 'hard' criteria but a broad consensus about intentions and goals.

The overall response was very good, especially by the artists. Many artists assured me that they were happy to participate because this was the first exhibition that took their work for what it was, as an engagement with electromagnetism and not, for instance, a piece of audio art.

***Waves* Dortmund, HMKV 2008**

Waves was realised again in 2008 together with Hartware Medien Kunst Verein in Dortmund (HMKV - Hardware Media Arts Association), Germany, an organisation which for more than 10 years has been creating media art projects in the Ruhr Valley. In 2008, Inke Arns, artistic director, and Susanne Ackers, managing director jointly managed HMKV.

Inke Arns is an internationally well known curator and art historian whom I have known since she organised Ostranenjie, a festival with Eastern European media art, in 1993, but we had never worked together before on a substantial project. Arns is co-founder of the Deep Europe project, and a contributor to media art net, a web site dedicated to building a substantial resource about media art history and theory, and co-host of the Spectre mailinglist. She has worked on waves related themes such as the Slovenian artist's Marko Peljhans project Makrolab, the Russian poet and futurist Klebnikov, and, more generally speaking, media and radio art.

For *Waves@HMKV* the task was how-to make a new exhibition which would not just reproduce the first one.

HMKV uses Phoenix-Halle, a large production hall of a former metal steel works and now an industrial monument, built in 1898 as a part of the Phoenix steel production complex. Since the 1980ies the Ruhr valley has been rapidly de-industrialising as a result of which government policy has been to dismantle some structures and convert others into spaces for culture and creative industries.

Waves in Dortmund referred to the social relevance of waves through the new slogan, 'Waves - the art of electromagnetic society.'

For *Waves* in Dortmund the challenge also was to make meaningful use of such a huge space as Phoenixhalle, also given that there was a very limited budget and relatively little time. The concrete work on the exhibition could only start on January 02 2008, the opening was on May 9th 2008.

The challenge was met, firstly, by reducing the number of artists and optimising the production of remaining works. The differences was more clearly accentuated between large installations which needed a black cube and smaller works presented on walls.

A main intervention was by the artist Franz Xaver who installed a *Foucault pendulum* in the middle of the hall. This directed attention to the height of Phoenixhalle and centred the main exhibition space while at the same time providing an important link to the history of science.

Three workshops were carried out inside the exhibition, by Martin Howse, Evamaria Trischak and Derek Holzer.

Two special projects were organised in public space in Dortmund, Deceleration Point by Udo Wid (AT) and Field Amplification by Hive Networks (UK).

Waves short bibliography:

First outline of an idea:

Medosch, A., 2004. Not Just Another Wireless Utopia: Developing the Social Protocols of Free Networking. In *The Future of Computer Arts - and the history of the International Festival of Computer Arts, Maribor 1995 - 2004*. Ljubljana and Maribor: Maska, MKC, pp. 43-54.

Catalogue Waves Riga:

Medosch, A., Šmite, R. & Silina, D. eds., 2006. *Waves - electromagnetic waves as material and medium of art*. (exhib.cat. RIXC and Riga Arsenal Aug 24 - Sept. 17 2006), Riga: RIXC.

Introduction

Medosch, A., 2006. Waves - an introduction. In: *Waves - electromagnetic waves as material and medium of art*. (exhib.cat. RIXC and Riga Arsenal Aug 24 - Sept. 17 2006), Riga: RIXC. pp. 14-23.

Catalogue Waves Dortmund:

Arns, I. et al., 2008. *Waves - The Art of the Electromagnetic Society (exhib. cat.: HMKV/Phoenixhalle Dortmund 10.05.-29.06.2008)* HartwareMedienkunstVerein, ed., Dortmund: HMKV/Kettler.

Introduction

Medosch, A., 2008. Waves - The Art of the Electromagnetic Society, Introduction. In *Waves - Catalogue*. Dortmund: HMKV/Kettler, pp. 124-131.

Reader on em topics, Acoustic Space Magazine:

Medosch, A., 2008. Waves - the Art of Deconcealment. In *Spectropia: illuminating investigations in the electromagnetic spectrum*. Acoustic Space #7. Riga and Liepaja: RIXC & MPLab of Liepaja University, pp. 170-189. Available at: <http://www.thenextlayer.org/node/876>.

Medosch, A. & Šmite, R. eds., 2008. *Spectropia: illuminating investigations in the electromagnetic spectrum*. Acoustic Space #7. Riga and Liepaja: RIXC & MPLab of Liepaja University.

Waves Riga 2006

Arsenals, 24.08.2006 - 17.09.2006

Organisers: RIXC Center for New Media Culture

- > Concept: Armin Medosch
- > Curatorial team: Raitis Smits, Rasa Smite, Armin Medosch
- > Film programme curator: Erwin van't Hart
- > Curator assistants and managers: Signe Pucena, Daina Silina
- > Streaming programme co-ordinator: Adam Hyde
- > Technical director: Davis Bojars
- > Exhibition architect: Rudolf Bekic
- > Editorial team (catalog): Daina Silina, Rasa Smite, Armin Medosch
- > Designer: Martins Ratniks
- > Press coordinator: Agnese Rucina

Artists

Anthony McCall (US) *Doubling Back* (2003)

Aaron Kaplan / AT, Doron Goldfarb / (IL/AT) *Volume Rendering of interference patterns* (2006)

Adam Somlai-Fischer (HU) / Bengt Sjöln (SE) / Usman Haque (UK) *Wifi Camera Obscura Prototype* (2006)

Artificiel: Alexandre Burton, Julien Roy, Jimmy Lakatos, Pascale Malaterre (CA) *beyond6281* (2004)

Antanas Dombrovskij (LT) *Untitled* (2006)

Bas van Koolwijk (NL), Derek Holzer (US/NL) *Ozone* (2003-2006)

Bureau d'Études (FR) *Electro-magnetic propaganda, the statement of industrial dogma* (2006)

Bulat Galejev (RU) *Small Tryptich* (1975) *Space sonate* (1981) *The Space Dandelion* (1987)

Disinformation: Barry Hale, Joe Banks (UK) *Blackout* (1997)

Erich Berger (AT/FI) *Tempest* (2004)

Evelina Domnitch, Dmitry Gelfand (US) *Camera Lucida: Sonochemical Observatory* (2003 -)

Farmersmanuel: Nik Gaffney, Mathias Gmachl, Oswald Berthold, Gert Brantner

(AT) *Elektrosmogfreien* (2006)

Franz Xaver (AT) *Hydrogen (RT03)* (1993 / 2003)

Gints Gabrāns (LV) *Aiz aizvērtām acīm* (2006)

Jacob Kirkegaard (DK/DE) *AION* (2006)

Jay Needham (US) *Tell us your Secrets* (2006)

Jean-Pierre Aubé (CA) *Spying the Arsenal's workforce* (2006)

Julian Priest (UK/DK) John Wilson (UK) *The Political Spectrum* (2006)

Judith Fegerl (AT) *Tension Object* (2005)

Joyce Hinterding, David Haines (AU) *Purple Rain* (2004)

Luke Jerram (UK) *The Edison Project* (2005)

Lotte Meijer (NL), Adam Hyde (NZ/NL), Aleksandar Erkalović (HR) *Wifio* (2006)

Mark Fischer (US) *Cetacean acoustics* (2000-2006)

Mārtiņš Ratniks and Clausthome: Ģirts Radziņš, Lauris Vorslavs (LV) *Spectrosphere* (2006)

Marko Peljhan, Sašo Podgoršek (SI) *Ladomir Qikiqtaq* (2006)

Martins Vizbulis (LV) *Communication interference 2* (2006)

Nina Sobell (US) *Interactive Brain Wave Drawings* (1973 – 1993)

Oskars Poikāns (LV) *Air column* (2005)

Paul de Marinis (US) *Rome to Tripoli* (2006)

r a d i o q u a l i a: Honor Harger (NZ/UK) Adam Hyde (NZ/NL) *Solar Listening Station* (2006)

Rasa Šmite, Raitis Šmits, Mārtiņš Ratniks (LV) *RT-32 Acoustic Space Lab* (2002)

Robert Adrian (CA/AT), Norbert Math (IT/AT) *Radiation* (1998)

Scanner (Robin Rimbaud) (UK) *Breakthrough* (2006)

Sine Wave Orchestra: Furudate Ken, Daisuke Ishida, Jo Kazuhiro, Mizuki Noguchi (JP) *The Sine Wave Orchestra stay amplified* (2006)

Steve Heimbecker (CA) *Paravent* (2006)

TAKE 2030: Ilze Black, Shu Lea Cheang, Alexei Blinov, Martin Howse, Vladimir Grafov (UK) *PORTA 2030* (2006)

Voldemārs Johansons (LV) *Summa* (2006)

Yunchul Kim (DE/KR) *Hello, world!* (2005)

Waves Dortmund 2008

Phoenixhalle 10.05.-29.06.2008

Organisers: Hartware MedienKunstVerein (HMKV)

- > Concept: Armin Medosch
- > Curatorial team: Inke Arns, Raitis Smits, Rasa Smite, Armin Medosch
- > Managing Director: Susanne Ackers
- > Curator assistants and managers: Etta Gerdes, Francis Hunger
- > Technical Director: Uwe Gorski
- > Special Projects: Andrea Eichhardt
- > Press coordinator: Roland Kentrup, ZK Medienagentur

Artists:

Robert Adrian X / Norbert Math (AT) *Radiations* (1998)

Michael Aschauer (AT) *24/7 Into the Direction of Light* (2008)

Erich Berger (AT) *Tempest* (2004)

Bureau d'Etudes (F) *Electromagnetic Propaganda - The Statement of Industrial Dogma* (2008)

Jonah Brucker-Cohen (USA) *WiFi Hog* (2003) *WiFi Liberator* (2007)

Paul DeMarinis (USA) *Rome to Tripoli* (2006 - 2008)

Evelina Domnitch / Dmitri Gelfand (BY/RU/NL) *Camera Lucida - Sonochemical Observatory* (2003-2006)

Mark Fischer (USA) *Cetacean Acoustics* (2006)

Bulat Galejev (RU) *Cosmos Dandelion* (1981 / 2008) *Small Tryptich* (1975) *Cosmos Sonata* (1981 / 2008)

Joyce Hinterding / David Haines (AUS) *Purple Rain (Broadcast Delay)* (2004 / 2008)

Hive Networks (GB) *Field Amplification* (2008)

Derek Holzer (USA) *Tonewheels* (2008)

Martin Howse (GB) *Demons in the Aether* (2008)

Luke Jerram (GB) *The Edison Project* (2005)

Voldemars Johansons (LAT) *Aero Torrents* (2007)

Aaron Kaplan / Doron Goldfarb (AT) *Visualising Waves - Volumetric Rendering of Waves* (2006)

Jacob Kirkegaard (DK/ D) *Aion* (2006)

Bas van Koolwijk, Gert-Jan Prins (NL) *Synchronator* (2006)

Anthony McCall (USA) *Doubling Back* (2003)

Marko Peljhan (SLO) *INSULAR Technologies* (1999 -)

Oskars Poikans (LAT) *Air Column* (2005)

Julian Priest (NZ) *The Political Spectrum Review* (2008)

Martins Ratniks / Clausthome (LAT) *Spectrosphere* (2006)

RIXC (LAT) *Skrunda Signal* (2007 - 2008)

Scanner (GB) *Breakthrough* (2006)

Nina Sobell (USA) *Interactive Brain-Wave Drawings* (1973-1993)

Adam Somlai-Fischer (HU) / Usman Haque (GB) / Danil Lundbäck (SE) / Bengt Sjölen (SE) *WiFi Camera* (2006 -)

Take 2030 (F/GB) *Update {id, signal, latency}* (2003-2008)

Evamaria Trischak (AT) *4816* (2006-2008)

Udo Wid (AT) *Deceleration Point* (2008)

Franz Xaver (AT) *Hydrogen* (1993) *Foucault Pendulum* (2008) *Wave and Form: Change of Medium - The Antenna as Interface* (2008) *Wasserstoffbrücken. TheNextLayer // HalfBit* (2008)

APPENDIX B: Professional Practice During Time of Study

Summary: besides the two *Waves* exhibitions documented in Appendix A, this document presents key areas of practice during my time of study at Goldsmiths from 2006 - 2011 which were directly relevant for the development of my thesis (other activities which may have also been important are not mentioned).

Main activities were the setting up and maintenance of *Thenextlayer.org* (TNL), an online platform for collaborative research and publishing; the curator in residence project *Liquid Territories* at Laboral in 2008, the public art project *Street Radio / Hidden Histories*, Southampton (2008), the organisation of a workshop on artistic research and practice related PhDs called *taxi-to-praxi*, Goldsmiths (2007), as well as participation in conferences, symposia, lectures and seminars on topics such as *Waves*, artistic research and New Tendencies.

Thenextlayer.org

The Next Layer - <http://www.thenextlayer.org>
Idea, concept, administration
hosting and server: lo-res.org

Founded 2007 as platform for collaborative research, particularly addressing researchers doing practice based PhDs facilitating discussions using not only text but also images, audio and video.

When setting up *Thenextlayer.org* (TNL) at first the intention only was to create a research journal for myself. After getting acquainted with the software used, I recognised that it was easy to host a number of research blogs. I invited other researchers to use TNL to discuss methodologies at an early stage or share ideas not normally considered developed enough for sharing. This concept was called peer-preview (instead of review).

Peer-preview groups are closed working groups which make content available only selectively. Peer preview allows to work in protected spaces in small groups and thus share work at an early stage.

The discussions on TNL gave rise to the idea of organising the one-day workshop *taxi-to-praxi* together with Adnan Hadzi.

Taxi-to-praxi

Workshop day on: *Artistic Research*

Concept and moderation, in collaboration with Adnan Hadzi
Goldsmiths, 21st of April 2008, 10 am to 5 pm.

The experimental workshop day taxi-to-praxi took place at Goldsmiths, Ben Pimlott building, on 21st of April 2008. Around 35 people met in a seminar room whereby this group consisted of about one third of people from Goldsmiths, one third from other universities and one third of independent practitioners such as artists or curators.

The day was divided in two halves, a morning session with invited lectures by the Free Software developer Jaromil and the artistic researcher Lindsey Brown from Dundee University, and the afternoon session with short presentations by everybody who wanted to talk about their work. The day concluded with a lively discussion of topics affecting practice based research in digital arts.

One of the purposes had been to make visible the diversity of research. The term taxi-to-praxi was referring to the creation of taxonomies as an integral part of any research process. Plenty of key-words to describe research and practices were used throughout the day. Unfortunately there was not enough time to open the discussion more towards a reflective meta-level and possible further steps to be taken.

A more detailed report can be found online: <http://www.thenextlayer.org/node/452>

Art Projects

Floating Structure - Liquid Territories (2008)

Curator in Residence
Laboral, Centre for art and creative industries
Gijon, Asturias, Spain
September - October 2008

The residency was spent researching the creation of an island in the bay of Gijon as an artistic research project, which would transgress the boundaries between curation, production and participation. The project foresaw the building of an oceanic sculpture as a research platform for artistic measurements. During the stay in Gijon, the author in collaboration with the artist Franz Xaver developed a concept for an oceanic sculpture as a research station. (research report available in German only)

Street Radio / Hidden Histories (2008)

Public Art Work

Southampton, 14.03.2008 - November 2008,

Commissioned by Solent Centre for Architecture,

Realised in collaboration with Hivenetworks, Southampton City Council, Heritage, Oral History Unit

Micro-broadcasting from 10 light poles in central area using excerpts from Oral History Archive.

On 10 light poles in the centre of Southampton on Above Bar street weather proof little boxes have been mounted which contain repurposed commercially available hardware. The unique hard- software combination implemented by Hivenetworks is playing soundfiles in a loop on FM radio on 89.0 MHz. The very low powered USB FM transmitters are said to have a range of about 10 to 15 meters. Thus, around each light-pole in a radius of 30 meters approximately you can hear one particular radio art piece created by me with excerpts from the Oral History Archive. The boxes also scan the surroundings for mobile phones with the bluetooth function on sending those who accept a short bluetooth text message announcing the narrowcast of excerpts from Southampton's Oral History Unit on 10 listening stations in the city centre.

This new public interface for negotiating the past (and maybe future) of the city relates to the vibrancy of the heyday of Southampton as a port city, which is now fading away in public consciousness. As the city reinvents itself, *Street Radio / Hidden Histories* brings together latest wireless and open source technology to put cultural heritage back into the heart of the city. At each selected listening station is played an audio piece of about 10 mins, with topical narratives compiled from life interviews selected from Southampton's Oral History Unit. The stories relate to the chosen spot. Thus, a spot near a former luxury department store speaks of food of the poor; a small memorial for the musicians on board the Titanic has voices on the Titanic disaster.

(Audio Node 1: Titanic URL/listen: <http://www.thenextlayer.org/node/341>

Audio all nodes, excerpts only:

http://www.thenextlayer.org/audio/by/album/hidden_histories)

Medosch, A., 2009. Situating Nodes and Narratives: Hidden Histories/Street Radio. In *Node.London Reader II*. Node.London. London: Mute Publishing Ltd, pp. 95-106. Available at: <http://www.deptford.tv/files/Node-L-reader-2008-7b.pdf>.

Lectures and Seminars

Rewire, Media Art Histories (2011)

Lecture: Automation, Cybernation and the Art of New Tendencies (1961-1965)

Friday 30th of Sept. 2011

Liverpool John Moores University, 27.09. - 01.10.2022

Coded Cultures (2011)

Concept and Panel moderation: Technopolitics - Beyond Information

Vienna, 27th of Sep. 2011

Troubling Research (2011)

Lecture and seminar: Art as Visual Research

Academy of Fine Arts Vienna, Austria, 01.05.2011

FOR ACTIVE ART – New Tendencies 50 Years Later (1961–1973) (2011)

Lecture and panel

MSU, Zagreb, 14.04.2011

Brian Holmes Symposium (2010)

Lecture: Technopolitics and the Art of New Tendencies (1961-1965), Sat. 27th, Nov 2010,

Van Abbemuseum, Eindhoven, NL, 26.-28.November 2010

Systems of Learning (2009)

Panel

Royal College and Imperial College, 6th of Oct. 2009

Get Published (2009)

Conference panel

Queen Mary University, 28.04.2009

Waves - curating as research (2009)

Lecture and seminar

Art University Linz, 29.01.2009

Who is Afraid of Artistic Research (2008)

Lecture: 'think, make, do - research based media arts practice -. curating as research'

Dundee Contemporary Arts Centre, Dundee, Scotland UK

23.Oct 2008

Spectropia, Listening to the Universe (2008)

Keynote lecture: Artistic Research

RIXC, Riga, 16.-19.10.2008

Taxi-to-Praxi, Art as Research (2008)

Workshop

Goldsmiths, London, 21.04.2008

Waves, Maxwell City (2007)

Lecture as part of Workshop, 31st of May 2007
Atelier Nord, Oslo, Norway, 29.05. -02.06.2007

Pixelache, Architectures of Participation (2007)

Lecture: The Next Layer - The Emergence of Open Source Culture, 31st of March 2007
Kiasma, Helsinki, Finland, 29.03.-01.04.2007

Summit, non-aligned initiatives in education culture (2007)

Workshop, The Hacker Way of Learning, Sat May 26
Hebbel am Ufer, Berlin, Germany, 24.05. - 28.05.2007

Hackit (2007)

Keynote lecture: The Culture of Creative Coders
Pisa, Italy, , 28.-30.09.2007

Elevate Festival, Democracy! (2007)

Lecture: 45 Revolutions Per Minute
Graz, 25.10.2007

Arte.mov, Festival of Mobile Culture (2007)

Keynote: 45 Revolutions Per Minute
Belo Horizonte, Brazil, 15.-18.November 2007

NOW Festival, The Conquest of the Invisible (2007)

Lecture and discussion
Barcelona CCB 29.11.2007

Cool Media Hot Talk, New Media Art Mythologies (2007)

Computer-mediated discussion with Geert Lovink
De Balie, Amsterdam, 05.06.2007

Conferences

Textures, SLSA-EU Conference (2010)

Conference track: Networks and Sustainability 17th of June 2010
Concept and moderation, in collaboration with Rasa Smite
Stockholm School of Economics, Riga, Latvia, 15.06.-19.06.2010

Open A/D (2009)

Symposium
Concept and moderation
Vienna Design Week, 02.10.2009

Creative Cities - the promise of the creative economy (2009)

Concept and moderation, in collaboration with Ina Zwerger
Organiser: ORF, Ö1, Science.
Date: 31.3.2009
Place: Vienna Radio Culture House,

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APPENDIX C1: The Making of New Tendencies Part 1

Interview with Matko Meštrović, Korčula, Lumbarda, Saturday 08.08. 2009
The interview was recorded on a digital audio recorder and transcribed.

Q=Questions Armin Medosch

A=Answers Matko Meštrović

Q: What was your professional background at the beginning of your career?

A: As a student of art history in the early 1950s in Zagreb I became member of a programme on Radio Zagreb and I was employed there with a regular job with a task to participate in the life of plastic arts. My idea about the historic moment was that we have to be very strongly oriented towards what is the meaning of Modernism against all traditional academic structures and their interest.

Luckily, the intention of the editor of the program was just that so that I was really supported by the small collective of the programme, where others performed the same task for the different disciplines, literature, film, and theatre.

I succeeded with my studies and I managed to finish a few years later so that I felt really in the middle of some social effort to open new possibilities in the development of all fields. My idea was also that the phenomena which I was concerned with are not limited to the traditional artistic field, galleries and so on, that Modernism also is involved in space in general, urban space especially, so that architecture was also another main interest of mine.

Fortunately, the editor, I should mention his name, Ervin Peratoner, was very sceptical but very strongly critical in suggesting the sources of what was generally happening at the moment in the world, especially in some neighbouring countries, and I had the possibility to regularly visit Milan Triennale, Venice Biennale, also I was surprised to learn later that I was the first from Yugoslavia to visit *Documenta* in 1959. I was very well informed. I regularly received the most important professional journals, like *L'Architecture d'Aujourd'hui* and some other Italian magazine, so that I was up to date in my position. My mental orientation was open and really motivated to combat.

High-Modernity and Zagreb in the late 1950s

Q: What was local artistic life during high modernity?

Zagreb has a very good tradition just in that orientation because some people between the wars were active in CIAM, close friends of Le Corbusier. Really, Zagreb was one of the best examples of a modern urbanism, and in the early 1950s that famous group Exat 51, Experimental Atelier, was founded by a few architects and painters. Their activities were also important because they early in the 1950s opened a polemic in the public about what was the new conception of the plastic arts and social role of the artist. It was not an individualistic position, but a new programme

of social relevance: applied art and the arts are the arts - there are no reasons that other objects in our environment should not be cultivated, given the same care in the sense of good shape or practical values.

That group received some commissions as part of the efforts of the Yugoslav government to present itself and the Yugoslav industries at the international trade fairs and other manifestations like the world exhibition in Brussel, Expo 58. They were older than me but we were very close. Later just developing some of these ideas a new institution was created, Centre for Advancing Industrial Design, because there was a real historical social need that the industrialisation of the country should be elevated on a higher civilisational level. Use in social evaluation, in the evaluation of social needs, just that was my ideological complex.

Q: Was this modernist programme supported by the state?

A: The most important fact was the rupture between Tito and Stalin and the immediate consequence was not nice, because that isolated position of the country was dangerous. When you have at all your frontiers the armies under Soviet command it is not easy to survive and the country had been destroyed completely during the Second World War. As a young man, in the secondary school, I participated in the action of reconstructing the country, working on railways construction in Bosnia.

That general endeavour was evidently presented in a recent big interdisciplinarily conceived exhibition, representing Croatia in the 1950s. You can also see the same in the sciences, for example through the foundation of the very important Institute for natural and biomedical sciences "Ruder Boskovic"; new universities were created, new factories, there was a genuine effort to make a step forward; consequences are still to be analysed and valorisation is always a necessity if you have to move further. For examples, of the fact that the Zagreb's International Trade Fair was moved to the south, across river Sava.

Culturally, Yugoslavia and Zagreb too was open to all influences, the official programme of international agreements supported the need for more and more complete information so that many international exhibitions were done. For example as a student I was a guide for the big exhibition of Henry Moore in Zagreb in 1955, the most important works of American action painting were presented in exhibitions of American art, there were several similar projects from graphic to industrial design, so that the picture was, generally speaking, full.

And the social feeling was also in accordance with that effort. There were difficulties in the everyday life, in the efforts of government to facilitate the forms of production, there was also open discussion about the methods how industrialisation should be done; international experts were consulted concerning the Adriatic sea, two regulatory programmes of the UN were engaged, unfortunately those new trends were later ignored; but I would say we had more satisfaction than frustration in this frame that I tried to describe.

The Pre-history and Making of NT1

Q: How did NT 1 get started?

A: It is almost a legendary story by now, how it did happen. As I said, I used to visit important art manifestations in Europe. During my army service the last part of it was on the island of Vis, I was anxious that it should end at the moment before Venice Biennale would be closed in 1960. Fortunately, at the last moment I succeeded in visiting it and I made a report about it.

A few days later in the Gallery of Contemporary Art Picelj was discussing with a man I had never seen before, obviously a stranger. I just waved salute to Picelj but he called me and said Matko come here, and he introduced me to Almir Mavignier. Picelj left us, and as he spoke Italian and I also speak it very well, so we continued to talk. He had just come from Venice, our first question was what did you find there of interest? We both came to only one name, Piero Dorazio. We stayed together all day discussing different things.

Finally in the evening when we were separating -- he was to leave Zagreb the next day -- we concluded two things. The first proposition was to make a very well selected exhibition of Yugoslav painters curated by me and presented at the home of Kurt Fried, the owner of the Ulm newspaper. He used to offer the new things to the Ulm public in his home.

The name of Ulm as a place where HfG was active was fascinating for me. I knew something about Bauhaus, about Bill and his idea to reconstruct Bauhaus, because I saw in one Triennale in Milan the presentation of the organisation, curriculum and all activities of the HfG. Almir Mavignier was a student of the first generation of this school that started in 1953. He would always say that two Maxes, Max Bill and Max Bense signed his diploma. Max Bill was known to me, but Max Bense, I had never heard of before.

Mavignier appreciated my ideas and had a very good opinion of my capacities. He insisted that I should make an exhibition of Yugoslav painters with no other influences. The second proposal was that he would like to let it be known to the Yugoslav public the work of the many other people yet unknown, but who generally do work "similar to that of Piero Dorazio".

The day after I went to see Božo Bek to explain this project. We were very close in our doings, so he accepted it. There is the first letter I wrote to Mavignier: "the project is accepted."

The first proposal was realised in spring 1961. I was in Ulm, the exhibition was very, very successful, the best things that we could find at that moment from Šuštaršić, Ljubljana, or Knifer to Rabuzin, that famous naive artist³⁹. The material was transported to Berlin also, but unfortunately because of some diplomatic conflict between West Germany and Yugoslavia, because Yugoslavia recognized the GDR, the exhibition was never opened there.

³⁹ The artists selected were very heterogenous, from naive painting to figurative but modern to Informel and geometric.

Mavignier asked me to go to Dusseldorf, to bring some photographs from Egypt that he had made that same last summer, that was to be published in the last number of the review Zero. I came there just at the last moment when they were preparing that issue. It was Otto Piene, Hans Mack and Guenter Uecker.

If I remember it well I was in Switzerland coming back probably trying to visit Max Bill but that suggestion from Mavignier was not successful. There were some other people however, such as Gerstner, my main new contact, and coming back through Munich I cabled to Božo Bek: "we should make all efforts to show these things in Zagreb."

In Munich I connected with von Graevenitz who would get very close to me during my stay in Paris in the last half of 1961. Later he became coordinator for the movement NT for Germany and Switzerland; he unfortunately tragically lost his life in an airplane crash.

There were different suggestions in the correspondence with Mavignier, about the name of the exhibition, about who should be included. Some of the names were very known to me, like Piero Manzoni, or Castellani from Milan, but I did not know about Gruppo N, Padua, and neither GRAV from Paris nor about many other people from Mavignier's list.

Finally when it came to taking responsibilities for choosing names Mavignier had the last word. He did not accept my proposition that my old friend Enzo Mari should be included. "Almir, why do you refuse him," I asked. He looked at me and did not explain - typical Latin American animosity between two completely different types of men. Mari was not included in the first exhibition, but we proposed Knifer to be included. And Picelj, he was active in preparing the exhibition, in graphical work, and he included himself and Mavignier did not oppose it. The first exhibition NT was opened in August 1961.

Q: Did you make an official call?

A: No, not me but Bek sent some letters with invitations and with the specific conditions for the participation, it was not easy to organise an international exhibition in Zagreb with insurances and all other aspects of that work. It was not my duty.

Q: Is there a copy of that letter?

A: Yes, In French, I found something in my archive. You can find other things in the archive of the MSU (Museum of Contemporary Art). One very important thing is the original of the letter that Mavignier sent to me, I gave it to Bek. Marina Viculin found that letter in the archive of the Museum; and why is it important? Because just before the opening of the exhibition I asked Mavignier, who is formally responsible for this exhibition and he answered, Bek, me and you.

Q: So that means in the end you, Bek and Mavignier made the final list for the exhibition?

A: No, no, no. What it means, to be responsible, that it was not easy to make a separation between organising the conditions of the exhibition and the activities of making the selection. Neither Mavignier was really sure what the title of the exhibition should be. Bek proposed some ideas. Mavignier finally did the selection, because he did not accept my suggestion to choose Enzo Mari and in the beginning of the correspondence he made it clear that the responsibility for the selection belonged to him. We accepted that. For the second exhibition there was no more that condition, I was completely free to make my selection, there were many new names, for example Gruppo T from Milan, who were not included in the first exhibition, Mari came, and several other people from Zagreb.

Q: How big was the first one? Was there a large space?

A: You should know that in an old Baroque house in the centre of the old city of Zagreb, Katarina square it is called, there were several rooms and the objects were presented in that space. Although Mavignier was responsible for the hanging, he wanted to make the exhibition with some help from our side. Also the second exhibition was done in the same space, it was not too large but the number of participants doubled in the second exhibition (from 29 to 58).

There was an intention of the city of Zagreb to make an important contribution to arts, in music and the plastic arts, so that in the same year the music Biennale in Zagreb was founded and the idea was that parallel to that every two years the similar Biennale of Plastic Art of this New Tendencies exhibition should be done. Unfortunately because of an incident that happened in the spring of 1963 the second exhibition was postponed, so in general arrangements we lost the step.

NT, The Movement

Q: Why was it postponed?

A: It is another story; it is not easy to explain. Anyway, after first exhibition I spent six months in Paris and made a very important friendship with GRAV and also was very close to members of Gruppo N from Padua and able to assimilate the new ideas that were developed in these groups. Early in 1963 with a help of some friends I made a visit to Padua, Milan, Basel, Paris, and to see what we were going to expect for the second exhibition. When I came back to Bek to report what that second exhibition would be like, I found him in miserable condition, he was unable to speak to me and I wondered what was the reason. Finally, I asked again, "Tell me what happened!" He answered, "We sent the telegrams."

The invitation for the second exhibition was cancelled after the speech of president Tito against abstract art. But speeches like this we had earlier also, the resistance to new ideas of people from academies that were close to the bureaucracy was evident. So, somebody said to him there is too much abstract art in Yugoslavia.

Bek, to proof that he supports something different from what is generally known as abstract art, invited two of the most influential politicians in Zagreb, Miko Tripalo and Ivo Bojanić, to show them the works from the first exhibition that were acquired

for the collection of the museum. He wanted to ask for their suggestion what he should do. They said there was nothing anti-communist in these works, but why you ask us when you have your artistic council (governing body of the gallery)?

He naively put the question to the council. A lady who was the president then caused this upset. So you imagine my situation. I returned with enthusiasm about the new position in art, and now I had to explain to all these people why this exhibition had to be postponed. There is also in our language a proverb: "there is no bad things, only for the bad things." The response to the new invitation was absolutely incredible; everyone came to Zagreb for the second exhibition so that quantity as well as quality made a definite impulse to the creation of a movement.

Q: What were the ideas of that movement?

In your article that I read I noticed that you give importance to the ideological context. That was in the background of that movement, but it is not easy to describe. My text in the second exhibition catalogue tried to do that. The catalogues were shaped in the same way, with no titles and no capital letters, so my text remained without title. When it was republished it had the title Ideology of New Tendencies. When they republished it in the exhibition for Venice it was called Sociological Analysis of 'New Tendency'. That text was translated also into German for the exhibition in Leverkusen, in Slovenian and lately also in English for this MIT publication that I hope will be published soon. So that text is used as the most complete answer to your question.

If you look at the theoretical thinking of different groups you can find similarities but also many differences. For example Gruppo N was ideologically very expressed in the context of ideas of the Left. The theoretical production of GRAV was methodologically more clear regarding some practical aspects of the significance of these new objects especially with the role towards the public. You should 'activate the spectator'; or, 'we don't need psychological content', because psychology is not needed on the level of visual research.

At one point of my text I conclude, that as you understand better the phenomena of visual perception, how it happens in the human being, then probably you should be able to understand better other realities in the social environment. That is the most important moment to be analysed now, because the development of so called media art has thematic and problematic relations with New Tendencies.

Q: Were there any reviews, any feedback?

A: I should say that the reaction was not special. The most interesting was some documentary made by Croatian television. They had seen that the public was animated, very much. And especially in the way Abraham Moles used to say: "Voulez-vous jouer avec moi" - the play was the important moment, no contemplation.

Q: Were the works interactive?

A: Yes, but there are some other aspects I am not able to quote now. Anyway, Paris as

the official centre of world art was not sympathetic to that. Some influential people, Jean Cassou, tried to let Paris see that new type of art. They succeeded to make a very beautiful exhibition in 1964 in the Museum of Decorative Arts. But the reaction was very disappointing. There was an intention in all these efforts, not to destroy but to neutralise the dominant mental structure in the actual civilisation, taking the positive aspect of it to a further way of valorisation.

[...]

Q: There is a quotation from you in an article by Darko Fritz about the need for the scientification of art. How should I understand that?

A: Just let me remember the title of the article that Darko is trying to interpret. There was a deep necessity to make a bridge between two cultures, artistic and technical, between human sensitivity and human intelligence, between emotion and rationality. I send you a copy of an article, my paper that was presented at the *Art Transition* manifestation in Boston in 1975 where I quoted Abraham Moles. The source in human being for the creation, artistic and scientific is the same, there is no other.

Some people from Gruppo N used to say art is science. (Claps) You cannot do that only from one hand. They still make a difference between art and science. Remember Altamira people. They used art to cultivate their attention for the movement of the animals who will be caught by them. Abilities to reflect and to do the things may be separate methodologically in practice, in big production. Fordism as the dominant type of capitalism separated development from execution. Humanisation and scientifications are both necessary and Darko used the last sentence from my text of the catalogue of the second exhibition, where I said to enrich humanity the poetic ways are not enough, or something like that.

Q: There is another quote by Morellet about a change in art similar to that in science.

A: Yes, it's a quotation from the first exhibition, where some statements of artists were published. I said to him several times, "You believe that but you are not able to realize that belief." Most symbolic for these ambiguities are some of his paintings done with a piece of natural wood included in the square of the picture. "Geometree," an interpellation of tree and geometry.

Q: Let's go back to this quote by Morellet. Did you believe in that 'revolution' in art?

A: I understand this point of view. In the same way were my reflections on the necessity to develop a scientific point of view to facilitate the progress of human kind. I believe in intuition as important moment of human creation. The rational judgement is no less important, so that Morellet's statement is an exaggeration that practically was impossible in the art. The work of Morellet, I said earlier, did not confirm this position. It consists in one moment of an element of pure rationality, geometric; and at the same time he uses a piece of wood that is not geometric.

So Morellet himself developed this conflict, these contradictions. You must see the

context of the moment when that sentence was formulated: the general production of artistic things was just only emotion, informal, without any clear rational idea, and that was a reaction to that. All the galleries were selling only those things.

It was a scandal in Italy when in 1963 at Rimini *Convegno internazionale artisti critici e studiosi d'arte*, a symposium, Argan defended the NT approach. The day after his speech many Italian galleries were definitely closed. It was very interesting how strong was his influence in the artistic public and the market. But what Argan has seen in the idea of NT transcended not only the real situation but the historical possibilities also, so that the topic of utopia is always there in these avant-garde inclinations or positions. But in my reflection I used to say, if you look at the flower, all flowers are optimistic - their idea of what they are going to develop. Hope is a natural phenomenon, not just a psychological or a social one.

Q: But this idea of progress, at that time, 1963, NT was really also connected with this idea of progress?

A: Absolutely. The ambition was to contribute to human emancipation. There is no real progress without emancipation, to allow potentials to be realised.

Contemporary Perception of NT

Q: When Argan defended NT the galleries closed?

A: They became aware that art produced and sold in their galleries had no prospect anymore.

Q: That is quite inconceivable today that art galleries would react in such a way to a critic. How was the reaction to the show in Venice?

A: It was very well received, but my possibilities to follow that were very limited. I don't know exactly, anyway Umbro Apollonio and Filiberto Menna made really a new trend in the public communication.

But it is curious to tell what happened to me in Leverkusen. I was invited by Udo Kultermann, together with Umbro Apollonio to make a speech at the opening of the exhibition. Umbro was attended with real interest. When I started my speech, there was at first also real attention. But at one moment the mayor of the city who was in the first row stood up and abruptly left. Udo Kultermann was sitting there, pale like this, but did not move. I looked at him, he was not looking at me, and so I continued. Afterwards I was told why that man did that. He was provoked in my speech by the mentioning of Bauhaus and some other moments with which the ideas of NT were connected historically. There were still alive those contrary orientations, those aspects in political life in Germany thanks to which Ulm school, HfG closed in 1968. There are conservative forces always and they are trying to make their presence visible.

NT, politics and science

Q: Where would you place the early NT politically?

A: There is a moment in some of my writings that this point was explained indirectly. Certainly in the early 1960s there is a place for hope, for progress. In the science there was real progress, there was man in space. And the possibilities for real advancement in the social conditions made afraid the forces of conservatism. It was evident in '68, but the revolution was unsuccessful. "L'imagination au pouvoir." That explained the belief that the ideas of the Left were not abstractions, that they had some life forces that could be awakened. But you know that the reaction was very strong, so strong that many such spirits were changing their orientations, especially French philosophers.

Q: Can you say something about the 'group' question? Why did people make groups?

A: It is a very important and not enough studied moment. There was Exat 51. It was a reaction against too much individualism, I used to quote Wols as a painter who extremely analysed his own interiors without hope that any other human being or animal can be concerned with his destiny as a lost individual being. The tachism, Informel and action painting, all these were negative signs of that destiny of humanity and the young people tried to show "we are not alone". In the first exhibitions my text ends with this idea: 'One thing alone is nothing; only with all the others it is everything.'

Collectivity as idea was an old one in the artistic education. Bauhaus used to teach different generations, different classes together and to make experiments collectively. Gruppo N decided to make artistic objects but not to sign them. The same was a latent idea in GRAV, but the personalities there were too strong to accept that.

Just to realise the spiritual possibilities to make a new step towards the unknown there was needed more contact with others and participation in the collective activities. It remained unexplained why there were these groups and why they disappeared, but the market was one of the strongest reasons. The Biennale of Venice was an instrument of the market. When they took Julio Le Parc and did his personal exhibition and gave him the principle award he could not be anymore an anonymous member of GRAV. There was an American group that was rarely mentioned, Anonima. I could not go further in this interpretation, that phenomenon is not studied enough.

Q: Were you aware of cybernetics?

A: Not yet. It is interesting that the fourth exhibition, T-4, was not supported by the members of NT. They were confused, the computer was unknown, the personal computer did not exist, and there were only big computing machines. In Stuttgart there was the German plant for producing these machines and a replica of *Zuse 4* was presented recently at the ZKM exhibition. Only some people from science like Nake and his friend tried to see how it could be useful developing some artistic ideas, but there are a lot of ambiguities ideologically, conceptually, for example regarding the idea that the artist should be able to write the software himself.

Q: But cybernetics is not necessarily about computers, it is about feedback as a central mechanism. The statements of GRAV for example could be related to that.

A: No, no, you are right. Norbert Wiener, that was the real creator of cybernetics, he was teaching at Ulm school as a guest professor. What was his definition of cybernetics? It was command of human beings. It is not so important in which ways, in which domain. It could be applied to any domain. But when you try to deploy these ideas to the concrete task you are unfortunately obliged to restrict the potential significance of these cybernetic approaches. And the reduction is a real danger.

In the sciences there is a great production of articles, of papers, which hardly anybody really reads and on which nobody has ever made any real judgement. How much of that scientific production is really useful and for which purpose? So when you say science, you mean, something, the best of the possible content of the word, but reality does not consist only of the best things. It is my way of looking at it.

NT's reasons for decline

Q: Between the 2nd and 3rd exhibition of NT, there was some problem?

A: I tried to explain that in the text of the third exhibition. When you have an idea you are immediately looking for the possibilities of realising it and you make some suppositions. When you are going further you realise that suppositions were wrong, that you would not be able to realise your intentions. That was clear to me already in 1965. And this is significant, that exhibition has the title in the singular, New Tendency, just in the moment when we decided to accept all that is offered. Somebody, a tourist group from Moscow brought to Božo Bek a collection of photographs that showed the activities of a group from the Soviet Union, Dviženije, which consisted of artists, engineers and cyberneticians. They had important commissions, for example during the October celebrations they decorated enormous surfaces in Leningrad, or, they had an attractive exhibition in Moscow, there was a queue, long, hundred meters before the entrance, and nobody knew about that in Europe.

And Anonima group from America, three artists, very strong in their writing and their thinking, came also. How they came to Zagreb I don't know, but one of them Francis Hewitt, came personally to participate in the Symposium. We met again 1969 during my stay in US but their conditions to survive, as a group of course, were very weak.

In any way, in 1965 the disappointment was already there and Julio Le Parc parted from the group GRAV, the market re-oriented his interest.

Q: But was that the main problem that the market adopted it as a style?

A: No, there are different aspects. Some people from the movement like Enzo Mari or Le Parc himself tried to define the concepts that should be developed inside the movement. They made formal criteria to decide, who belongs, who belongs not and a list was done, living people were excluded or suggested to be excluded from the

membership of the movement.

Why? Because the idea was dispersed, there were many variations. A Brazilian, Waldemar Cordeiro, exposed an interesting thing. He put a bottle in the concave niche and used the bottle as a refractory for the images that were on the other side of the bottle, this was Pop Art, Op Art, NT all in one, but it was not wrong to let these things to be shown, this is the more correct way of deciding than to restrict.

For which criteria? You have seen (Julije) Knifer. He was just close to NT, (Miroslav) Sutej also, but they were not able to accept all aspects that were developed. Thus, they were excluded, Piene as well. It was wrong; I tried to contribute, as a coordinator of the movement. There were four, Enzo Mari, Le Parc, Graevenitz and me. Some bulletins were produced with these intentions to make the movement more consistent, but orthodoxy of that kind was dangerous and we were unable to go further in that direction. If you insist on your ideas, only on your ideas and don't look for what is going on you are condemned to isolation, but finally NT were condemned to isolation for many, many years. It is just these last years that this name is used again.

Q: So in 1965 what is shown is just the reduced core?

A: No, Le Parc and Mari, they tried to make the core. But we in Zagreb have been conscious that it is not possible, because of the other contributions, which I mentioned. So the contradiction is between changing the plural of tendencies into the singular and thereby affirming the acceptance of all new unorthodox contributions.

Q: But why were you then so disappointed?

A: For example, Mari proposed a competition for the exhibition because he believed if we were able to define more precisely the conditions of the work, how it was to be presented, how it had to be produced and distributed, then we would contribute to make the NT idea more clear. About 20 artists participated and a name that never had been heard of before, a young French artist, obtained the first award. What has he done?

I don't remember his name (Fadat) or something like that. He put some pieces of paper and some sources of light and the idea was that you can turn these pieces, and make different ways of casting shadow and light and using that as an instrument for research. It is excellent as an explanation of an idea but absolutely inadequate for the realisation, how to produce that industrially, how to distribute that?

It was Vasarely's conception, he used big workshops to produce his objects and paintings with different prefabricated elements. The best ideas can be transformed into a caricature when they are in the course of being realized in a real sense.

NT and the computer

Q: from 1965 to 1968 there happened another reorientation?

A: Probably that was the consequence of many new situations and also of the influence of Abraham Moles who gave an interesting lecture at the symposium at Brezovica in 1965. He had already theoretically elaborated the idea of how to use computers in an artistic way. He developed, similar to Bense, they both were teaching at Ulm school, an 'esthetique de information.'

That intermediate period was the time when I personally was not anymore very connected to the groups but some colleagues like Putar and Bek wanted to continue, and mostly Boris Kelemen who was very well versed in German. His brother, a composer and founder of the music Biennale in Zagreb, was living in Germany, as one of the most important avant-garde composers.

Probably through that Boris knew what was going on in Germany, maybe through Bense also and he discovered Frieder Nake. The relation of art and science and how to make it more concrete, especially with computers seemed very promising. Bek visited the institute of nuclear physics where there was installed the first big computer in Zagreb, to consult the people about that. He approached an old scientist, he is still alive, Zdenko Sternberg who made his acquaintance to a young very gifted man, Bonačić.

As Darko (Fritz) pointed out in his text dedicated to Bonačić, it was a real fact that this scientist was enough interested in art that he was able to consecrate all his career for that scope: to develop with the most appropriate technical methods for analysing the phenomena of visual and also acoustic perception. It was decided by organisers to make a large programme of a year with two symposia at the beginning and the end and several exhibitions, refreshing also the most vital ideas of NT. But nobody from NT movement participated anymore in that programme.

So formally that was the stop to NT as a movement, as a presence, but not as a continuity in developing some basic ideas, for that reason I accept this large period that was included in the exhibition in Karlsruhe from 1961 to 1973. Your text also made it clear. Although *Bit International*, does not belong to NT as a group, the same people in Zagreb, the organisers, continued its ideas.

Q: So the organisers, you as a critic could more easily make the transition, but the artists could not?

A: (Gianni) Colombo had a posthumous exhibition recently near Torino. He was the most important member of Gruppo T, they tried to reconstruct all his projects. For the understanding of media art development it is important to visit that.

In Italy, some new categories were already introduced, from psychology, from other fields. Paolo Benvenuto was a friend from Padua, very close to Gruppo N, he made a contribution to the catalogue of NT3 and Group de Recherche d'Art Visuel were also very attentive to see what scientists could do to help clarify their own ideas. Instabilité, instability, that's a term that comes from nuclear physics. I never was

looking for a more attentive analysis of that aspect. But it is interesting.

Q: With this new phase comes in participation from commercial research labs. Isn't that going against the grain of artistic thinking to have these corporations?

A: No corporations, but the people who were close to those ideas who were working in those corporations. Practically, who could work with those kinds of computers then? When did the first PC arrive? 20 years later.

Q: But they are working for companies with whose help the US is bombing Vietnam?

A: My son received just the last type of Apple's PC and the friend looking at it said, it would not have been possible without the project of man going to the moon. You cannot say what the technologies developed for war will have consequences in other areas. It is just basically known that those powerful machines were not used so much for bettering the human world but for destroying it. How you would explain that? Not easily? Be careful to not simplify that question.

Q: I am not sure if I fully understood that.

A: Some people in the movement are using the instruments from the big firms that at the same time are producing the arms for the Vietnam War. That moment was clearly pointed out in the first symposium, because (Alberto) Biasi was the only one to make a critique just from that point of view. I know what is a war. My life is very marked with the war situations; the Second World War and the last war were local here. Now you have a knife to cut bread, you can kill a person also with it.

Q: At the exhibition in Graz I saw the Boeing 3D wireframe graphics. The jury said we could not decide on any criteria and then of course the technicians won the first prize because their programming is much advanced compared to that of an artist who gets a few hours on a machine.

A: But look what in Zagreb was incomparable to what was in London at the same moment. More than 100 companies contributed to Cybernetic Serendipity. I said yesterday it was a big fair. In Zagreb we did not have a sponsor of that kind.

(Referring to Biasi's intervention in 1968): there was a polemic at the first symposium between Nike and Biasi and I made a comment. It is summarised in English. In the short sentences, the problem is well illustrated.

Q: NT was very international. How did you manage to make that in Zagreb?

A: Naturally I try to explain my position and my orientations. Thanks to Božo Bek who had a very important experience. It was earlier than me for several years. He studied to be an art historian in Leningrad. In the last moment in 1948 he left Leningrad together with one of the founders of the journal Praxis. When he came back some years later to Russia, somehow he was able to see Malevitch's work so that he has double feelings of what is oppression in cultural life and what are the possibilities of real creation when the occasion is open like the years of the 1920ies in Russia.

The museum (Gradska galerija suvremene umjetnosti) was created to have an open opposition to the academy and the Museum of Modern Art that belongs to the Academy of Art and Science. The first exhibition was a didactic exhibition of abstract art with the first class production of French artists, so there was continuity. Several persons were involved not just Picelj, but Vjenceslav Richter also. He was the Party member during its illegality before the Second World War and spent some time in Vienna, he was wanted by police and wounded. He was really following those progressive ideas, before foundation of the Exat 51 group. Some other intellectuals, I should mention at least the director of museum of applied art, Zdenka Munk, a Communist but of a cosmopolitan orientation, were actively present supporters. Many persons able to make made a clear difference with regard to what they supported, as opposed to some others also influential.

Q: In NT there were mostly men?

A: But how many women were involved in art in general at that time? There were several, Helge (Sommerock) from the group Effekt, Marta Botho, and Grazia Varisco the lady from gruppo T, and Dada Maino, also from Milan. The feminist movement came later.

APPENDIX C2: The Making of New Tendencies, Part 2

Interview with Matko Meštrović, Korčula, Lumbarda, 26th and 27th of July 2010. The interview was partly recorded, partly dictated and typed on location.

The interview has been edited in consideration of the overall length of the thesis. A full version can be made available on request.

The story of the Pavilion of Arts

Meštrović told the story of Umjetnicki Pavilion (Pavilion of Art). In 1960 a celebration of the modern art pavilion was arranged. The pavilion had originally been built for the millennium exhibition in Budapest, 1896, and then was dismantled and transported from Budapest to Zagreb. All important new artistic schools had been shown in this venue. For the celebrations, Meštrović prepared a contribution on the modernist architect Drago Ibler and Zemlja (Earth) group. Meštrović had a meeting with Ibler and interviewed him. At the end he was given a document by Ibler, the original version of the Earth manifesto.

At the day of the exhibition opening, Meštrović went there early, half an hour before the official opening. But there was a policeman, saying the exhibition was cancelled. Meštrović called professor Milan Prelog, who knew nothing about that, but had a direct connection with the minister of culture, Anica Magasic. Thanks to her intervention the scandal was avoided. It turned out that an influential artist and member of the Yugoslav Academy of Arts and Sciences, Krsto Hegedušić, had intervened to close down the exhibition. The reason for his intervention was Meštrović' text about Ibler's role in Earth group, which diminished Hegedušić' role. Hegedušić wanted to be seen as the most influential artist. (Note: Hegedušić combined political art with a naive rural style in painting, a kind of Socialist Breughelism which could claim to be both leftist and patriotic, i.e. a style that could be understood by Yugoslav peasants, cf. Impossible Histories 2006) Hegedušić had links with the highest party layers and abused his position to protect his personal interests, explained Meštrović.

The episode was also told to illustrate that while there was no systematic censorship of the arts, individuals with power acting undemocratically could exert a special damaging influence.

Meštrović also told about Radoslav Putar, who was very important for him, as he was received by Putar when he came from his native Split to Zagreb as a very young man to pass examination for registration for art history study. Putar encouraged Meštrović in that first meeting, saying "it was not a real examination, just a human discourse."

Putar was personally attacked in the academy by another academician, Vanja Radaus, because he disliked what Putar wrote about his work. Putar did not make academic career. Allegedly his dissertation was not finished on time which was the 'official' reason. Putar became an important participant in NT.

Meštrović' Marxism

Q: What did you read in 1959-1960-61? Did you go to see movies? Influences from outside plastic arts?

A: I don't remember exactly but I can tell you something about my reading at a later stage of my life..

After many crises in my personal activities I was involved in the Centre for Industrial Design founded in Zagreb by Federal Chamber of Commerce. I started to go there at the beginning of 1964. There I had some stimulus for more professional reading than for general one. At the end of my career there in the middle of 1968 I was invited by AICA to participate at a Congress in Bordeaux. The title was 'TV and the Arts'. Radoslav Putar just a few weeks before had returned from Canada bringing with him a book from Marshall McLuhan, *Understanding Media*, and he gave it to me. At the same time an important man from the political side, Ivo Bojanic, became general director of Zagreb Radio and Television.

I showed to him that invitation from AICA and he sent me to Bordeaux. I prepared a presentation and sent it there before my arrival. I arrived at the last moment, the evening before the conference. I was hungry and looked in the hotel for something to eat, and a lady who was very close to AICA from Belgrade, Katarina Ambrosic, stood near me to exchange some information and wanted to tell me something. At the last moment she held back and did not say what she had wanted to say.

The next morning Giulio Carlo Argan who was the chairman of the conference proposed a change in the schedule, that my presentation should be given first. I was young and courageous, I wasn't surprised. I read my presentation in French, and going back to my seat I heard him commenting to the audience: "You have had occasion to hear what is a real Marxist approach to this topic."

In my text Marx had not been mentioned. But a long time later I started to take seriously that remark from Giulio Carlo Argan. I knew him from before, we were close friends, but as he was not a Marxist either I was surprised how he came to connect me with Marxism. Personally I still had a dilemma because of my religious feelings. At that point in my life I had not started to engage seriously with Marxist literature.

I give you this case to illustrate the complete unsystematic nature of my intellectual development and my maybe too great confidence into intuition. Many times I became conscious that intuition is not a good guide but also I had to recognise that I personally have nothing better than it.

Donald Egbert, an American architectural historian, professor from Princeton University, came to Zagreb to talk with me, I think it was 1967 or so, anyway, I have his letters. But in his book *Social Radicalism in the Art, from French Revolution to 1968* (1970), he called me a Marxist critic.

I think I was not influenced from ideological propaganda, but it is my social origin

that this side of orientation was strong, my experience as a child during Second World War and some clear understanding what was the war and what the social revolution.

Korčula Summer School

Q: Have you ever been at Korčula Summer School?

A: Summer 1968 in Korčula: a big gathering of the most brilliant philosophers of the world, from Marcuse to Bloch and Habermas. I was there participating not as a speaker but as a reporter, with some of my friends. The most important of our Croatian philosophers was Vanja Sutlić. Early in the morning he came with catastrophic news. "This night world Communism died." He had heard on radio the latest news about Soviet troops entering Prague.

It was very dangerous for Yugoslavia. That same year was a *Convegno internazionale artisti, critici e studiosi d'arte* in Rimini. There was Maldonado also, and to my surprise Yuri Solovyov (founder of VNIITE, the All Russian Institute for Technical Aesthetics - the latter a synonym for industrial design). I was walking with Maldonado, suddenly Yuri came to greet us and he greeted first Maldonado and then me asking: "How are you doing, what are you doing." I abruptly answered, "we are waiting for you" (I meant the Russian troops). He immediately turned and left us. He was sent on a special mission to calm the world reaction to Prague.

Croatian Spring

Q: What, if any, influence did the Croatian Spring have on NT?

A: No connection.

Ivo Bojanic who would later become general manager of Zagreb Radio and TV, formerly secretary of civic party committee, and Miko Tripalo (a high level reform-oriented Croatian politician) supported New Tendencies activities over Zagreb gallery and Bek's activities. When I came back from my visit to different countries to select the works for the second exhibition, to ... (interruption, see old interview). Q: Why did City of Zagreb support contemporary art gallery?

Galerija suvremen umjetnosti

Q: Why was Galerija suvremene umjetnosti founded?

A: It is a consequence of the long struggles between conservatives and modernist views. I explained yesterday the story of the opening of the Art pavilion. The same man, Krsto Hegedušić was most influential from the point of view of official art politics, as a member responsible for plastic art in the Academy of Arts and Science, as a master of art in his workshop, and as an old leftist, as he believed himself, but most reactionary regarding the practical politics. In his master workshop he collected

the most talented young people and made the public picture of himself as the most progressive intermediary.

So in that same sense he organised artistic group Mart with some people outside the circle of his disciples, like Murtic (first quasi abstract painter). So they have a big exhibition in the Umjetnicki pavilion, and I as usual made a report for the radio in a daily broadcast, a review without any glorification. A day or two after that the editor in chief of cultural literary redaction where I was a member called me.

I am not able to describe dramatically enough the way he presented me with the decision. He said, I am coming from Ivan Šibl, general director Zagreb of Radio and TV (the TV just started in Croatia). He asked me to fire you. Why? It's not important. The president of the JAZU (Yugoslav Academy of Art and Science) asked him personally to do that. So thanks to my support you are condemned to 3 months of silence. (I am not sure which year that happened, but all what I said is true.)

The most progressive forces in the party could not support such behaviour of the conservatives. They founded a civic gallery with different cultural politics. One of the first exhibitions there a didactic one about abstract art, with the work of the most important French artists, such as Vasarely, and others. Božo Bek who was not allowed to publish his findings and his research on the Earth group activities before the Second World War would soon become director of the civic gallery.

Q: What were the expectations?

A: The most important thing was to get up to date information, what is going on in the world.

The civic authorities were very progressive in that particular moment, but for that new cultural orientation there already existed an important model, theory and activity of group Exat 51 which at that moment was not any more active as a group and not very productive, but it could serve as a precedent. (Liljana Kolesnik worked on that) An important conclusion in her big book is that in Croatia there was no real avant-garde before Gorgona and NT. She doesn't recognise Exat 51 as avant-garde.

When Udo Kulterman (German art and architecture critic) came to Zagreb he was interested mostly in architecture because there was produced Jugomont 61, a system of prefabricated houses. He was so enthusiastic that in the first book he published afterwards one of 8 pictures used was of Ju-61 system.

The idea of design

Q: When did you stop working for Radio?

A: At the beginning of 1964 I was starting to work for the design institute - Centre for Industrial Design, founded by Federal Chamber of Commerce. There existed several artistic associations. There was a difference between artists of visual art and artists of applied art of Croatia (ULUH and ULUPUH). This second association brought inside different branches of the applied arts and some architects also.

As in the manifest of Exat 51 there was the declaration that for them there is no difference between art and applied arts. Inside ULUPUH many ideas for industrial design have been developed; prominent in that were (Vjenceslav) Richter, (Bernardo) Bernardi (architect from Korcula) and (Ivan) Picelj (all three members of Exat 51); so inside ULUPUH was formed SIO, Studio Industrijskog Oblikovanja, it prepared a presentation of Yugoslavia at the Triennale of Milan in 1957 and successfully obtained a medal; from the same people was proposed the idea of a research centre, educative, informative, documentary and operative. With the prospect of economic reform and the intention to obtain a higher level of industrial culture - CIO (centre instead of studio) started at the beginning of 1964. Richter was the formal director and I came the first.

We had many promises in the wake of launching economic reforms which unfortunately failed so that the centre lost support. I finished being there in until the end of 198, publishing the last number of the 12 issues of the magazine Design (Dizajn). With this magazine the term design was formally introduced. Until then the term in use had been Gestaltung - oblikovanje.

Zvonimir Radić, another person active there; was already a member of ICSID (Internationally Council of Societies for Industrial Design - people like Maldonado and others). They were very responsive for the programme of the centre and for this large conceptualisation, which foresaw different departments, educative, looking for appropriate educative institutions or their programmes, operative, where real design will be practiced, experimental or pragmatic, informative - where is the crucial information of what is needed and what are the potentials for development, as people, as firms, as materials, as management and so on and particularly what is going on in the field in the world. We have a good connection with British council for industrial design, personally with Sir Paul Reilly.

Churchill in 1944 when he thought about the future of GB made the decision to put the heaviest accent on the development of the quality of British industry, from that time Paul Reilly was head of Council of Industrial Design; we later organised a very important didactic exhibition together in Zagreb, Belgrade and Ljubljana with conferences of most important British personalities in design, like Micha Black or Michael Farr, and celebrities like Lord Snowdown.

I had meetings with him at 1968 in Tbilisi. Yuri Solovyov organised it with Unesco, a big conference *Art and Technology* under chairmanship of Giulio Carlo Argan; just before that the Soviet Union founded a big institute or rather network of institutes throughout Russia to develop a systematic approach to technical aesthetics (term for industrial design). Krushchev called Reilly four times for consultations, Unesco supported this idea and the most important designers, practitioners and theorists from the entire world, Japan and the United states attended that conference.

But on the second day these people started to ask why were we invited here? Just to assist to abstract discussions of art and technology?

Then Yuri Solovyov organised a parallel "conference" in his apartment during the night. But Russians could not understand what Americans meant, and I had to

translate. On the next day we went for a visit to a monastery in the mountains. I was sitting next to Reilly as the bus went slowly through serpentines, Reilly said, "Matko I have understood yesterday night what is the role of Yugoslavia."

The last time I spoke to him was just after the death of Tito. Reilly: "Yugoslav people unfortunately don't understand what a great man they lost."

Q: Your PhD was on design?

A: Yes, the title was 'Design Theory and Environmental Problems' (1980). I brought a copy to George Nelson, who could not believe that such a book would come from Yugoslavia. Bernardi was impressed also who had good relations with people in GB, but they asked for somebody who could read it in Croatian and make a proposal. Unfortunately they found a Serb who just was taking a course of Margarete Thatcher's ideas. He informed the publisher that it was good but not interesting. Udo Kulterman spoke with a publisher who asked me to offer a manuscript in English, but I was not able to do it personally. An American woman who specialised in Croatian was ready to translate but when the project came to the self-managing community of interest for the sciences the chairman refused, explaining, "why has that man not written it in English," so the money was denied.

Enzo Mari

About design: I know (Enzo) Mari from 1959 I think, I visited (Bruno) Munari, who was very famous at that time, and he suggested me to visit Mari and gave me his address in Milan, Piazza Baracca 10, and I rang, he came, opened, started to look at me, very suspicious, he is of a stature which is very unusual in Italy, tall, with a beard, so finally I decide: "mi lasci entrare o no?" (would you let me enter or not?) We became friends very quickly.

I was very interested in his particular way of thinking, very engaged critical thinking. The moral and moralistic point has a great importance to him, especially how the things are professionally well done. He was a perfectionist in design, with the finest sensibility, very far from any kitsch taste. He really did not make a difference between art and applied art in his work. Especially I was fascinated by his structures, in cardboard, in metallic laminate. I was surprised when preparing the artist list to be invited (for NT1), Mavignier refused to accept him. They have met previously, and Mavignier was afraid of his way of looking at him. Unfortunately Mari was not present in the first exhibition. He accepted my proposal to make his personal exhibition in the Museum of Applied Art.

[...]

But back to Mari: his work and research was well presented and what he has done for Danese and others, but had no real consequences. It just confirmed our good relations.

In the debate after the first exhibition when the idea of a movement was quite mature already, I visited him in Milan just with the intention to collect enough information

for the second exhibition.

I used to go by night train to Padua, stay there one day or continue to Milan and next night in Paris and go back to report what I find interesting in Paris to people in Milan, Manzoni, Castellani, I did not know yet Gruppo T, and especially in Padua, Massironi, Biasi, ... I remember that from Milan I planned to go to Basel to visit Gerstner, and as I did not have enough money, just entering the train Mari gave me some money.

But as for the second exhibition I took responsibility for the selection. Of course I invited Mari also and he was critical what is good or not. His ideas are extremely rigorous vis-a-vis his own work and attitude and towards the others. So as a person he could be very difficult, in communication. As I remember he studied at Brera Academy but always gave the impression of a self-made man. He had more of an ethics of a craftsman than an artist or intellectual. But he also engaged with intellectual questions, which he formulated rigorously and with extreme consequences. A heavy man. One of the discussions that I had with him, he took as an opportunity to propose his own version, what should be researched, how the research in visual arts would have to be.

The deepest problem was how to use industrial methods of production in the field of visual research. His proposal was called 'divulgarion of the examples of research'. Richter was still in the industrial design centre and Putar probably also. Both could have a look at the proposal but they did not observe any special problem in this approach, they considered it I would say, legitimate in the field of visual research, so the CIO took a part in preparing the material.

This material (text in NT3 catalogue) was then done with the help of me and my colleagues at the centre. Nobody could say in advance what would be the reaction and what result could be expected or how many people would react or what they will do. But a relatively large number of the potential members of the movement participated. Otto Piene surprised me when I saw that he accepted and prepared an object for the competition. But the biggest surprise was Michel Fadat with his proposition of an instrument to make research. Technically it was too poor and unconvincing, but ideologically he was the closest to Mari's idea, which is maybe one of the basic contradictions of NT.

The problem was that after Op Art it lost significance because nobody was interested in research any more, only in selling.

The Computer and NT

Q: Your attitude to computer phase of NT?

A: You will see in my book the picture of the first computer designed by Maldonado for Olivetti. And Olivetti supported arte programmata, and I had a personal contact with their secretary for cultural relations (I don't remember the name). So in some way I was intrigued with these new machines. Mostly from the visual, structural point of view. So in the next photograph you can see what is inside of computers, the

quantity of chips interconnected. And immediately in my imagination, with my intuition the new important things are not more mechanical constructions but some kind of relations of the unities, the multiplicity of unities in some new order. Abraham Moles was one of the main influences, proceedings from the symposium in Brezovica, can illustrate that.

Regarding the programme for the next tendencies, which should happen two years later at 1967 but was postponed because some uncertainties cropped up about what could or should we do. There was an idea, which remained unrealised. It is just recently that I discovered in letters that it was proposed and accepted from three groups to make a collective exhibition with group MID, (already present at 1965) Anonima group from NY and Divizenije from Moscow, and Bek tried to realise that through different channels to obtain the permission for the Russian group to go outside, but unsuccessfully.

Q: What do you think about computer generated graphics?

A: I did not believe too much in that, but I was sure that we should try. Nobody from NT was active in that direction. Only Biasi was to come on the first symposium, to protest. There existed only one big computer in the institute of physics, Ruder Bosković We were lucky to have the contact with some scientists that were open Mujevic, Tezak and some others ...

APPENDIX C3: Interview with Darko Fritz

Korcula, Lumbarda, 27.07. 2009

The interview was recorded on digital audio and transcribed.

The interview has been edited in consideration of the overall length of the thesis. A full version can be made available on request.

Q=Questions Armin Medosch

A=Answers Darko Fritz

Q: How did you originally get interested in NT?

A: In Zagreb, NT are part of common knowlegde, part of mainstream culture, but only as a term, which covers all art that we call Concrete Art, arte programmata. Only later I discovered that it stands also for a wider spectrum that includes digital art, computer generated art and conceptual art.

I started to get interested in art when I was 14, 15, 16. While working on the cathedral project in 1988, a computer generated environment with performer and video, cctv. We worked on the computer-generated (CG) interface with five artists. We were trying to learn more about existing CG -- available art was all about conceptual, multimedia, extended cinema art, mail art, but information about CG artworks was available through Leonardo Magazine and Siggraph scene, and we knew that we were not interested in things happening at Siggraph, -- so we started research how these things began. Then, somebody told me that within NT there had been also CG art. So I went to the museum of contemporary art, bought *Bit International* magazine that was available at the time and that's how I discovered that there was CG art in NT. A few years later I discovered that there was conceptual art too.

There were several restrospectives of NT, the earliest one was 1992, 93, 94 it was art of constructivistic approach, something like this, and that includes a lot of work of NT.

I got interested especially in conceptual art as diametrically opposed to Concrete Art. I was doing research on that and as years were passing, media art became more popular. In 1990 I came to Amsterdam to do postgraduate studies in media art at an art academy.

Gradually media art became more popular, a global network arrived, first projects on the internet and an utopian project joining art and life. There were three keywords, global network, social engagement and computer-generated.

When I thought about those keywords, that reminded me of NT and that hardly anybody, neither in Croatia, knows that those keywords, were not only keywords, but also denoted the practice of NT, under much harsher conditions, when global networking was harder to achieve, with the Berlin Wall, when it was even dangerous to send a letter from one country to another, not talking about travelling and

communication and projects and so on.

Out of irritation that no single art historian in Croatia or any other place -- as this phenomenon is not Croatian, I would like to underline, NT are a truly modernistic international product in the pure sense of the word, the headquarter was in Croatia, also some Parisians, GRAV, took the headquarter to Paris for a while, for a while also a group in Italy was very active, there were bigger group shows not just in Zagreb, but also in Paris, Venice and Leverkusen, so I couldn't consider that some Croation national heritage, whatever some Croats like to think -- so in the mid-1990s I felt irritated because of a lack of historical knowledge in general.

As media art has been suffering projections regarding the future and has never been contextualising its past activities, I had a kind of hard argument that all participants can learn something from those achievements, although today computers are not comparable to those ones, the political situation changed from Cold War to post-Cold War and so on.

Information society that was on the way up since 1960s, now has arrived, but the keywords have been there already back then. I was actually suprised that the difference between contemporary art scene and media art scene had become bigger and bigger -- I am talking of the mid 1990s, as contemporary art scene did not follow media art scene at all, because media art did not happen in the galleries, did not happen in the networks of contemporary art scene, its power structures and so on. There were no magazines, in Flash Art, Artforum and Kunstforum you could not find any information about media art at the time.

Things have been happening on some obscure mailinglists, ad-hoc projects, outside those power structures, and it took a long way untill media art would be accepted; so in that sense I made a difference between contemporary art and media art scene, however all my activities are about filling the gap or bridging those two worlds, because I think they have a lot in common, thats my mission; and as conceptual art scene is maybe suffering too much from contextualising and self-referencing and historical referencing and often you cannot read at all contemporary art project without knowing the context, art history and especially conceptual art history, and unlike that media art is missing historical context completely.

I noticed those phenomena and I found it problematic, as no researcher or art historian did even research the broader scene of media art, putting media art in some kind of perspective, any kind of perspective, actually, it was all about recent things. I know it was sexy doing things and not thinking where it came from, it was an exciting time for producing - talking still about mid 1990s - so at that time I made the decision that it is necessary to put media art into a historical perspective and create a discourse.

What I have done on the small scale was that I bought many *Bit International* for a small price and I started to give them away to any international people I met and started to talk privately about those problems. I was doing that for years.

Over time my interest got bigger and bigger and I started to dig into the archive as it was available. It looked like they didn't have at the time a centralised archive so I

went from office to office, drawer to drawer and asked all these people that fortunately I know, curators that have been dealing with NT, "do you have some material," and then I got some slide or some document. Then I heard that there was some mysterious cupboard full of documents, but that was not sorted. They allowed nobody access, so my research at the time was about the materials, where to find them and bit by bit I got the things together.

In 2000 came the first results, Multimedia Institute opened a new place, MAMA, and they commissioned an exhibition. They wanted to give visibility to their project and show their internet art competition. Then I proposed to extend that idea to exhibitions from 1960s digital art. As far as I know this exhibition was the first retrospective in the world of such computer generated art.

I am still alive

A: MI2, Multimedia Institute was started by Soros, later they also founded MAMA. I was happy to work with them, these guys were very young and were more coming from a socially engaged scene and net art scene.

[...]

At the time there was a fashion in art, that was low tech media art, and actually artists started to show interest in the history of their own discipline, not art historians, not theoreticians, but artists, through this very genre of low tech media art; Alexei Shulgin and Vuk Cosic who previously were strongly involved with net art, were both dealing with low-tech. To be precise, not Vuk Cosic but Ascii Art Ensemble. In the exhibition were exhibited original ASCII graphics from the 1960s and 1970s and next to it Ascii Art Ensemble, a brand new piece from 1999. Alexei Shulgin performed live, the dx386 Cyberpunk band, which was consciously using 386 PC, an already very old PC at the time with a limited amount of memory and a small hard disk, to show that with such a limited hardware you could make a multimedia exhibition.

The academic fashion of showing interest in the history of media art happened some five years after that. As I made the exhibition I started with MI2 to develop a book idea. Alongside the *I am still alive* (2000) exhibition we published a website with lots of historical material. At the time if you googled early computer art, maybe less than 10 websites were dealing with the subject. I think apart from our site it was mostly illustrations that you can see some of those websites; in our case we published the whole table of content from all *Bit International*.

It was my intention to republish historical material, and we wanted to be able to publish it in better physical form than it was originally published, as we can now have colour reproductions instead of black and white, we can improve english translations, we can join material from the catalogue and *Bit International*; there are the same projects from different perspectives, with artists' statements, descriptions of the work, publishing original code listings ...

That was the time when interest in software art became big and I wanted to prove that software was a topic then but there was hardly a place where you could discuss those things or publish it, and that was the case with *Bit International* magazine and

the symposiums, they did publish and they did discuss software. It was not bit art from the black box, as Cramer names it, that was not the case; for NT4 flow charts and programs have been required in the call to come with the works.

In 2000 I applied at the Ministry of Arts in Zagreb, Croatia -- two applications, basically to continue the research. I was doing research from my private money, time, as I was not institutionalised. We published a small booklet and website alongside with the *I am still alive* (2000) exhibition, with a text from Matko Mestrovic, the basic information, the table of contents of Bit International, and with a few stamp size reproductions, together with that new stuff, the net art competition and Ascii Art Ensemble.

It was a small book but important as it was printed, and the website attracted lots of researchers. As I said, when you googled it was immediately coming up, and lots of researchers contacted me from that time on internationally. We have been turned down the first year for the publishing project and continuation of research.

[...]

After the first application failed, I made a reduced budget, re-designed the project and we have been turned down again. In the third year I did the same, re-designed, shrunk the budget and I have been turned down again -- actually they lost my application in the Ministry of Culture. I saw it with my own eyes, I went there and saw the application, 'positive answer,' and one month later they told me they had lost it, five or six other applications had been lost together with mine, so that was the attempt of publishing a book in Croatia.

In 2003 I met Barbara Buscher from Kaleidoscope, at a symposium on Max Bense. Following her suggestion, I embarked on a new book publishing project, with an application for Bundeskulturstiftung. Margit Rosen contacted me, looking for information on NT for PhD research, connecting me with ZKM as a possible partner. Buscher gave up because she thought that artistic freedom would be in question when working with ZKM. We started talking about an exhibition and book project with ZKM, also MI2 and Kaleidoscope envisaged as partners. In the end only ZKM was left, this is part of a long history of such 'agreements' I had with Weibel.

Bit International

Then I curated the exhibition *Bit International* (2007) in Graz, Neue Galerie. It was a historical restaging of the whole thing NT with the key idea to interpret it not only as an exhibition but also as a network of people. With artist's statements displayed next to the work, as well as some original working materials, computer programs or analog program, or for instance the letter by Herman de Vries saying 'these works are not done by computer but they could be.'

We also presented the audio archive with more than 40 hours from four symposia, that had been digitised and archived and made available in an easy interactive format on DVD.

Everything was done under heavy time pressure, we had less than six months for preparing the exhibition; it was similar with the ZKM exhibition, but not so bad because international loaning agreements had been done for Graz with loans from

Spain and people from other non-English speaking countries.

You cannot find these people on the internet, and most of them are dead. You had to trace those artists, in South America, Japan, they were not famous artists, so it was hard to find them.

It was different with the first phase of NT, these artists were established, their works had become part of museum collections. My job was to find contacts of people from whom we could borrow works, logistics was done by ZKM. I was supposed to trace the resources and be very precise. For famous artists that was no problem, but for CG artwork that was quite a problem. So apart from a few collections, like Hannover, who have quite a few CG graphical works, it was very difficult to track down artists and pieces.

For instance Compos 68, group from NL, made up of three people, at t-4 they won the prize, and had a great show in Vienna the year after, but then nothing was heard of them anymore.

I found some flow chart in the archive. A lot of material I did not find in the collection but in the archive. Materials such as small computer graphics sent to be published in *Bit International*, a lot of those originals got exhibited, but officially could not be part of the collection because they must be bought or donated, so they remained in the archive.

When I finally found the contact for Compos 68, I went to Utrecht, and the gentleman literally took from the attic a box and said to his wife: "You see, nobody came to ask me for this for 40 years, and do you remember when I said, it is important, so some day somebody will recognise that." So he was bringing this dusty box full of artworks. Lots of works have been found this way, tracing the work was a hard job, especially for CG work as well as this audio archive.

I did not want to follow the fetishistic idea of an exhibition of artworks. For me the idea was about exhibiting NT, which means it is not only artworks, its all work-in-progress, all ideas, and especially social engaged ideas which are often not readable from the artwork alone, especially not nowadays, because we don't know how important was the participatory integration of audience.

This is not only a picture you look at, when you change your position the picture changes, this was a revolutionary, participatory interactive relationship which had very strong social ideas behind it. These ideas we cannot read anymore today, because basically it was invented back then.

And these guys published manifestos and texts and I tried to show that as much as possible using strictly original materials, and showing not only artists but also gallerists, art historians and all other people that participated in the movement and the symposium, and also *Bit International*. I treated as equal text, image, artwork, audio, participation, any kind of document or trace, if it was part of an exhibition, symposium or magazine.

[...]

Q: What was the difference between the exhibitions in Graz and at ZKM?

A: In Graz it was more about showing ideas, so I showed some works that were not shown at NT. At ZKM it was strictly only NT. At ZKM there were more artists but fewer works per artists. In Graz I made the exhibition design myself, at ZKM I did not.

[...]

The ZKM exhibition was split into five sections, NT 1,2,3,4,5, so they missed out other exhibitions that were not in Zagreb, those in Venice, Paris, and Leverkusen. I was against the Zagreb-centric approach, but they had some funding related policy, that they had three cities doing something with independent curators that are not superstars and who were allowed to make a high budget exhibition with a big institution. I am lucky to work with them but you don't have things in your hands, and lots of compromises have to be made.

Also because of a lack of space we excluded lots of work that actually would have fulfilled the hard criteria of inclusion. The audio archive was not interactive, and what I was missing most was the timeline.

In Graz I included a timeline, a chronology, including also several pictures and videos, as this is so complex and NT consisted of such wide ranging activities, six exhibitions alone within t-4 (1968-69). There was a whole room dedicated to this timeline.

[...]

Q: Did this change the general perception of media art history?

A: We need multiple perspectives, and we still have very few perspectives. NT has a potential to be a perfect case study. Implicit in it is the shift from modern to postmodern discourse and included are several ways of making media art, such as lumino-kinetic, electronic and digital art, and possible different views on conceptual art as part of media art history.

On Kawara is a perfect example of the intersection of media art and contemporary art. There was a quite well done retrospective in Ingolstadt. I try to find always new perspectives from NT, it was so complex, you can draw so many perspectives.

Q: How does this affect you as an artist?

A: I have been educated as an architect, then shifted to art and graphic design. It didn't have a direct influence, i didn't start to make ASCII graphics. Just recently I started to consider now to include some of the elements into my own artistic practice with a new series of work that I dedicate to some artists of historical importance, who are Goran Trbljak and Vladimir Bonacic.

[...]

NT Network or Movement

A: For me the most important aspect of NT was that it was a network. I consider NT not as a series of exhibitions, but as an international network. They considered themselves during the first phase as a movement, but it was never defined - the term NT was also used as a genre name by other artists.

When computers came into the picture NT was opening up to another network of people. So we are talking about several networks, and this aspect of live meetings. There was quite a number of people in 1965 in Brezovica, they opened communication channels with circular letter, it was always very political who would write the circular letter, as there never was a hierarchy in NT.

The decision making was always done in the group, also curatorial decision making. The editorial boards have always been group editorial boards, it was always the question who was inviting whom. There was the Gallery of Contemporary Art in Zagreb providing the infrastructure, but there were also other groups offering to provide infrastructure. There were often those little fights, for instance about GRAV, who made a stamp. They felt at one moment to use it like a logo. There were lots of fights between the early groups involved in NT, those live meetings and later the symposia, that's important.

During t-4 when organisers included CG art they used colloquia and symposia as a means to learn about those subjects. It was a whole process of organising, it was not one curator who made a show.

All those circular letters were about finding a new direction, also to have the live meetings to make a new board to make another meeting. At one point they felt the exhibition and catalogue were not enough, so they made a new magazine.

[...]

Q: Would you consider NT an avant-garde?

A: At the time the idea of believing in science and a rational approach was rather radical, as maybe opposed to now. This was a time when informal art and abstract expressionism was dominant.

They [NT] said, no, we don't agree with this renaissance idea of the artist as an individual genius transmitting religious meaning into artwork. No, we use a rational approach, teamwork and therefore strive for the demythologisation of artist's role in society. They believed the artist was taking an active role in society, quite under the new leftist influence or revisionist Marxism, or in any case, an anti-Stalinistic, anti-dogmatic Marxism, which at the beginning of 1960s was rather radical.

These ideas have been articulated independently by artists from France, Germany, Italy and Croatia, and around the world, but they didn't know about each other, the

role of New Tendencies was to bring them together.

They were approaching the language of science and programmed art as opposed to art coming out of the stomach, so that was revolutionary at the time, as well as expanding the language of experimental art.

But these guys were borrowing their terms from science; they posited there are many possibilities and what is shown [as an artwork] is only one of many possible outputs.

They were as well expressing ideas about active participation of viewers, with structures that are changing, as well as producing multiples which was elaborated as a critique of the art market. The idea of multiplication was very important, the multiple has a lower price and is more affordable.

Art and Technological Society

Q: In 1960, wasn't there already strong scepticism of this high-modernistic approach. At the time already you could see the downside. Science already by 1945 had lost its innocence with Hiroshima and Auschwitz, and this modern idea about progress had lost its attraction

A: As far as my research shows, I did not find a critical approach towards science in the first phase and this shift you mention did not happen in the early 1960s but mid 1960s. In 1965 NT are already in crisis. At about 1963 their dynamics was the most strongest.

The outcome of a general believe in rational organisation of the world is '68. When NT started they did not have a critical approach. As such I find them as the last convinced modernists, they do believe in progress, in technologically driven progress.

Then some of the participants will join students' groups in '68, but the core of organisers will not be on that side, and with them many of the participants who wouldn't change their approach.

[...]

Q: What was the relation with Praxis and Korcula summer school?

A: Only Rudi Supek participated in the 1965 catalogue. These people had strong anti-technological influences through Adorno.

Even the organisers of NT, we cannot approach them linearly, as I explain in an article recently Many of the organisers from Zagreb have been members of proto-conceptual group Gorgona and at the very same time while organising this believing-in-science-NT they were doing completely absurd irrational and existentialistic, situanistic, non-materialistic, non-objective, behavioral art as members of Gorgona group. The same people were doing same things at the same time, in case of NT this was very public, that was very prominent public figures promoting NT, and at the

same time almost entirely in private have been doing big-fun non-materialistic art. We need to take a non-linear approach and everything fits.

Q: Can you comment on that Morellet quote, about the revolution in art as big as the revolution in science?

A: A very cutting edge statement; what happened was that this kind of art became mainstream and was appropriated, especially by the American art market. The 1965 exhibition at MoMA and the term Op Art focused on aesthetics, turned everything into a cosmetics, the whole social thought that was behind such a statement was not absorbed and not integrated. The commercial art market took apart any social ideas and focused on retinal effects and funny patterns.

This was also in the context of a constant need for novelty, to have something to compete Pop Art, as a commercial approach, so the revolutionary ideas melted away under the heat of mainstream cultural industry. That was the case when Julio Le Parc won first prize in Venice.

Some others criticised that NT participated at all in such a bourgeois art event as Venice, that was a topic that was discussed, and another topic was that he had been participating individually and not as part of GRAV group.

That shows that the movement found itself in crisis, within a few years that kind of idea vanished, and that was a reason why they tried to find a new refreshment in CG art, whereby many new participants were not aware what these organisers were searching for.

Q: Can you talk a bit about GRAV and participatory art?

A: GRAV made participatory work and at that moment that was the very revolutionary way of approaching art work, that art work did not exist by itself but by participation of common citizens.

These works from today's point of view were extremely formal, so we see some geometrical shapes and some people doing something with it and having fun. They did not get into narrative, they were very formal, if they had that would have made a difference.

Early NT participants have been all about social change, they only talk about that, maybe they didn't find the right form or adopting the right vocabulary. You can see on that narrative level, Enzo Mari was in t-4 exhibition, he just exhibited the red star and hammer and sickle.

Q: And in 1968 the computer artists joined?

A: The first generation of NT was for social change through systematic research; then a new generation of software programmers and scientists comes who start to shape our new information age and they are actively participating in reshaping that very world that we are living in, but without any critical or wider perspectives on social aspects; there have been some little groups of subcultural programmers who

had some hippie ideas in California, but these guys were not part of NT, so they had not really any social frame for their computer art activities.

The organisers of NT tried to contextualise their activities within the art system with more or less success and they have been quite often underlining the aspect that these artworks were not really artworks, that they were examples of research, outputs. But those scientists did not have a toolbox to deal with all those social programs and they had a more or less conservative approach to art.

When you see Michael Noll with his Mondrian experiment and his ripping off of various Op Art works, he was Kraftwerk programmer, but he has a very conservative approach, I interviewed him, he likes classical music, he does not like electronic music and I think Impressionists are the last art movement that he really appreciates.

Q: What happened in 1968?

A: Computer artists and scientists are in general quite isolated, they are more steering at their screens and very few get involved in that social activity.

Italian participants have been discussing those issues from summer 1968 till summer 1969 and they have been concluding this was the time to stop any art activity and the join student movement.

So there was the whole range from let's stop making art to we don't know anything, let's keep doing science. Members of the first wave were all ideologically on the same front, but with second generation they come from all different kinds of places, even from the very corporations.

It seems very strange that such a leftist group invited corporations like Boeing and Qualcomm, actually enemies participating in their activities, such as Michael Noll working from Bell Labs and corporate artists.

And then you have Frieder Nake, a very convinced Marxist, pioneer of computer art and he tried to involve Marxist thought within CG art. His students in 1970s were supposed to study Marx' Capital VI. 1 first and then start making CG art. Then you have people like Max Bense who had no politics at all.

Q: Why did it end?

A: They could not find any consensus anymore in 1973. They tried to make another one, in 1978.

I went through the notes of all the meetings. There is a letter of Koscevic who was involved with conceptual art and he gave up: 'he is leaving that curatorial board because he cannot believe in an exhibition which tries to show naive art or primitive art, constructive art, video activism, computer art, conceptual art, and there is no platform.'

It took five years and many meetings to decide they could not find a common platform. They made a symposium in 78, 'Art and Society'.

[...]

My thesis is that if the personal computer had existed by mid sixties the world would be different, If the power of computing would be in personal hands -- not the hands of a few lucky artists who get then access to the non-touchable hardware, the mainframe in the laboratory, that then was really hard to get access to, it was possible for a few lucky artist but not the general population -- if the personal computer had been built in the 1960s which was technologically possible but not willed by the corporations, the whole story would be different; there would have been possible resistance within the field of technology like it is possible nowadays with hackers and so on.

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