Essay

The Machine as Art (in the 20th Century): An Introduction †

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Abstract: The machine, over the course of the 20th century, progressively integrated itself into all fields of human activity, including artistic creation; and indeed, with the first decades of that century having established a surprisingly vital and wide-ranging series of perspectives on the relationship between art and the machine, certain artists in the wake of the Second World War no longer felt compelled to treat the machine as a mere theme or source of inspiration: the machine itself becomes art—unless it is art which seeks to become mechanical? The artist mutates into "artist-engineer"; and this transition, resonating within a specific historical context, leads not only to a questioning of the nature of the work itself, but also to a broader questioning which places us within the realm of anthropology: what is this art telling us about the actual conditions of contemporary human society, and what is it telling us about the future to which we aspire? It is the goal of this special issue of *Arts* to stimulate an historically conscious, protean, and global (re)thinking of the cultural relationship between man and machine; and to this end, we welcome contributions falling anywhere within the nearly infinite spectrum represented by the prismatic period during the middle of the last century in which the machine became a legitimate artistic medium.

Keywords: art; machine; science; technology; machine aesthetics; systems aesthetics; 20th century art history

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As humankind finds itself afloat in a sea of technology, it is with newly attentive eyes that we look back to the pioneer machine artists of the middle of the last century—and we do so both to understand their vision, and to wonder what has become of it. What does the machine mean after the Second World War? The drama of the conflict, in which the machine was a central element, put an end to the techno-scientific utopianism that had been dominant in the Western world for several decades. Yet to this trauma is opposed a contrary force—that of the astonishing hope of reconciliation between man and machine; and it is amidst this tension that the proposition of "the machine as art" comes to occupy us here. If the current sense of the machine, that is, its association with modern technique, and indeed technology (as in speaking of the cybernetic machine), appears rather late, the word is originally derived from the Latin *machina*, which means an invention but which is also used in the sense of "work made with art"[1]. In the post-war period, this link with artistic creation is more ardent

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[1] The technical meaning of the word "machine" is attested from the 16th century. It is then associated with the mechanism, and subsequently with automation. (Rey 1992).

than ever, when, despite the troubled relationship between man and machine, there has also emerged in the midst of its scientific and technological discoveries a huge expansion of the creative sphere.

This path was opened at the beginning of the century, and then unceasingly appropriated by later artists. John McHale, himself an artist, theorist and researcher, highlighted in the 1960s the artistic frontier so revealed:

> ... reacting more swiftly and intuitively to changes in his immediate environ, and being less hampered by academic specialization and professional commitment, [the artist] has been more attuned to new forms and technological potentials of our period. If Dadaism, Surrealism, Constructivism, and their later variants have sensitized the contemporary vision to the metamorphosis of cultural values, often through a savage and corrosive irony, they have also provided a usable mythology of the machine and an insight into its creative potentialities. (McHale 1969, p. 38)

The reflections developed during the interwar period by the Bauhaus, and as part of a larger formal inquiry corresponding to an epoch defined by the machine, find clear expression in the agenda that Walter Gropius described, in the mid-1920s, in these words: "Believing the machine to be our modern medium of design, we sought to come to terms with it" (Gropius [1925] 1965). The pivotal period of the 1950s tinged these reflections with a new color. It is clear that, in retrospect, this was a period of transition between a vision of the machine as an element external to man (the machine, or the representation of the machine, may well then exert an influence on the creative process—but from the outside—and thus giving rise to a discrete *machine aesthetic*), and our contemporary period, in which humankind, surrounded on all sides by technology, has established with it an unprecedented conceptual relationship.

This transition is clearly illustrated in the London of post-war reconstruction where, for example, the 1954 exhibition *Artist versus Machines*, organized by the group of English Constructivists,[2] "was important because it explored, in a vey positive way, the possible uses of machine-made materials and industrial techniques by abstract artists" (Grieve 2005). The British critic and historian of architecture Reyner Banham nevertheless delivers an acerbic comment[3], blaming them for remaining restricted to a formal approach with the machine, which is not approriate anymore to the contemporary period Banham designates, at this time, as a "Second Machine Age"[4]—a second industrial era in which the machine is, this time, fully integrated into the domestic sphere, and thus becoming omnipresent. The relationship between society and the machine takes on a new form: inviting us to plunge into the atmosphere of the time, and as always in his colorful and picturesque style, Banham remembers that "what appeared to be a second machine age as glorious as the first beckoned us into the 'Fabulous Sixties'—miniaturization, transistorization, jet and rocket travel, wonder drugs and new domestic chemistries, television and the computer seemed to offer more of the same, only better" (Banham 1980).

A number of artists, through initiatives sometimes individual, sometimes collective, give birth to a broad trend, protean in nature, and with Paris as the epicenter: the two big names of machine art, Swiss-born Jean Tinguely and Hungarian-born Nicolas Schöffer, had moved there to launch their careers, and it is in Paris as well that the early and important exhibitions of their work are held. But initiatives are also being launched from other artistic centers and will develop rapidly in the 1950s

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[2] *Artist versus Machine.* Building Center, Store Street, London, 19 May–9 June 1954. Exhibition organized by Victor Pasmore, Kenneth Martin, Robert Adams and John Weeks. John McHale also presents works. Re this exhibition, see Alastair Grieve's comprehensive article, (Griev 1990). One might also mention the important Paris exhibition, one year later, dedicated to kinetic art: *Le Mouvement*, Galerie Denise René, Paris, April 1955.

[3] (Banham 1954), cited in Alastair Grieve, *Constructed abstract art in England, op. cit.*, pp. 29–30. He writes: " ... the welcome insistence on the virtue of new materials is sterilized and compromised by an all-too-frequent reliance on Simple-Simon geometrics which the Abstract Art of the twenties inherited from nineteenth century academic theory ... ".

[4] (Banham [1960[1967). He writes: " ... we have already entered the Second Machine Age, the age of domestic electronics and synthetic chemistry, and can look back on the First, the age of power from the mains and the reduction of machines to human scale, as a period of the past." (introduction to the edition of 1967, New York, Praeger, p. 10).

and 1960s. It is precisely the various trajectories of this "machinic" renaissance of the middle of the century that this special issue of *Arts* proposes to explore.

One of the focal points for an analysis of this theme is New York's Museum of Modern Art during the winter of 1968–1969, in the form of an exhibition that takes place under the revealing name of *The Machine as seen at the end of the Mechanical Age*, and the catalog for which, with its famous metallized cover, remains an important resource for art historians[5]. Directed by exhibition curator Pontus Hultén (Figure 1), this catalog reviews the history of the relationship of Western artists to the machine, documenting various theoretical axes that are then developed in their relationship to technology, and illustrating many newly established forms of convergence between art and machine.

Figure 1. Pontus Hultén during the installation of the exhibition *The Machine as Seen at the End of the Mechanical Age*, Museum of Modern Art, New York, 1968. Around, works by Claes Oldenburg and Thomas Shannon. Photograph: Shunk-Kender © J. Paul Getty Trust. Getty Research Institute, Los Angeles (2014.R.20).

Despite the richness of the work, the initiative of Pontus Hultén can not be exhaustive. The number of artists who participated in the 1950s and 1960s experiments with the machine itself—namely, art involving actual mechanical articulation—far exceeded the scope of his exhibition, and represents a remarkably diverse group: Giovanni Anceschi, Marina Apollonio, Roy Ascott, Fletcher Benton, Davide Boriani, Martha Boto, Robert Breer, Pol Bury, Enrique Castro-Cid, Gianni Colombo, Lin Emery, Edward Ihnatowicz, Harry Kramer, Liliane Lijn, Heinz Mack, Kenneth and Mary Martin, Charles Mattox, Nam June Paik, Julio Le Parc, Bruno Munari, Robert Rauschenberg, George Rickey,

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[5] (Hultén 1968), 27 Novermber 1968–9 February 1969, catalog under the direction of Pontus Hultén. (See here for photo of catalog cover: http://www.fondation-langlois.org/html/e/page.php?NumPage=1716).

Nicolas Schöffer, James Seawright, Thomas Shannon, Jesús Rafael Soto, Joël Stein, Takis, Jean Tinguely, Grazia Varisco, Gerhard von Graevenitz, David von Schlegell, Wen-Ying Tsai and Robert Whitman. If there is one name, for example, that of Robert Rauschenberg, which jumps out at us as not belonging in this listing, we will be perhaps astonished to discover that he not only created as soon as 1959 a wheeled sculpture—his "Gift to Apollo"[6]—but also, in 1963, a Tinguely-like motorized sculpture—his wire-framed "Dry Cell"[7]. Thereafter, the work he will complete with the collective *Experiments in Art and Technology* (E.A.T.), for which he is, in 1967, one of the founding members together with the artist Robert Withman and two engineers, Billy Klüver and Fred Waldhauer, will constitute a substantial contribution to the initiative we are discussing here[8].

At this stage is revealed the complexity faced by anyone who would venture to present a definition of "the machine as art", "machinic art", or "art as machine"—and which task is made even more daunting by the many new roles that art has been attempting to take on, and especially during the tumultuous 1960s. In the catalog for the exhibition *Metamatic Reloaded* at the Museum Tinguely, art historian Andres Pardey has nonetheless advanced these quite insightful designations: "Art is an interaction generator, process condenser, happening machine, adventure producer"[9]; and although it is of course beyond the scope of this brief introduction to address each of these functions, it becomes clear that it is not only the relationship between the artist and the work that is deeply modified and redeveloped, but also that between spectator and work, and between whom a real interaction takes place.

How can one understand such an upheaval when the machine as a medium does not correspond to anything in the framework of the canons of so-called "traditional" art? The criteria for judgment of this art must also be revisited: the machine is certainly neither painting nor sculpture, but can not, either, fall into the category of "minor art"; it belongs, in part, to a sphere external to the world of art, and its acceptance as such is therefore problematic. One must remember, furthermore, the historical context, which is that of the Cold War and a profound questioning as to the equilibrium between the human being and the forces of the machine. The experience of a "war of machines" and the nuclear disasters of 1945 gave rise to a feeling of helplessness in the face of a technology that had revealed itself capable of annihilating humankind. Playing with this truly human feeling, the Swiss artist Jean Tinguely ironically emphasizes that the machine is also capable of provoking its own annihilation: in the early 1960s, he designed works devoted to self-destruction, or "suicide machines". The most celebrated of these, entitled *Homage to New York*, was programmed to self-destruct during a 17 March 1960 performance in the MoMA sculpture garden. For French curator Henry-Claude Cousseau, "it is the triumph of the machine itself, capable of production and conception until its dismantling, and to control until then its existence and destiny" (Cousseau 2015).

The incisive work of Jean Tinguely (Figure 2) cannot be thought of as representing a single "spirit" guiding the artist in this era of the machine. On the contrary, the diversity of propositions regarding the machine as art is such that it would be difficult to grasp here the complete picture. The machines of Jean Tinguely, these moving sculptures, belong to the world of mechanics. In other cases, the machine is electronic, as with the hypnotic devices of Nicolas Schöffer, and about whom the art historian Arnauld Pierre observes that "in a time when humans had already entrusted to the machines so many other more delicate functions—notably cognitive and cerebral", his work tends to be nothing less than an "industrial production of the material of the dream" (Pierre 2015), that is to say, a penetration of the machine into the consciousness of the spectator. The drift towards this invisible machine also takes

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[6]   See here for details on the work *Gift for Apollo*: https://www.rauschenbergfoundation.org/art/artwork/gift-apollo.
[7]   See here for details on the work *Dry Cell*: https://www.rauschenbergfoundation.org/art/artwork/dry-cell.
[8]   Robert Rauschenberg and Billy Klüver also initiated, in 1966, the *9 Evenings: Theatre and Engineering* program, supporting the establishment of interdisciplinary projects conciliating art and new technologies. As part of the same approach, one should also mention the *Art and Technology Program* established by Maurice Tuchman at the Los Angeles County Museum of Art.
[9]   (Pardey 2013), 23 October 2013–26 January 2014.

place through the advent of cybernetics[10], its conception of the world being based on *systems* of control and communication. Therefore, and in this context, there occurs a paradigm shift in the apprehension of the role and of the nature of the machine, "whose objective is no longer the accomplishment of work, of a mechanical task, but the processing of information" (Quinz et al. 2015).
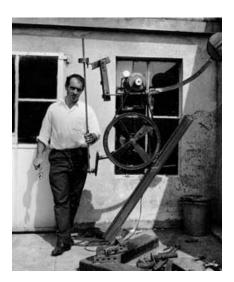

Figure 2. Jean Tinguely with an early example of his "Eos" series. Photograph licensed under Creative Commons © ErlingMandelmann.ch.

This dematerialization of the machine is already identified by Pontus Hultén, who actually speaks, in the title of his 1968 exhibition, of the "end of the mechanical age". This tension is highlighted very early in the introductory text: the mechanical age lives fully its culminating phase but sees already the symptoms of its near end—this at the threshold of the 1970s, and which decade will see this phenomenon confirmed—as the importance of mechanics is progressively eroded by advances in electronics, electromechanics, chemistry, biotechnology and, in particular, *software*. For theorist Jack Burnham, this exhibition of Pontus Hultén draws a line of demarcation between "the earlier 'machine art' and what could be defined as 'systems and information technology'"[11].

In fact, that same year 1968 saw the publication by Burnham of his memorable article "Systems Aesthetics" (Burnham 1968b), in which he describes the transition—already prefigured in the development of cybernetics—from a culture of the object to a culture oriented towards systems: as the machine moves in the direction of dematerialization and ephemeralization[12], artists, in a corollary manner, show a growing interest in the system, and to the detriment of the object. In short, this trend can be considered as one of the symptoms of the end of the "golden age" of the art-machine as represented by Tinguely and Schöffer. In particular, an opening is created for more "conceptual" initiatives, as well as for many forms of artistic performance, but also for "virtual" art, and which can

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[10]　In 1968, both John McHale and Jack Burnham expressed a great deal of interest in the exhibit *Cybernetic Serendipity* (ICA, London, 2 August–20 October 1968; Corcoran Gallery of Art, Washington D.C., 16 July–31 August 1969; Exploratorium, San Francisco, 1 November–18 December 1969), catalog under the direction of Jasia Reichardt (Reichardt 1968). The discipline itself was formally established in 1948 by Norbert Wiener (Wiener 1948).

[11]　(Burnham 1980). Burnham distinguishes between "the earlier 'machine art' and what could be defined as 'systems and information technology'", and he then goes on to elaborate: "The latter includes artists' use of computer and online display systems, laser and plasma technology, light and audio-sensor controlled environments, all levels of video technology, color copy duplicating systems, programmed strobe and projected light environments using sophisticated consoles, and artificially controlled ecological sites".

[12]　This artistic transition between the mechanical and the digital (computer art) also generates a geographical dispersion: digital art pioneers such as Frieder Nake, William Latham and Harold Cohen work, respectively, from Stuttgart, London and California.

be considered as both funeral director (in the sense of total dematerialization) and heir (in the sense of technology as interface) to the art machine.

Burnham will soon showcase some of these new developments in a 1970 exhibition entitled *Software: information technology: its new meaning for art*[13], and which is focused on a data-intensive approach to art. Originally to be entitled, in an obvious reference to Hultén's show, "The Second Age of Machines", the name under which the show was actually held places much more emphasis on the immateriality of information based processes.

For Burnham, what these new artistic forms have in common is that the focus is no longer on *things* (the art object) but rather on *process.* In a landmark book of the same period, *Beyond Modern Sculpture: The Effects of Science and Technology on the Sculpture of This Century* (Burnham 1968a), he describes how, in the context of systems art, the development of the relationship between art and technology is resolved within the larger culture and not specifically within the field of art. That is to say, this new relationship between the artist and the machine ends not in the creation of works of art, but in the creation of a *lifestyle*[14].

Nor is Burnham isolated in this approach; it is common to a variety of thinkers who are at the time connected to each other and whose attention is focused on the state of art brought about by the new information environment[15]. John McHale, for one, writes:

> The future of art seems no longer to lie with the creation of enduring masterpieces, but with defining alternative cultural strategies. But in destroying the formal divisions between art forms, and in their casual moves from one expressive medium to another, individual artists do continue to demonstrate new attitudes towards art and life. As art and non art become more interchangeable, ... the artist defines art less through any intrinsic value of the art object than by furnishing new concepts of life style.[16]

It is interesting to note that Hultén himself, in choosing to end his introduction to *The Machine as seen at the end of the Mechanical Age* with this quotation from McHale, also wishes, it would seem, to have his exhibition seen from a perspective which includes a focus on this new concept of lifestyle. According to this conception, in which new technological means are at the service of new forms of art, the arts—and it is again McHale speaking—"are no longer a canonical form of cultural communication restricted to specific elites and conducted according to specified rules and procedures ... The promise within the newer media is of a greater interpenetration and interaction of life-art-culture rather than the forms-objects-images that preserved and isolated social life (McHale 1969, p. 339)."

Yet even beyond this transformation of art into lifestyle—as, for example, in the vitality of conceptualism to which we have been a witness—the underlying presence of the machine as mechanical entity does not seem to have dissipated. We are realizing, in fact, that there is a strong symbiotic relationship between the mechanical machine and the electronic machine, and which in combination—as with the electronically enabled automobile—occupy such an important place in our daily lives. The machine, in other words, continues to have an ever-increasing physical footprint; but it was actually during the middle of the 20th century—the golden age of machine art—that humankind first becomes aware of the extent of the invasion of the environment[17] by technology. Moreover, for the

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[13]　(Burnham 1970), New York, Jewish Museum, 16 September–8 November 1970; Washington D.C., Smithsonian Institution, 16 December 1970–14 February 1971; catalog under the direction of Jack Burnham.

[14]　This same term, "life-style", is used by Jack Burnham in his text "Art and Technology: The Panacea That Failed" (Burnham 1980, p. 213): "Nevertheless, avant garde art during the past ten years has, in part, rejected inert objects for the 'living' presence of artists, and by that I am referring to Conceptual Art, Performance Art, and Video Art. In the case of such artists as Chris Burden, Joseph Beuys, Christian Boltanski, James Lee Byars, and Ben Vautier, art and life activities have become deliberately fused, so that the artist's output is, in the largest sense, *life-style.*"

[15]　This intellectual world also included at the time some other leading figures as, for example, John Brockman, Gene Youngblood, Douglas Davis, and Billy Klüver.

[16]　John McHale, as cited by Pontus Hultén in (Hultén 1968, p. 13). Probably derived, with some slight modifications, from (McHale 1967).

[17]　See, in particular, (McHale 1970).

first time, the undeniable vulnerability of humankind to these increasingly advanced technologies induces actual vertigo: the French anthropologist André Leroi-Gourhan remarks in 1983 that "what is happening in our world is without doubt grave, but the privilege of living during the generations that have been chosen to know the moment when man would find himself naked before his machines must command confident reflection (Leroi-Gourhan 1983)."

In the same way, we believe that the privilege of being able to participate in an investigation of a subject as fundamental as that to which this special issue of *Arts* is dedicated calls for a spirit of inquiry on the part of our contributors which, if not confident, is at least vigilant and conscientious. This inquiry, moreover—ongoing since the second decade of the 21st century—will make sense for us only to the extent that it corresponds to the development of our sense of rapport with the machine. A retrospective look at those who, half a century ago, included the machine in their creative activity seems now essential to writing the history of art; but more to the point, the present inquiry also represents a vital contribution to the question of a humanity seeking to navigate with assurance upon its ocean of technology.

References

Banham, Reyner. 1967. *Theory and Design in the First Machine Age*. New York: Praeger, p. 10. First published 1960.

Banham, Reyner. 1954. Match Abandoned. *Art News and Review* VI: 7.

Banham, Reyner. 1980. *Preface to the First Paperback Edition MIT Press*. Cambridge: MIT Press, p. 10.

Burnham, Jack. 1968a. *Beyond Modern Sculpture: The Effects of Science and Technology on the Sculpture of This Century*. New York: George Braziller.

Burnham, Jack. 1968b. Systems Aesthetics. *Artforum* 7: 30–35.

Burnham, Jack. 1970. *Software: Information Technology: Its New Meaning for Art*. New York: Jewish Museum.

Burnham, Jack. 1980. Art and Technology: The Panacea That Failed. In *The Myths of Information*. Edited by Kathleen Woodward. Madison: Coda Press.

Cousseau, Henry-Claude. 2015. Digressions sur les machines: Ingénieurs, bricoleurs et poètes. In *L'Art et la Machine*. Lyon: Lienart éditions, p. 46.

Griev, Alastair. 1990. Towards an Art of Environment, Exhibitions and Publications by a Group of Avant-Garde Abstract Artists in London 1951–55. *The Burlington Magazine* 132: 773–81.

Grieve, Alastair. 2005. *Constructed Abstract Art in England after the Second World War. A Neglected Avant-Garde*. New Haven and London: Yale University Press, p. 27.

Gropius, Walter. 1965. *Die Neue Architektur und das Bauhaus (The New Architecture and the Bauhaus)*. Translated by P. Morton Shand. Cambridge: MIT Press, p. 75. First published 1925.

Hultén, Pontus. 1968. *The Machine as Seen at the End of the Mechanical Age*. New York: Museum of Modern Art.

Leroi-Gourhan, André. 1983. Le fil du temps. In *L'illusion Technologique*. Paris: Fayard, p. 127.

McHale, John. 1967. The Plastic Parthenon. *Dot Zero 3* Spring: 4.

McHale, John. 1969. *The Future of the Future*. New York: George Braziller.

McHale, John. 1970. *The Ecological Context*. New York: George Braziller.

Pardey, Andres. 2013. From Méta-Matic to 'Métamatic Reloaded'. In *Métamatic Reloaded*. Heidelberg: Kehrer Verlag, p. 25.

Pierre, Arnauld. 2015. 'I am the Dream Machine'. Les écrans hypnogènes de Nicolas Schöffer. *Les Cahiers du Musée National d'Art Moderne*, 53, Winter 2014–2015.

Quinz, Emanuele, Jack Burnham, and Hans Haacke, dirs. 2015. Préface. In *Esthétique des Systèmes*. Dijon: Les Presses du Réel, p. 12.

Reichardt, Jasia. 1968. *Cybernetic Serendipity. The Computer and the Arts*. London: Studio International, Available online: https://monoskop.org/images/2/25/Reichardt_Jasia_ed_Cybernetic_Serendipidity_ The_Computer_and_the_Arts.pdf (accessed on 17 January 2018).

Rey, Alain, dir. 1992. *Dictionnaire Historique de la Langue Française*. Paris: Dictionnaires Le Robert, entry for "Machine". p. 2082.

Wiener, Norbert. 1948. *Cybernetics: Or Control and Communication in the Animal and the Machine*. Cambridge: MIT Press.