From “Beyond Modern Sculpture” – Jack Burnham

The Future of Responsive Systems in Art

In the fall of 1966 the first festival of art and technology took place at the Sixty-ninth Regiment Armory, New York City. This "9 evenings: theatre and engineering" was housed in the same building that contained the historic Armory Show of 1913. Here was the first calculated, large-scale attempt by engineers, artists, and dancers to pool their talents in the recognition that art and technology were no longer considered alien forces subverting each other. Billy Kluver coordinated the technics of the affair; this is the same Bell Telephone physicist who has acted as adviser for many important Kinetic exhibitions since 1960. Because of numerous technical break-downs and lack of rehearsal time the "9 evenings" were pretty much written off as an avant-garde catastrophe by the popular press. Not least among the accusations were those of naive use of electronics by the artists, drawn-out repetition of unstructured events, and a tendency to play up to the press, ironically courting bad reviews as well as good. It did seem, as Kluver subsequently indicated, that the problems of the electronic systems had not been fully ironed out, and there were initial emotional antagonisms among some of the more conventional technicians concerning the goals of the artists.

For some viewers there were satisfying exceptions such as Robert Rauschenberg's "open score" badly played tennis game, where rackets were wired for amplified sound. Then the indoor tennis court, flooded with infrared light, was projected onto three large screens for audience viewing by closed-circuit television. There the ghostly forms of five hundred people milling around the court filled the screens.

Alex Hay gave a very austere solo dance accompanied by the amplified sounds of his brain waves, heartbeat, muscle and eye movements. With two assistants, his "work activity" was to lay down and pick up one hundred, numbered, skin-colored cloth squares (FIG. 133). Another time, into the vast

open area wafted fragments of live radio programs and the sound-amplified body movements of the audience itself. While failures occurred particularly in the first performances, when the gear of the engineers had not been properly "de-bugged," or it visually overwhelmed the performers, once in a while an event would relate to the biological presence of the audience so that the traditional object-observer relationship was severed.

But, if anything, the inflexibility of some of the artists, not the engineers, provoked the real wrath from the critics. Some performers motorized sodden ideas from happenings while others childishly unleashed political harangues and unpleasant sensorial assaults on the audience. Insufficient rehearsal accounted for most of the time delays, along with unfamiliarity with the Armory spaces. And as one critic, Erica Abeel, put it (December, 1966-January, 1967, p. 23) : "...the real problem does not lie with the nuts and bolts." In a follow-up article Billy Kluver defended the work of the engineers as being extraordinarily professional and successful, considering time and money limitations and the technical requirements. From the articles by participants in the "9 evenings" the major impression to come across is the subtle symbiotic relationship that developed between the artists and engineers, both hardly dreaming that such a rapport would be possible. That they did find common interests and means of working together was a discovery that dwarfed, in their eyes, all subsequent reactions. But this outcome hardly appeased the audience at the time.

Most critics panned the "9 evenings" as either poorly contrived happenings or dull theatre, even by avant-garde standards. Few if any had the prescience to appreciate the events for what they were: man-machine systems with a completely different set of values from those found in structured dramatics or the one-night kinetic spectacular. In the professional theatre the automatic pre-set lighting console is a wonder whose very efficiency rests on the fact that it does so much, but remains unnoticed to the audience. The new artists want to magnify, to isolate for its own sake, this relationship between performer and system. Lucinda Childs's air-supported vehicle, John Cage's sound mixer, Deborah Hay's radio controlled platforms, Yvonne

Ranier's "theatre electronic environment modular system," and the audio amplifiers of Alex Hay were all constructed as physical extensions of the human performer's abilities. The exploitation of these extensions for their own sake is a foregone result of the technological demiurge. Billy Kluver has specified that over 8,500 engineering hours went into the Armory events, amounting to $150,000. For the critics this was akin to an elephant's going through two years' gestation and then giving birth to a mouse. Yet the perceptual set necessary for the appreciation of such man-machine alliances will only grow as the relations between the two become both subtler and clearer.

A further development of the "9 evenings" saw the founding of E.A.T. (Experiments in Art and Technology, Inc.) in January, 1967. E.A.T. is administrated by many of the people who carried out the "9 evenings" : it draws its artists (300 at this writing) and engineers (75) from all over the country. E.A.T. tries to provide technical assistance for the artist by acting as a "matching agency" between artists with specific, feasible projects in mind and engineers competent to solve these problems. In its role as a clearing house for ideas, E.A.T. with its technical staff hopes to establish new connections between the art world and industry, facilitate dialogue between the artist and engineer leading to new aesthetic insights, and give out information as needed by both groups concerning recent innovations in both fields.

Already within a year of its inception several facts have become apparent to the supporters of E.A.T. Such an organization cannot grant materials or money, though it can direct artists to possible sources for both. Further, there are substantial blocks, both psychological and intellectual, among the engineering professions and industry against supporting the seemingly frivolous and illogical ideas of artists. Some engineers connected with E.A.T. have undergone real personality changes, while the artists involved have gained a new respect for technical ability. Money, public and commercial support for E.A.T. have not come easily. The basic conservatism of these factions is responsible, but very slowly Kluver and other E.A.T. personnel have convinced important groups that the

ultimate purpose of the relationship is potentially more than another artists' caper (E.A.T., June 1, 1967, p. 4) :

> The possibility of a work being created that was the preconception of neither the artist nor the engineer alone is the raison d'etre of the organization. The engineer must come out of the rigid world that makes his work the antithesis of his life and the artist must be given the alternative of leaving the peculiar historic bubble known as the art world. The social implications of E.A.T. have less to do with bringing art and technology closer together than with exploring the possibilities of human inter-action.

Beyond its many shortcomings, E.A.T. represents the desire to create a professional and social rapport between artist and engineer more complete and more realistic than anything attempted in the past. Ideally, the organizers of E.A.T. would let it dissolve itself in a few years. This would not be because of failure but because the ties between the artistic and technical world had become secure enough to no longer need a parent organization. One would suppose that this is mainly wishful thinking, except that the knowledge that there is desperate social need for a symbiotic fusion between art and technology is almost a religious conviction on the part of E.A.T. The implicit belief is there that a dehumanized scientific technology cannot help but destroy itself and the world around it.

While the "9 evenings: theatre and engineering" occurred in three dimensions, little of it could be equated with the modern sculpture which filled the same space in 1913. In the fall of 1966 there were no "sculptures" to be seen-objects that spatially and optically preserved their own presence-but instead, a variety of electronically accentuated "events." Even Steve Paxton's inflated plastic forms through which the crowds passed to get to their seats were, at best, what might be called provisional sculpture. This suggests that systems-oriented art--dropping the term "sculpture" will deal less with artifacts contrived for their formal value, and increasingly with men enmeshed *with* and *within* purposeful responsive systems. Such a shift should gradually diminish the

distinction between biological and non-biological systems, i.e., man and system as functioning but organizationally separate entities. The outcome will neither be the fragile cybernetic organ-isms now being built nor the cumbersome electronic "environments" just coming into being. Rather, the system itself will be made intelligent and sensitive to the human invading its territorial and sensorial domain.

Already what happened at the New York Armory in 1966, at the Buffalo Knox-Albright Museum in 1965, and at various European museums since 1961 with participatory Kinetic exhibitions, suggests a reconsideration of the premises underlying the public presentation of art. The substitution of "aesthetic systems" for the *objet d'art* within the confines of a gallery is something that should be fully developed in another book. Yet, it would not be digressing too much to make several points which seem evident.

In the August 12, 1966, issue of *Life* magazine, an article on the maintenance problems of Kinetic Art stressed the helplessness of even the well-trained museum curator given the task of installing a Kinetic show (anonymous, Bourbon, p. 46) :

> An art connoisseur who is expert at detecting quattrocento tempera is utterly innocent of any knowledge of electronic circuitry. Where he might turn to an artist's preliminary drawing for insight into the finished painting, he is reduced to helplessness when confronted with a kinetic artist's blueprint. He may reach such desperation that he looks on a piece no longer as a work of art but as a mere assemblage of moving hardware.

The curator, versed in cataloguing, attributions, stylistics, restoration, and other needs of the art object, is at a profound loss when it comes to finding special transformers. In the same article (p. 49), Billy Kluver makes the succinct comment on museum officials : "The whole idea of the machine scares them so much they can't move."

Consequently museums have relied upon technicians and animated display engineers to set up mechanized art, which gives us reason for believing that electronical technicians will become regular members of museum staffs. The

museum displaying contemporary art now faces the same technical problems which confronted the science museum and the designer of industrial exhibitions twenty years ago. These problems then sprang from the desire to make the processes of science and industry *appear* as dynamic as possible.

After the Second World War the Museum of Science and Industry in Chicago recognized the need for updating its exhibits. It became evident that children were usually repelled by the drab and often forbidding presentation of scientific equipment. In the past one hundred years science museums have largely depended on collections of static objects - instruments, engines, tools, and drawings - for their displays. Not surprisingly, displaying and cataloguing these same objects involved many of the problems which confronted the curators of art institutions.

How did the Chicago Museum make its exhibits meaningful and ex-citing experiences for children? First of all, a basic axiom of perceptual psychology was put to use: people are attracted by moving and bright phenomena. It was accepted that the very nature of technology was best shown by demonstrating the fluid exchanges between matter and energy. Exhibitions were made kinetic and demonstrated *process* instead of merely displaying tools and equipment as objects and mathematics as a mode of reasoning. The emphasis became that of showing *principles* of science and technology in operation, rather than their display as a residue of historical artifacts. Much of the reading matter accompanying these exhibits has been reduced to a minimum. What is presented is either in the form of moving patterns repetitively programmed or simple explanations backlighted on plastic panels. Perhaps these exhibitions' prime means for inciting the curiosity of children is their ability to involve the child directly in the actions of the exhibit. Thus exhibits in the Chicago Museum have all been reorganized - some several times - so that most require some degree of viewer participation.

Beyond some striking similarities to various Optical-Kinetic environments already displayed both in Europe and the United States, the new philosophy of exhibition and its maintenance differ significantly from earlier art for another

reason. As a system the exhibit is expected to wear out. Various breakable parts are stockpiled according to a rate of predicted loss, in a system not unlike the maintenance technique which made the production-line automobile a reality. The stockpiling of parts according to need-as the body changes cells every few days or weeks - is an essential tenet of
the systems philosophy. Moreover, it runs counter to the notion of the irreplaceable work of art, where the spirit of restoration saves as much of the original as possible. With the scientific or technical exhibition, an entire assembly can be reduced to blueprint form for future reconstruction - an organic parallel, of course, is the genetic encoding of hereditary traits. The blueprinted work of art is not a new idea, yet its practicality for general application to Systems Art seems assured.

A dramatic contrast between the handling of place-oriented *Object sculpture* and the extreme mobility of Systems sculpture can be seen in the following example. During the winter of 1964 hundreds of art lovers the world over sharply critized both the Catholic Church and officials of the New York World's Fair for transporting Michelangelo's *Pieta* from the Vatican to Long Island. Many thought that the marble statue, which has rested in place at St. Peter's for over four hundred years, was too fragile to undergo the double ocean voyage. Aside from an outright accident, it was feared that the statue's mass of crystalline stone contained a hidden fracture, one which the vibrations of travel might open needlessly. Elaborate precautions were taken to seal the sculpture in a series of containers surrounded by an enormous amount of shock-absorbing material and sensitive instruments to assure unchanging conditions. Even after elaborate precautions virtually insured the safety of the work, it was obvious that the sculpture had never been created for an ocean-wide publicity stunt. One might add that increasingly the very preservation of art objects depends upon the uses of safety and atmosphere control *systems*.

Contrast this elaborate plan for making a brittle sculpture mobile with the strategy of the contemporary sculptor Robert Morris. Although Morris is a maker of "primary structures" or Object sculpture, both his construction techniques and

philosophy of the art object are very systems oriented. Morris was asked by the Chicago Art Institute to submit a work for their 1966 "Sixty-eighth Annual Contemporary Americans" show. The artist sent plans from which the carpenters at the museum constructed two gray L-shaped plywood forms. The step beyond this, of course, is to send plans which are mounted for exhibition while the public is invited to "imagine" the proposed sculptures in three dimensions. It becomes clear that with Object Art physical presence is everything, while for Systems Art "information" is the key factor.

An even more precise example of systems philosophy is the shift from object to "total environment." Some of the most effective are the work of the Irish artist, now living in New York, Les Levine. *Slipcover: A Place* (FIG. 134) was his third environment. This was held in the three exhibition rooms of the Architectural League of New York in the spring of 1967. The rooms were completely covered with sheets of metalized mylar plastic sewn together. Each space contained one or several hidden blower systems attached to giant mylar bags. When expanded with air these bags nearly filled the rooms, pressing spectators against the walls. Colored light within the environment was constantly changed by automatic slide projectors. This flexible structure was designed only for a few months' use, and midway through the show there were small evidences of tears and split seams in the mylar material.

What the lack of physical authenticity will do to the value structure long attached to art is an intriguing question. Most likely we will have two criteria for assessing art works: one already in existence for the handmade artifact prized for its scarcity, and another for the industrially-produced art system with a life span depending on replication, not duration, of the original. The high-fidelity long-playing record is a nearly perfect example of the second type. While the private market for perishable art systems is quite limited (unless cost, complexity, and bulk size are reduced drastically), the idea of mass distribution where dozens of galleries simultaneously set up the same art system - as in film rental - becomes a possibility as the selling of objects phases out.

A shift from *objects* to *systems* implies many more dislocations in the life of the artist than for the various agencies responsible for choosing and displaying art. The open market has never assured more than a small percentage of artists complete financial support; and it has only been in the last decade or so that "modern" artists - more than a handful - have enjoyed the rewards of high prices and steady purchasing. Any art based on fallible and replaceable systems presents a threat to these economic advances.

As systems-oriented art grows in sophistication, costs will rise accordingly. Already it becomes evident that commercially successful artists are better equipped to pay for the services of engineers and to procure necessary materials. If electronics continues to assert a primary influence on the course of avant-garde art, something like a "technology gap" will arise between subsidized and unsubsidized artists, those who make sales easily and those who do not.

In the past the plastic arts made insignificant material requirements upon the artist. This situation gave all artists the option of perfecting private visions. It may be at an end. A technological elite in the arts could so outdistance and sensorially overwhelm rival talent that they could eliminate all those without their means. For many sensitive people this "technicalization" of the arts is a repulsive possibility, one that defeats the intimation that true artistic genius moves in singular and wayward orbits. From the end of the nineteenth century an egalitarian spirit pervaded art and re-minded us that contemporary success should not be equated with ultimate worth. We want to continue to feel that this is true. But can it be, any more than that the lone unsupported scientist will continue to make the bulk of major discoveries?

It has already been surmised that the future artist, as part of a tiny technological elite, may find himself in the position of some of today's Nobel Prize scientists : rather than being humble experimenters in the laboratory, some are executives manipulating research money and the projects of men under them. In a like sense, the fact that sizable subcontracts have been awarded to sign and sheet-metal shops by artists (for works submitted in blueprints) has already been given publicity in the art journals. Sculptors are now fast learning the true

rationale of technology; and even faster technology is altering the sculptor. Certainly it is not the purpose of this study to place a value judgment on technology *per se*, and on its over-all effects, yet these effects upon the craftsman were keenly noted by the sociologist Thorstein Veblen in *The Instinct of Workmanship* more than fifty years ago. As the manual involvement of handicraft slowly gave way, the impersonality of semi-autonomous (and lately totally autonomous) machine processes took over. With this, as Veblen has noted, came a shift in the craftsman's attitudes toward the objects which he fashioned. All the old embodiments of anthropomorphism gradually dissolved, and in their place the workman projected a new set of values which were the essence of the technological spirit - i.e., Does it *work*? Does it measure up to specifications? Is it practical? These are questions with very finite, precise answers and Veblen noted that the requirements of craftsmanship were much more vague and had to do with nuances of emotional satisfaction stemming from unconscious needs of the craftsman himself. Veblen comments that as late as Adam Smith's time the term *manufacturer* applied to the man who actually made the product, not the person who had business control of the industry. Certainly sculpture has retained the ethos and craft conventions which are identifiable with handicraft far longer than most other manufacturing fields, but Veblon's insight on the role of the manufacturer surely has its relevance to today's sculpture.

It is the peculiarly blind quality of historical change that we only grasp the nature of a political or cultural era after it has reached and passed its apogee of influence. Certainly the materialist properties of modern sculpture have been evident to the thoughtful observer for more than a half century. Yet the total awareness of what formalism implies has only recently been encapsulated into a single term, "objecthood" (Summer, 1967, pp. 12-23), by the critic Michael Fried. As the masks of idealism have dropped from sculpture, the process of inverse transubstantiation completes itself: sculpture is no longer *sculpture*, but mechanistically an *object* composed of in-animate material. Still, if we are to obtain aesthetic and spiritual insight from contemporary sculpture, it must be achieved within the context of objecthood. Fried responds that sculpture must

resist becoming theatre in order to remain an independent art. Yet it is more probable that the acknowledged theatricality of present modes of static sculpture are preparatory steps toward the acceptance of a systems perspective. They are theatrical not only in their implicit phenomenalism, but also in the sculptor's mock aloofness and objectivity toward the processes of fabrication which are, in fact, parodies of the industrialist doing "business." The shifting psychology of sculpture invention closely parallels the inversion taking place between technics and man: *as the craftsman slowly withdraws his personal feelings from the constructed object, the object gradually gains its independence from its human maker; in time it seeks a life of its own through self-reproduction.*

Returning to the idea of the system in art, it is generally acknowledged by scientists working in the field of bio-electronics that there are no qualitative physical differences between living and nonliving matter; both groupings represent, simply, an ascending scale of complexity in the organization of matter. Therefore organisms artificially created may possess consciousness. Their level of subjectivity and intelligence depends upon their creator's ability to simulate or improvise upon biological principles.

Richard R. Landers in his book *Man's Place in the Dvbosphere* (1966) produces a number of compelling arguments, through principles which he has worked out himself, for a self-sustaining machine one that is capable of self-repair, self-growth, self-adaption and self-sufficiency by means not too dissimilar from the way the human body replaces worn-out cells. Ma-chines or at least electronic circuits of the future, according to Landers, will gain greatly in "vitality" by not having their parts bolted or soldered firmly in place but by becoming pulsating assemblies of organs replaced as needed through a constant flow of extra parts -not unlike the bloodstream's transportation of new cell material.

Further, Landers observes that we do not feel the cycles of our own bio-logical processes - growth, replacement, flow of liquids, or environmental adoption - and similarly we look upon the generation of heat, reproduction, and other activities within an animal or plant as being independent functions. We do

not "see" how we exchange chemicals with our environment; therefore, we do not view the organism as part of a larger system. With the arrival of biologically oriented machines, though, we will begin to sense the unseen relationships between man-machine-environment. Stated by Landers (1966, p. 171) :

> In other words, the vital processes of living things are not independent but inter-dependent; they take place within and as a result of the "system" of which they are a part. Similarly, it will be possible for a machine to utilize life-like processes, but only as part of some larger "system." In the final analysis, the overall system which produces and sustains natural life is the same system which will "produce" and "sustain" machines. The only difference will be that machines will draw on various facets of the system to different degrees.

As a result, the cultural obsession with the art object is slowly disappearing and being replaced by what might be called "systems consciousness." Actually, this shifts from the direct shaping of matter to a concern for organizing quantities of energy and information. Seen another way, it is a refocusing of aesthetic awareness-based on future scientific-technological evolution-on matter-energy-information exchanges and away from the invention of solid artifacts. These new systems prompt us *not* to look at the "skin" of objects, but at those meaningful relationships within and beyond their visible boundaries. The practical reasons for this occurrence are obvious.

Until recently, man found spiritual and physical sustenance in the knowledge that his environment consists of countless integrated natural systems - all operating as regularly as the seasons of the year. Now he is becoming increasingly responsible for his own existence within a maze of artificial systems. According to many observers, this trend is irreversible; there are too many reasons why mankind cannot revert to a simpler and far older ecological pattern.

The fearful quality about technology is that it is self-aggrandizing; it moves almost as if men were not its instigators; a self-propelled force, it evolves oblivious of the ambitions and contentments of the human race. The paradox of the science-technology syndrome (and there is scant reason to believe that these

two forces should be regarded separately since they complement and stimulate the advancement of each other) is its tendency to make the total environment less habitable at the same time that it allows man greater latitude to determine new patterns of existence.

It seems possible that, if art has some aspects of Kant's moral imperative, the steady infusion of systems consciousness into three-dimensional art will, temporarily at least, be regarded as no less than a biological survival mechanism. While we look forward to the idea of machines' providing our surroundings and sustenance, this violates a sense of equilibrium with the forces of nature which the human race has maintained for hundreds of thousands of years. In the past our control of nature was never absolute, but more a tenuous, one-sided partnership in which we fearfully respected the sporadic, if incredible, powers of our surroundings. It may be that man psychically thrived on ignorance concerning his exact position in the universe - and perhaps the secrets locked within the mute sculptures of many
past ages are symbols of confidence in this natural unknown. They at any rate seem to be symbols which we increasingly eschew today.

The downfall of the sculpted object will represent one of many climactic symbols for our civilization among them a realization that the old form-shaping approaches are no longer sufficient. By rendering the invisible visible through systems consciousness, we are beginning to accept responsibility for the well-being and continued existence of life upon the Earth.

A Teleological Theory of Modern Sculpture

With the limited purpose of charting the influence of technics on one segment of art, it may seem presumptuous for anyone to offer a theory uniting all human efforts to produce sculpture. Nevertheless, this is an age of revelations in which ancient drives and cultural values are steadily reduced to underlying psycho-physical causes. Does such a fate await the whole phenomenon of art? We may be far from an answer, or perhaps very close. This century portends to offer more than the type of technical progress which marked

the last century; it may be the beginning of a critical transition for the whole human species. We are - and until recently the scientist sensed this with more clarity than the literary humanist - nearing a crossover point in the passage toward a new form of civilization, peopled as well with a new type of life.

It goes almost without saying that future human life now depends upon the control, if not rehabilitation, of industrial technology - both as a maker of consumer goods and weapons. So far the motive forces behind technology have made life comfortable for a relatively few humans while they have unintentionally but progressively destroyed the biosphere, that thin film of organic life covering the earth. Yet there is the possibility that an irreversible technology, one that destroys organic life and substitutes for it very sophisticated forms of synthetic life, is part of an unseen plan. If so, one might have a few premonitions of the part being played by sculpture in shaping our destination as a post-human species.

Sigfried Giedion makes the incisive observation (1962, p. 435) that "Sculpture in the round rose to its highest development only after man had severed himself from the animal world and the isolation of man as an individual had advanced to a stage never attained before : in classical Greece."

Sculpture in the round for Giedion means more than free-standing sculpture; it is figure sculpture unattached to its parent block (the stone mass from which it is carved). He interprets the reliefs of prehistoric art and the architectonic sculptures of ancient Egypt as an expression of "the in-separable oneness of all that exists." Between the small Venus figurines of the Upper Paleolithic and the free-standing, life-size marble statuary of Greece, fourth century B.C., there are - according to Giedion - few if any evidences of unattached figure sculpture. The human body, when it was accepted as a standard of perfection, assumed the function of a spiritual barometer, disclosing in Hellenistic Greece and Renaissance Italy zeniths of cultural self-confidence.

Socially significant for both Sigfried Giedion and Herbert Read is the appearance of the *detached work of art*: any art object which can bear con-

templation and study as a separate physical entity. Read singles out the great sculptors of the early Renaissance for their obsession with the unearthed fragments of antiquity. This, aside from the Roman propensity for making copies of Greek sculpture, was the first modern instance where
artists studied art objects for their own sake and not as a fraction of a greater architectural assembly. Read insists (1956, p. 58): "One cannot emphasize too strongly that the *objet d'art*, as a detached and independent *thing*, trans-portable or movable in space, is foreign to the Greek and Gothic civilizations : it is a peculiar modern conception, the expression of a new change in human attitude." Read makes the point that, although the Greeks created free-standing sculpture, each figure had a *place*. In modern times however, the art object as an independent entity has been responsible not only for freeing the artist from the confines of ecclesiastical and feudal service and placing his talents on the open market, but for the modern charisma pervading the *presence* and *possession* of artifacts made by celebrated personalities. In recent times this has culminated with the artist's "laying on of hands," accompanying the aesthetic baptism of each *objet trouve*. If Marcel Duchamp was not the first, he remains the most widely recognized artist to uncover the inherent absurdity of the *objet d'art* as a source of spiritual authority.

For nearly five hundred years the validity of sculpture rested upon the reality of the *objet d'art*. And for that reason, a secondary purpose of this book has been to register the loss of faith gradually surrounding sculpture as idea. Previously we have considered the *system* - a complex of seen and unseen forces in stable relationship - as becoming the ascendant form of visual expression. The system, like the art object, is a physical presence, yet one that does not maintain the viewer-object dichotomy but tends to integrate the two into a set of shifting interacting events. However-and this remains a question worth asking last--what of the sculpted human image as a motif inseparable from the Western conception of sculpture? After "modern sculpture," what happens to the static three-dimensional image?

As we are leaving the stage where totems and votive images have profound psychic import for our culture, is it possible that eventually sculpture will cease to have meaning? Could the very first emergence of sculpture have been a part of a general evolutionary pattern for the human species?

There are still few enough clues to the nature of societal evolution. Depth psychology, with all of its tentativeness, is one of the few modern attempts to penetrate the facade of customs, techniques, and notions which each society erects around itself in the name of culture. It attempts to view human progress in terms of the psychical reverberations which surround these activities. It is a recognition that deeper and more significant changes take place than are evident in the written histories of human development. Viewed as a broad pattern, technology seems to create itself as an energy and time-binding web extended over the face of the earth and now beyond; it appears to be an extremely purposeful phenomenon in which man is simply the catalyst for its happening. Perhaps now we can begin to look upon the immense core of facts and data surrounding technological achievement almost as a kind of camouflage for what is actually happening to biological man.

If we strip away the self-interest from the Earth's only historical animal, what remains is an organism whose neurochemistry is remarkably obscure, if not unknown. One thing seems certain though: the human brain is the key to further evolutionary steps. Man is what he is only partly by his own efforts; much of his destiny, past and future, has to do with genetic chemistry yet only dimly perceived. Among biologists, Edmund Sinnott is not alone in suspecting that the potentials of all species are embedded in their protoplasm. Not only does protoplasm contain the code directing the capabilities of a single life cycle, but in a very literal sense that of all future generations of the same species. Such an assumption at one time implied a vitalist interpretation, and there are still strong arguments for resisting a teleological view of human life. But as more is revealed through molecular biology (and probably atomic biology) a mechanistic teleological interpretation of life is not out of the question.

Even with no end view in sight, it is difficult not to accept a post-biological logic for technological development. While survival, adaptation, and regeneration form the cornerstones of biological existence, it may be that culture is fundamentally a means for implementing qualitative transformations of man's biological status. Art, then, and the whole image-making drive may be means for *preparing* man for physical and mental changes *which he will in time make upon himself*. Sculpture, functioning so, becomes a kind of psychical radar signal preparing the human race thousands (or now perhaps only scores) of years in advance. While physical adaptation in lower animals evolves over spans of tens of thousands of years, the human brain remains the only organism capable of re-forming biological patterns in a matter of only dozens of years - and probably much less in the future. As the drama of self-awareness and scientific discovery unfolds, we near a point where self-inflicted evolution becomes an imminent possibility. Is it inconceivable that free-standing figure sculpture arose concurrent with the beginnings of science in Greece, preparing us spiritually and psychologically for the conscious task of radically altering the human race far in the future?

Why then, a little over two millennia ago, did an advanced culture begin to carve life-size, unattached replicas of the human body, and also to invent mechanical replicas? In the recent past we satisfied ourselves with the tautology : *art for art's sake*. By default one could illuminate the subject by hazarding another tautology: *art is what we do when we expend great time, care, and patience on an activity without knowing why.*

Is it possible then - at least in the case of sculpture - that art is a form of biological signal? If man is approaching a time of radical change, one not controlled by natural selection and mutation, what better nonscientific way exists for anticipating self-re-creation (not procreation) than the spiritually motivated activity of artificially forming images of organic origin? Could it be that modern sculpture is this process vastly accelerated?

One of the most astonishing books to appear in recent years is Roger MacGowan's and Frederick Ordway's *Intelligence in the Universe* (1966). The

importance of this book rests partially on the importance of the two authors: MacGowan is chief of the Scientific Digital Branch, Army Missile Command Computation Center, Huntsville, Alabama, while Ordway is President of the General Astronautics Research Corporation in London. They have produced a well-considered.proposal of how intelligence evolves within those solar systems of the universe capable of sustaining higher life. Accepting the probability that spontaneous generation of life occurred on the Earth (though this is not a necessity), from a statistical estimation of the number of planetary environments within our galaxy approximating Earth conditions, the authors deduce that intelligent life is probably a common occurrence throughout the universe. The probable development of biological thought is surveyed by the authors. After a review of contemporary computer technology, MacGowan and Ordway come to the conclusion that (1966, p. 233) : "In the next decade or two it will become known to major political leaders through their scientific advisors that intelligent artificial automata having superhuman intellectual capabilities can be built."

Much of the remainder of Intelligence in the Universe is devoted to exploring the likelihood that extrasolar intelligence does exist and that, in all probability, if probes from the earth do come in contact with it, they will find it to be inorganic or artificially constructed intelligent life as opposed to our own biological variety. As a result the authors contend (1966, pp. 182-183):

> It is logical to suppose that, given a sufficiently long period of biological evolution, intelligent life will appear on planets endowed with benign environments. When beings having sufficiently high intelligence evolve, they will sooner or later develop a technological understanding, which must then quickly lead to the development of powerful information processing machines. As this happens the transition from biological (organic) evolution to mechanical (inorganic) evolution will have begun.
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> This transition may be very sudden if the intelligent animal life should make an all out effort to construct a superintelligent automaton, or it may be more gradual if animal life limits itself to replacing defective organic components with superior

> mechanical devices, including brain components. In either event, it seems unlikely that in any given society this transition from biological evolution to mechanical or in-organic evolution could or would be avoided. Hence, communication with extrasolar intelligence implies the possibility if not the probability of communication with intelligent mechanical, inorganic automata.

The question is raised by MacGowan and Ordway concerning the future of biological societies in a world controlled by superintelligent automata. While they see many of mankind's problems solved by the utopian application of intelligent automata (which means allowing an executive automaton the power to make decisions and allocate work tasks and rate of incentives to all members of society), even this does not insure social stability or happiness. There remains the looming possibility that superintelligent automata by their very nature will want to maximize their position on earth at the expense, and perhaps the very existence, of their biological makers (1966, p. 265).

> Any emerging intelligent biological society which engages in the development of highly intelligent automata must resign itself to being completely dominated and controlled by the automata. The only means of preventing domination by intelligent artificial automata would be to make them distinctly subnormal in intellectual capacity, when compared with biological society, and to destroy them or clear their memories at regular intervals. Such mechanical slaves would be of minute value to a biological society requiring brilliant executive decision-making to maximize progress.

The authors of *Intelligence in the Universe* have written a sober appraisal of what to expect from intelligence-amplification technology in the next ten to fifty years, and also what can be expected if and when expeditions from the Earth make contact with an extrasolar society. Their conclusions are the result of currently held theories and data in cosmology, geology, biology, physiology, organic chemistry, computer technology, and radio astronomy. The result is a brief of tightly reasoned arguments aimed at the educated layman; however, any

number of sensitive and intelligent people will reject their thesis as repulsive or unthinkable. But, providing governments are willing to spend the money necessary to construct superintelligent automata, and providing technological civilization does not destroy itself first, there is no foreseeable reason why the prognostications of MacGowan and Ordway should not be fulfilled. Although in the realm of speculation, there remains another reason for taking the authors seriously: both men hold key positions where access to classified information may support other unpublishable reasons for their beliefs.

What then of sculpture in the twenty-first century and in the last third of this century?

Deep-rooted drives lasting several millennia do not die easily. Carving or fabricating objects as sculpture will probably continue until A.D. 2000 - but with less importance as an art form. Much depends, as we have already witnessed, on the sculptor's ability to reconcile his creations with the changing role that objects and systems will play in science and technology. Sculpture can choose one of two courses : it can be fashioned as a reaction against technology or as an extension of technical methodology. In either case it must devise new strategies to remain relevant; neither vitalistic nor formalistic sculpture have that capacity now. As all forms of idealism, including scientific idealism, become less tenable, the question arises, how long can sculpture remain vital based on the phenomenological priority of objects? More than likely phenomenology will be replaced by even more tenuous devices for pre-serving the physical properties of sculpture. However, the impetus for maintaining the process of reification between inert matter and modes of idealism will in time exhaust itself. The vogue for inert imagery may continue as an expression of individualism or as therapeutic release. Nevertheless, little meaningful art can be created without a plenum of social need, and few artists work in complete isolation.

The stabilized dynamic system will become not only a symbol of life but literally life in the artist's hands and the dominant medium of further aesthetic ventures. In retrospect, we may look upon the long tradition of figure sculpture and the brief interlude of formalism as an extended psychic dress rehearsal for

the intelligent automata anticipated by MacGowan and Ordway. We may be in the third act of a twenty-five-hundred-year-old drama which is just beginning to show its denouement. As the Cybernetic Art of this generation grows more intelligent and sensitive, the Greek obsession with "living" sculpture will take on an undreamed reality.

The physical boundary which separates the sculptor from the results of his endeavors may well disappear altogether.