10. [Introduction] The Construction of Change

In 1961, while the Happenings Allan Kaprow reported on were creating a stir in New York (◊06), in London Roy Ascott was remaking art (and art education) in view of Wiener's cybernetics (◊04). The essay reprinted here is Ascott's first publication on the subject, and one of the first writings to advocate this connection between cybernetics and art, making it a founding document for the fusion of procedural technology and aesthetics/design that is new media. Through the rest of the 1960s the connection between "cybernetics and art" would continue to be an area of focus, in these words. More generally, artistic interest continues to this day in conception, information, behavior, and interaction.

While the Happening is viewed by some as the paradigmatic example of artistic interaction, others (as discussed in the introduction to Kaprow's essay) would disagree with this characterization. Frank Popper, in his influential *Art of the Electronic Age,* redraws the bounds of this debate by underscoring a distinction between *participation* and *interaction*:

> In the artistic context, "participation" meant in the 1960s, and still means today, an involvement on both the contemplative (intellectual) and the behavioural level. It differed from traditional attitudes towards the spectator by this double invitation and by its political and social implications. Besides being invited to participate through the devices specific to the plastic arts, the spectator was often encouraged to take part in events resembling a ritual ceremony or tribal feast.
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> The term "interaction" has a more recent history in this area and refers to a still more comprehensive involvement. Here the artist tries to stimulate a two-way interaction between his works and the spectator, a process that becomes possible only through the new technological devices that create a situation in which questions by the user/spectator are effectively answered by the art work itself. A global network is the usual form taken by these works, requiring equally global involvement from the spectator. The projects again have important social implications, though they are far less directly "political" than those of the 1960s. They tend to address more immediately daily problems or environmental issues, and can have a distinctly "scientific" flavour.
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> Thus, the term *participation,* in the context of contemporary art, refers to a relationship between a spectator and an already existing open-ended art work, whereas the term "interaction" implies a two-way interplay between an individual and an artificial intelligence system. (8)

Some have argued that Ascott's essay is the first to be published on new media art. Whether one agrees with this assertion or not, it is almost certainly the first published on education in these subjects. Consider how it compares to the classroom reports of Michael Joyce (◊42) and Robert Coover (◊49), and the imaginary classroom conjured by Seymour Papert (◊28).

Popper's distinction can be a useful one, especially if we are willing to adopt for its purposes a much broader definition of artificial intelligence than is traditional in computer science. At the same time, however, it is instructive to note that Ascott's later works do not fit neatly into Popper's dichotomy. In the 1980s Ascott became a pioneer and primary articulator of *telematic* art, in which an artist creates a system for communication and collaboration between physically dispersed individuals. Such cases are clearly not what Popper calls participation, and yet they are also not cases in which "questions by the user/spectator are effectively answered by the art work itself." Instead they are answered, in a sense, by the other user/spectators, through the context created by the artist—a "global network" of a rather different sort. Telematic art, in fact, might potentially be defined as work that attempts both Popper's participation and interaction. Further, telematic art remains fully consistent with the framework Ascott presented in 1964—of art as an investigation of behavior, of creating situations for exploring behavior.

Ascott's exercises in the second portion of this essay can be read as dematerialized art (along the lines of Yoko Ono's instructions) or as a straightforward report of the embodied work he was carrying out at the Ealing School of Art—and either reading may be useful.

—NWF

Further Reading

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The Construction of Change

Roy Ascott

Art and Didactics

While the creative process demands acts of synthesis which defy verbal description and which only the work of art itself can define, there are some aspects of artistic activity which can be examined and set down rationally. They are both empirical and analytical and involve forays into unfamiliar conceptual territories. Very often scientific ideas can reinforce or extend what is uncovered. To discuss what one is *doing* rather than the artwork which results, to attempt to unravel the loops of creative activity, is, in many ways, a behavioural problem. The fusion of art, science and personality is involved. It leads to a consideration of our total relationship to a work of art, in which physical moves may lead to conceptual moves, in which Behaviour relates to Idea.

Art, for me, is largely a matter of freely developing ideas and creating forms and structures which embody them. Whatever ideas I may pursue, and in the art the entire universe is open to investigation and reconstruction, Behaviour is an important reference in my considerations of space, time and form. I make structures in which the relationships of parts are not fixed and may be changed by the intervention of a spectator. As formal relationships are altered, so the ideas they stand for are extended. I am conscious of the spectator's role. Once positioned to a work he may become totally involved—physically as well as intellectually or emotionally. To project my ideas I set limits within which he may behave. In response to behavioural clues in a construction (to push, pull, slide back, open, peg-in, for example) the participant becomes responsible for the extension of the artwork's meaning. He becomes a decision-maker in the symbolic world which confronts him. My *Change Paintings* and kinetic constructions are not intended only to discuss and project ideas, but as analogues of ideas—structures which are subject to change and human intervention in the way that ideas themselves are. It is predominantly the experience of Change and the concept of power which lies behind our control and prediction of events which holds my attention at present.

In trying to clarify the relationship between art, science and behaviour, I have found myself able to become involved in a teaching situation without compromising my own work. The two activities, creative and pedagogic, interact, each feeding back to the other. Both, I believe, are enriched. The didactics of art, set against the discoveries of science, have concerned many artists in the past. It is useful to turn to the writings of, for example, Leonardo, Seurat or Paul Klee, but they cannot go all the way towards dealing with problems and experiences that face us today.

All art is, in some sense, didactic: every artist is, in some way, setting out to instruct. For, by instruction, we mean to give direction, and that is precisely what all great art does. Art shapes life. It is a force; only the aesthete makes a refuge of it. Through his work the artist learns to understand his existence. Through culture it informs, art becomes a force for change in society. It seems to me that one should be highly conscious of the didactic and social role of one's art today. Society is in a state of enormous transition. The most extensive changes in our environment can be attributed to science and technology. The artist's moral responsibility demands that he should attempt to understand these changes. Some real familiarity with scientific thought is indispensable to him. It is not enough to accept our

condition, or simply to enjoy it. Acceptance can only lead to a "murderous easy-goingness," as Thomas Mann has described it. "It would need a new society if art is again to become innocent and harmless."

Culture regulates and shapes society. The artist functions socially on a symbolic level. He acts out the role of the free man par excellence. Having chosen the symbolic field within which he will act, and setting for himself material limitations with which he is familiar, he sets out to discover the unknown. He stakes everything on finding the unfamiliar, the unpredictable. His intellectual audacity is matched only by the vital originality of the forms and structures he creates. Symbolically he takes on responsibility for absolute power and freedom, to shape and create his world. He demonstrates, perhaps ritualistically, man's "capacity to create what is to be... man's highest merit, after all, is to control circumstances as far as possible" (Goethe). In this context the artist's activity is as significant as the artwork he produces.

Creative leaps are taken in science also. Science seeks to reduce the unpredictable to measurable limits. While it may have a symbolic or ritualistic function, it is generally see to operate in the practical works in consort with practical power. By prediction, it reduces our anxiety of the unknown future. By control, it reduces the contingent nature of events and orders them to our advantage. By comparison, the artist plays, but it is play "in deep seriousness" (Mann). The culture to which art contributes, although it works without practical power, is responsible to a considerable extent for the direction in which society moves. The artist's activity serves to set before his fellow men the symbolic pattern of an existence in which, given absolute choice and responsibility and the power to take incalculable risks, the world and his own identity are shaped to his will. it stands for that optimum of control and creativity to which man's practical life constantly aspires.

Science and a discipline for Art

Culture has been well defined as "the sum of all the learned behaviours that exist in a given locality." The work of art occupies a pivotal point between two sets of behaviour, the artist's and the spectator's. it is essentially a matrix, the substance *between*. It neither exists for itself nor by itself. Consequently the artist would do well to examine with some precision the nature of the special activity which gives rise to his own art. "An organism is most efficient when it knows its own internal order." He might direct his attention to those sciences which measure behaviour, scrutinise biological processes and explore the internal systems of communication and self-regulation. He may ask how the human organism interacts with its environment: what relation knowledge has to perception. A consistent and thorough enquiry might lead to the forming of a discipline. But the behavioural sciences alone could hardly constitute the total backbone to one's art. Some real understanding of the world to which we respond and with which we have commerce must be obtained. Traditionally the artist relies on visual observation, intuitive judgement and day to day experience for this. But to fully orientate himself in the modern world the artist must turn to science as a tool and reference. I recommend that he turn to Cybernetics.

Science as a whole works on many fronts—too many highly specialised fields, in fact, for the artist to consult them all, except casually. Cybernetics however is essentially *integrative,* drawing many disparate sciences together. It ranges over many territories of scientific enquiry. It is a co-ordinator of science, as Art is the co-ordinator of experience. Cybernetic method may be characterised by a tendency to exteriorise its concepts in some solid form; to produce models in hardware of the natural or artificial system it is discussing. It is concerned with what things *do,* how they do them and with the process within which they behave. It takes a dynamic view of life not unlike that of the artist. Phenomena are studied in so far as they do something or are part of something which is being done. The identity we give to what we perceive is always relative, yet it presupposes a whole. Everything changes ceaselessly; we investigate our world best by seeing first the system or process before evaluating the "thing." Cybernetics is concerned with the behaviour of the environment, its regulation and the structure which reveals the organisation of its parts. "Control and communication in animal and machine" is a proper study for the artist.

Linked to technology, Cybernetics is responsible for unprecedented changes in the human condition. Cybernation is bringing about a total industrial revolution which will have far reaching social consequences. This science of control and communication is leading to new concepts of urban planning, production, shelters, transport and learning methods. The ball has started to roll. The artist cannot

ignore this creative force which is changing his world. Moreover, Cybernetics deals with concepts of information, perception, translation, logic and chance which are singularly relevant to his art.

And man's relationship to his environment has changed. As a result of cybernetic efficiency, he finds himself becoming more and more predominantly a Controller and less an Effecter. The machine, largely self-regulating and highly adaptive, stands between man and his world. It extends his perception into furthest space and deep into the finest particles of matter; physical labour is replaced by accurate, tireless automata; in many situations the machine can gather required information, store, process and act on it more swiftly and reliably than Man himself can. he perceives the world through the excellent artificial systems he has devised. Cybernetics is not only changing our world, it is presenting us with qualities of experience and modes of perception which radically alter our conception of it.

Science can inform a discipline for art, then, not to produce a scientific work but to substantiate our empirical findings and intuitions with clear analysis and reason. The final stage is beyond theory; only creative synthesis can produce that co-ordinating matrix for ideas which is art.

To praise science, however, is not to praise a spurious scientism; I mean that tendency in Art to use images and notations found in the *products* of science with no understanding of the concepts behind them:—a "scientific" style; a romanticism of machines and laboratories, micro-photographs and unidentified cross-sections; the furniture of science, the props. This attitude is often accompanied by a sentimental nostalgia for the past. To ignore the theory, the process, the demonstration must be a contradiction of science and, indeed, of a forward-reaching art. Anti-science in art is equally to be criticised. It is an attitude which derives from a fear of the vitality of modern life, its technological advance, its scientific daring. It is hostile to reason and clarity of purpose, it is irresponsible and vague.

Great art symbolises our will to shape and change the world and also puts forward the particular aspirations of its time. What is our symbol of faith? We may find that it will embody a concept of power realised in our capacity for highly adaptive control, subtlety of communication, and the boldness of our investigation and planning at the most complex biological and environmental levels.

A Groundcourse for Art

But no matter what our aspirations or intentions in art, we must prepare a discipline, a groundwork for creative activity. When I emphasise that my art and didactics are one, I am suggesting that the artist's discipline and experience can be usefully extended to the student. One can help him to win an outlook and to construct the groundwork for his own unique creative identity. But one artist is not enough. A wide diversity of artists and scientists, suitably co-ordinated, must confront the student. He, in turn, must be sufficiently uninhibited to respond. Out of the flux a many sided organism can evolve.

Such an organism, so to speak, is in the course of evolution at a London art school (Ealing School of Art). This two year "Groundcourse" (initiated and directed by Roy Ascott) is a microcosm of a total process of art education which would stretch from general secondary education to the graduate levels of professional art and design training and it occupies the pivotal point in it. It takes students from the secondary school and prepares them for a subsequent professional training. I would like to describe the Groundcourse, very broadly. My collaborators on the course have included a deliberately varied selection of painters, sculptors, designers, and scientists.[1] Each one has expanded his own given area of teaching with ideas fresh from his studio or study. These areas interact and suggest new fields of study and the need for new kinds of personalities. Ideas grow and exercises proliferate as teachers discuss and dissect each other's attitudes and pedagogic methods. So many exercises and methods of presenting them are thrown up in this creative milieu, even in the course of one week, that it would be impossible to list them here. I shall describe the general areas of study and a few examples of specific problems students may be set.

The First year course has many facets. Empirical enquiry in response to precise questions is balanced by scientific study; irrational acts by logical procedures. At the core is a concept of power, the will to shape and change. Cybernetics and behavioural sciences are studied regularly.

The new student's preconceptions of the nature of art and his own limitations ("art is Van Gogh"; "art is what my teacher said it was to get me through GCE"; "I am no good at colour"; "I am the class clown"; "I am thick, but good at patterns and posters") must first be severely shaken and

opened up to his close scrutiny. His disorientation is contrived within an environment which is sometimes unexpectedly confusing, where he is faced with problems which seem absurd, aimless or terrifying.

The nature of drawing is questioned. Example 1. Draw the room in reverse perspective. What information is lost? If any, find a way of adding it to your drawing. 2. Time-drawing of the model. Draw her hair in three seconds, face in three minutes, left hand thumb nail in three hours, legs in six seconds, right ankle in two days. 3. Draw her with acute earache. 4. Draw the room using only rubbings from surfaces in it. Copy the drawing precisely with line and tone.

The values of perspective, mechanical and architectural drawing are practised and tested against problems of space—scanning and design.

Perception studies examine the modes of human perception, their co-ordination and include the search for visual/plastic equivalents. Surface gesture, mark, colour, volume are investigated, always within some context. Example 1. Imagine you wake up one morning to find that you are a sponge. Describe visually your adventures during the day. 2. List the sense-data of an umbrella or a hot water bottle. Visually restructure the parts to form a new entity. Ask your neighbour to identify it. 3. If fifteen ragged criss-cross lines stand for a cough, how would you draw the BBC time signal? 4. Use only solid shapes to discuss your perception of: a bottle of ink; fish and chips; a police siren; ice hockey. 5. Show how zebras disguise themselves. 6. Invent a typewriter-bird and show the kind of tree within which it could most successfully hide.

In the workshop the student acquires skills in joining, moulding, separating, transforming wood, metals, and various transparent, reflective and flexible materials. Example 1. Make a sculpture in plaster of interlocking units, such that when a key piece is removed, the rest falls apart. Allot colours to the separate pieces, (a) to indicate the key, (b) to facilitate reassembly. 2. Using only wood, sheet aluminium, string and panel pins, construct analogues of: a high pitched scream, the taste of ice cream; a football match. Kinetic structures are built and studies. Concepts can be formed and developed by visual means. This might be seen as the third leg in the learning process, where, for some reason, verbal or numerical systems are inadequate. Unlike the latter symbolic systems, however, the visual ABC and syntax have to be reinvented for every problem. In visual terms students set about analysing and inventing games, logical propositions, idea sequences, matrices. Visual polemic is induced, codes designed and broken.

Natural growth and form in the context of, say scale, reproduction, simultaneity are analysed with meticulously detailed drawings. Example 1. Analyse and dissect a section of a pomegranate. Discuss with precise drawing its three-dimensional cellular structure. 2. Examine a plant in minute detail; design a new plant based upon the principles of growth you have observed. 3. Discuss visually the movements of a hungry, caged lion; a frightened squirrel.

In the light handling class students control a limited environment with lights, coloured filters grids and lenses, moving screens and prefabricated items. A theatre-play situation emerges, in the course of which students rehearse a variety of social and archetypal roles and explore the relationship of illusion to identity in terms of colour and light. The registration of environmental changes on light sensitive paper introduces photography.

Concepts of behaviour, environment, identity find their way into practical classes. Example 1 Draw a man, machine or animal. Cut up the drawing into seven sections (e.g. arm, head, wheel, handle, etc). Put the pieces with every one else's in a box. Pull out another seven at random; construct logically a new entity. Draw the environment in which you might expect to encounter it. 2. Show, with line and colour, the potential function of: the studio door, a water tap, an elephant, the window blind. Attempt to describe what they might have in common. 3. Invent two distinctly different animals; imagine them to mate and draw the offspring. 4. Make the illusion of, say, a bun or sausage, in three dimensions and on paper. Show it being submitted to various events: run over, squeezed dry, soaked in acid, minced, pierced by a shot gun. Measure the real against the metaphoric. 5. Create a world on paper with major and minor structural systems. Show a fault occurring in the minor one; design a repair centre to put it right. 6. Entropy may be described as a constant drift in the universe towards a state of total undifferentiation; pockets of resistance are organising continuously. Discuss this proposition, limiting yourself to six visual elements.

In this first year course the student is bombarded at every point with problems demanding a total involvement for their solution. Ideas are developed within material limitations and in the abstract. For the teachers, the formulation of problems

is in itself a creative activity; the above examples give a general indication of the kind of questions they have set.

In the second year the situation changes radically. The general direction is programmed but beyond that students must find their own problems. Students are set the task of acquiring and acting out for a limited period (ten weeks) a totally new personality, which is to be narrowly limited and largely the converse of what is considered to be their normal "selves." They design "calibrators" to read off their responses to situations, materials, tools and people. They equip themselves with handy "mind-maps" for immediate reference to their behaviour pattern as changes in the limitations of space, substance and state occur.

They form groups of six. These sexagonal organisms, whose members are of necessity interdependent and highly conscious of each other's capabilities and limitations, are set the goal of producing out of substances and space in their environment, an *ordered entity.*

The limitations on individual behaviour are severe and unfamiliar. The student who thinks himself "useless" with, say, colour, machine tools, objective drawing, may find himself with the sole responsibility for these things in his group. The shy girl must act out an easy sociability; the aggressive youth must become co-operative. One student may be limited to transporting himself about the school on a trolley; another may not use paper, numbers or adhesive substances.

The subsequent "ordered entities" are as diverse as the composite personalities of the organisms they reflect. Totems, time machines, sense boxes, films, sexagonal cabinets, cages have been produced out of the flux of discussion and activity.

Students are then invited to return to their former personalities. They must make a total visual documentation of the whole process in which they have been engaged. They must search for relationships and ideas unfamiliar to art (i.e. spatial relationships are familiar). They use, at first, every possible expressive means: film, collage, graphic processes, wood, plaster, metal, cloth, glass, readymades, rubber, paint and so on. They work on a huge scale at one point, and in miniature at another, sometimes with kinetic structures, sometimes with static relationships.

In the process, and reflecting upon their previously contrived limitations of behaviour, they become aware of the flexibility of their responses, their resourcefulness and ingenuity in the face of difficulties. What they assumed to be ingrained in their personalities, they now tend to see as controllable. A sense of creative viability is being acquired.

They move progressively into problems of their own; one set of ideas is preferred to another, exploited and pushed to an extremity of thought or technique. They also begin to chose specific limitations of material within which to work. They are moving towards the point of deciding within which professional field they will act. They are becoming aware of their special creative identity. Analysis and experiment are beginning to lead to synthesis. This is a report of work in progress; it can be little more than a brief summary of an evolving situation. It is difficult to do justice to the vitality and sense of purpose which the course engenders. What has been proposed is not a rigid system but a flexible structure within which every thing can find its place, every individual his way. It is an art which does not eschew science. It enables the student to become aware of himself and the world while enabling him to give dimension and substance to his will to create and change.

Note

1 Kenneth Adams, Anthony Benjamin, Adrian Berg, David Bindman, Dennis Bowen, Bernard Cohen, Harold Cohen, Noel Forster, B French, N Johnson, R B Kitaj, Stephen McKenna, J. Morris, J Nerichov, George Popperwell, Peter Startup, William Suddaby, Brian Wall, Brian Wright.