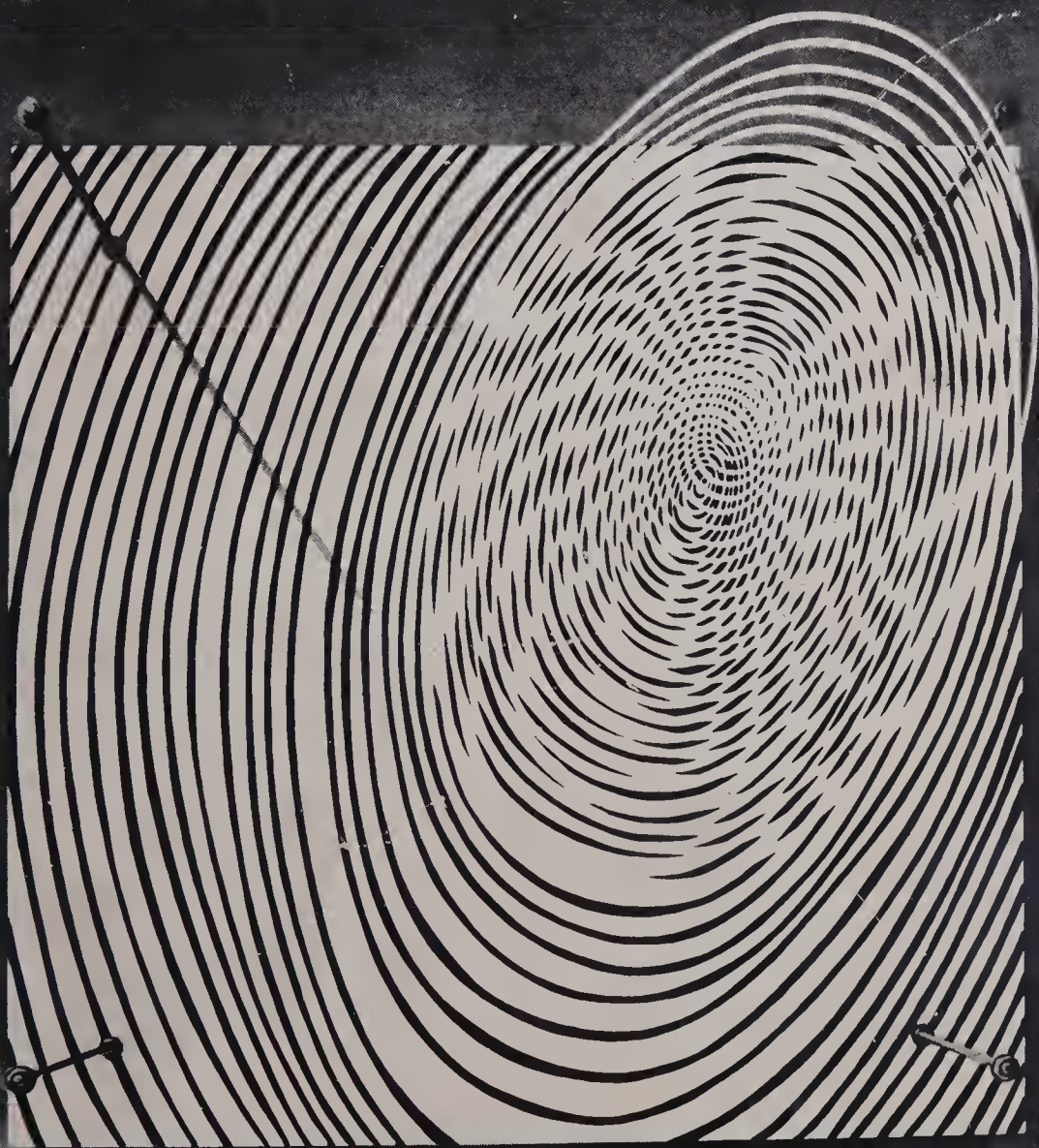
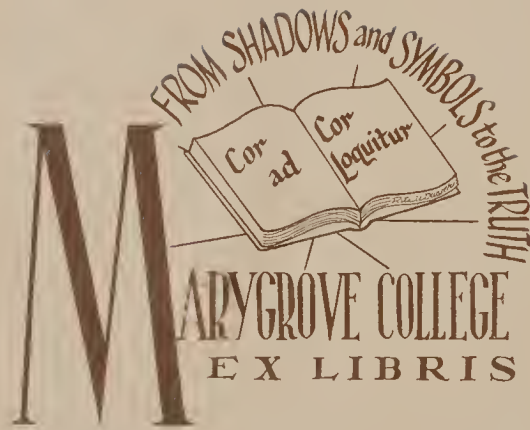


Kinetic art

The language
of movement

Guy Brett






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Kinetic Art



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Kinetic Art

Guy Brett

Studio-Vista : London
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Acknowledgments

The photos in this book, the selection of works, the text, are inevitably brought together in the context of an intellectual argument. But this argument doesn't bind the works or attach itself to them. Another writer might make a different selection of artists under the same title. And this could be good, because it could prevent the formation of a clearly-defined style and therefore bring us closer to the perception of individual artists.

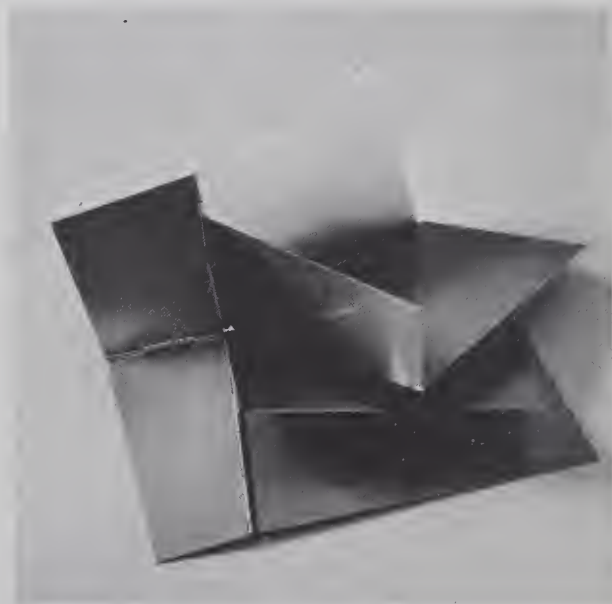
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I especially want to acknowledge here the work done by Paul Keeler and David Medalla at Signals, London, (1964-66) in exhibiting the work of several of the artists in this book and arousing enthusiasm for it.

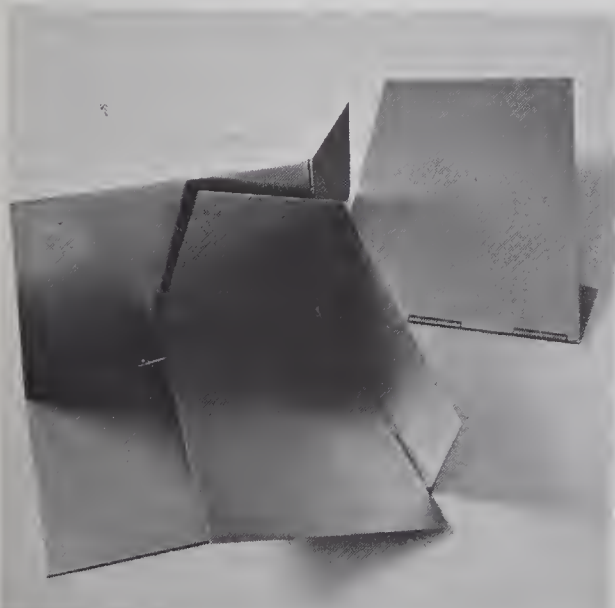
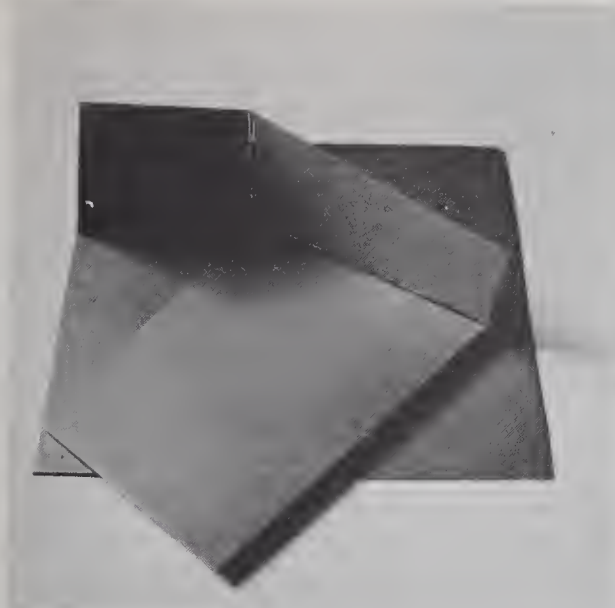
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Lygia Clark : *Monument in all situations*. 1964.



'Today a work of art ought to be alive like an organism' (Lygia Clark).

Some phases of Lygia Clark's *Monument in all situations* (1964), an articulated sculpture of aluminium plates linked by hinges which can be manipulated by the spectator.



David Medalla: detail from *Cloud Canyons*. Bubble mobile No. 2. 1964.

Movement produces the possibility of a work of art whose form *is* a process of growth. This growth might be revealed through the spectator's actions, linked to his movements, or it might grow of itself from within, responding spontaneously to the environment.

This book is about movement in art. But it is not movement in itself which is important. Movement in a literal sense is no guide to a work's quality or even its modernity. It so happens, though, that the word 'kinetic' has got itself used to describe a large number of artists and their work. And the word 'kinetic' has already gathered around it a lot of stylistic connotations, most of them purely technical: to do with the use of mechanical systems, electric motors, light, vibratory patterns and so on. These technical properties have often been used as criteria with which to define the work, to group it with others, even to justify it. This approach can only have the effect of creating an Academy of Movement, a body which can define itself clearly only by isolating itself. The tendency has certainly been to treat kinetic art as a separate pocket of modern art with its own inventors and rules.

Unlike electric motors or electric lights, 'movement' is not material. It means simply that the work extends in time as well as space. It has nothing whatever to do with one material or technique more than another. Of course movement has been used with many conscious or unconscious motives: for entertainment, for dramatic effect, for decorative effect. In many of the exhibitions of kinetic art which have been put together with technical considerations in mind there has often been a feeling of aggressiveness, waste, and finally monotony. This probably comes from taking movement very literally, as a process solely of *motorization*.

But it is obviously no good merely setting in motion existing forms, making a motorized version of an already established artistic language which was intended to express something different. The result may be more 'dynamic' than a static structure, but only in a very superficial sense. I don't think that the dynamic form of art which creative artists have sought since the beginning of the century, and are still seeking, necessarily has the connotation of speed and noise. Their 'dynamism' is something simpler and more fundamental. Perhaps it means nothing more complicated than being able to 'breathe freely' in new dimensions, finding a language which situates them in the world as they have become aware of it.

Above the details of personality, art has always expressed man's conception of reality in a language of space. The dimensions he gives space in or through the work of art are his own inner dimensions. So the work of art is a kind of mediator between man's inner world of order and the outer world of chaos, and defines a relationship between the two. Since the beginning of the century an entirely new language of space has been evolving in art, and in the work of a number of artists movement has arisen as a radical extension of that language. It is a shared feeling for space, rather than a similarity of technical means, which unites the artists in this book. What kind of space is it which has flowered in movement? What kind of space is it which can't be detached from the time in which it is revealed?

Part 1. A new space

'Every period brings its own enlightenment, its particular feeling for space, as a definite need. Our civilization, even for those who have never been in an aeroplane, has brought an entirely new understanding of the sky and the extension of space. Today there is a demand for a total possession of that space.'¹

'Growth is not merely quantitative striving for height but the increase of energy in all directions, and the transformation of material substances. The cosmic element is a vantage point to escape the mere terrestrial and encompass the whole. There are regions where laws apply, for which new symbols have to be found, corresponding to looser movement and greater mobility of coaction. One surrenders to such forces as air currents, cooler or warmer air.'²

'Little, it seems to me, do these [naturalistic] artists know how shallow their image of reality must appear to the scientific mind of today; to the mind which conveys to us nowadays an image of reality where there is no difference, no boundaries, between a grain of sand and a drop of water, a flash of electricity and the fragrance of a tree.'³

1. Matisse: *Problèmes de la peinture*, Paris, 1945
2. Klee: *Pedagogical Sketchbook*, 1925
3. Gabo: Trowbridge Lecture, Yale University, 1948

Three modern artists of the pioneer generation are here describing their search for a new system of language. The language they inherited, and which they found constricting, was the language of the Renaissance. It was easy, and some people still find it necessary, to accept the Renaissance space-conception, with its precedent in the art of Greece and Rome, as absolute. In fact of course it was the expression of a certain system of belief – one that identified what was real with what was visible. The space conception of the Renaissance was static. It represented the view of a single observer of the visible world through the device of perspective and it separated experience into categories with neatly drawn boundaries. It was the space of common sense; the shapes of appearances were final. The work of art was as clearly marked off from its subject as it was from the spectator.

The twentieth century produced the crisis of this view of the world. While many people clung to the old system for security, receptive minds became aware of it only as a block; what had been sacred limits became to them stultifying barriers. Their thought flowed across the old barriers, seeking correspondences in a vast new field. Across the barrier between visible things; between psychic and physical reality; between cultures and races; between modern and primitive peoples and ways of thinking; between our star and other stars; between matter and energy; between words, sounds, colours, smells; between the work of art and nature; between the work of art and the spectator. The

relativity of things was discovered simultaneously by art and science.

The story of modern art is the story of the growth of the language of space with which these relationships are understood and expressed. It is easy in retrospect to make it look as though it developed according to a neat theory. Inevitably a book like this can give little idea of the amazing diversity of modern art. It can only give indications. But there is no doubt that the great pioneers of modern art reacted to the modern world with similar forms of language and ideas about art, which opened possibilities for a 'kinetic' art.

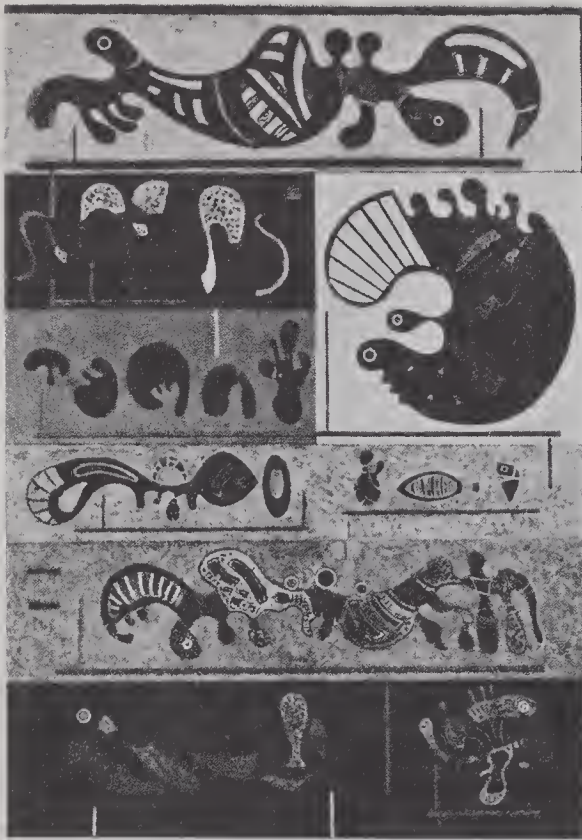
There were many reactions to the 'dynamism' of the twentieth century of course. The Futurists made enthusiastic use of the word. But they tended to interpret it descriptively. To express the interrelation of objects, they literally chopped up naturalistic representations of them, in some sculptures combining fragments of window, head and so on, in a conglomerate mass. Even Duchamp's famous 'Nude descending a staircase' is really a sophisticated version of a phased time-exposure photograph rather than a painting.

But chiefly there have been two different kinds of contribution. Some artists have formed a new language gradually out of the old, only using new forms in so far as they could give expression to them. Others have worked from a position of greater conceptual freedom, using things that had never been in art before, throwing out ideas they may not have had the inclination (or even the ability) to realize. They set out deliberately to free thought about the nature and role of the 'work of art'. Others still have combined both these activities. To describe these two different approaches I have used the familiar titles: Art and Anti-art.

The Futurists found a way of suggesting the movement of a body through space, but they failed to find a pictorial structure which was itself dynamic. They may no longer have been representing movement as arrested but they were still representing it. In Futurist painting rhythm is only an adjunct of form. But other painters found a structure in which the form *is* the rhythm, though their paintings may at first glance appear more 'static'.

The Impressionists were the first to begin to isolate colour and light again as essential elements in painting. They were seeking ways to intensify the surface, and they needed a more elementary and flexible instrument of language than realism. They were still concerned with appearances, and it was only gradually that subject matter lost its importance and the picture surface itself became the subject for analysis. The steps by which this happened are very well known and they culminate in abstract art. In abstract or concrete art the devices of representational space are cleared away and expression springs from an absolutely elementary language of relationships between forms in a real two-dimensional space.

In spite of the strongly different personalities they express, there is a complete correspondence between the paintings of the artists who lived through and made this transition. There is a shared idea about the nature of the painting in Mondrian's and Malevich's work, in the late paintings of Klee, Kandinsky and Matisse. (The paintings reproduced here, it is true, vary in date



Kandinsky : *Seven*. 1943. *Collection Max Bill, Zurich*.

by as much as 40 years, but only because they come at different moments in the lives of artists who were more or less of the same generation.) All conceive of the painting as an active surface on which real things happen. In other words the painting is not removed from the world by being a representation of it, governed by special laws of 'likeness'. The painter wishes to construct his work according to the same laws of relationship which he feels account for the existence of all phenomena, to find a common rhythmic sympathy through elements which are simple enough to be immediately grasped and immediately forgotten. Matisse wrote :

'Of this or that object which I used to present in all its complexity in space, I now keep only the sign which suffices.'⁴

His mural is a kind of score. To the right, flat signs for the body in motion burst out above and below the score.

4. Matisse 'XXe Siecle' no. 2, 1952

5. Malevich : *The Non-objective World*, 1927

Matisse : *Swimming Pool*. Design for wall ceramic, 1952. Gouache on cut & pasted paper. *Private collection*.



Kandinsky's painting also has the construction of a chart or score, with different compartments presenting elemental processes of form-creation. The whole canvas is an organic complex of interrelations – growth, shrinking; massing, fragmentation – not leading to the creation of any finished image, simply ebbing and flowing. Klee's painting again denies limitations in space and time, by giving the impression that we are seeing a fragment of a larger whole.

Malevich defined this concrete way of thinking precisely when he described the origins of his own abstract painting, which he called 'Suprematism':

'I haven't invented anything. I have simply felt the night in myself, and in it I have caught a glimpse of the new thing which I call Suprematism. That is expressed by a black surface which represents a square.'⁵

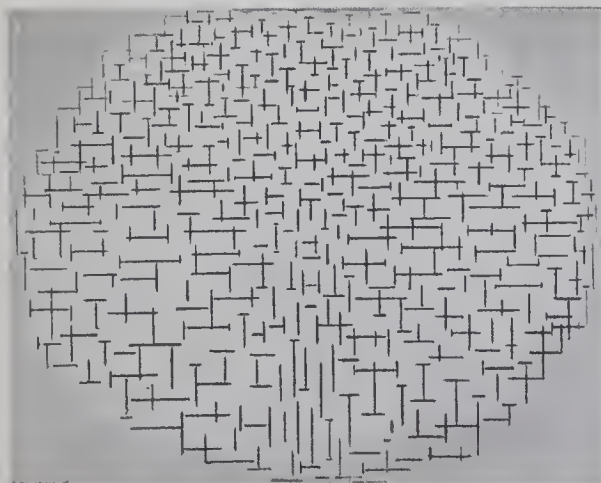
The square is a sign for the experience of night, or of space, or a sign simply for feeling, though it's not loaded down with particular references or complex symbolism. Elsewhere he called Suprematism the 'semaphore of colour' in the 'endlessness' of space.

Mondrian's was the clearest and most radical formulation of the new space. His elements were the most anonymous and inexpressive in themselves, the furthest from form as it was traditionally understood in painting. This painting (*page 16, bottom*) is quite an early one and still alludes to naturalism, though the means are no more than plus and minus signs. His later paintings make no reference to depth, use only right-angle bars and primary colours. Mondrian wrote:

The only constant relationship is the right-angle. By the proposition of dimension the constant

Klee: *Ludus Martis*. 1938. Stedelijk Museum, Amsterdam.





must be brought to movement: made living.⁶ It defines his position exactly. The right-angle is taken as a constant; in varying the dimensions the painter is varying simple spaces, not forms. And it is in the regulation of the spaces that the life, the movement, the 'breathing' of Mondrian's paintings lie.

Mondrian minimised the material importance of the elements, and made his language from pure relationships. One can see why the possibility of further *detaching* the elements on the surface has yielded such a rich language to artists today.

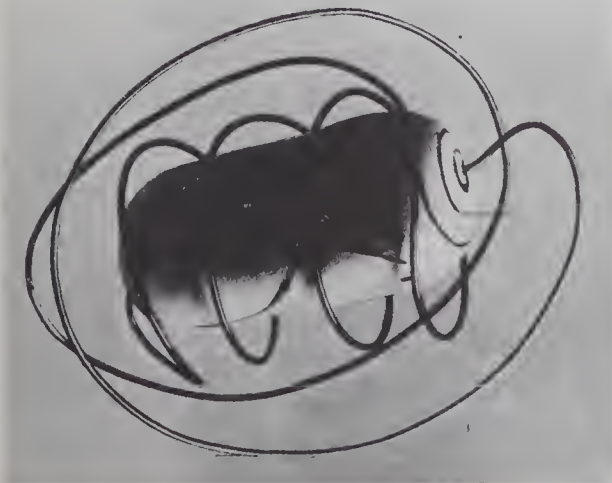
Opposite, above:
Malevich: *Part of Retrospective Exhibition 1920, Moscow.*

Opposite, below:
Mondrian: *Pier and Ocean.* 1915. *Kroller-Muller Museum, Otterloo.*

Right:
Vantongerloo: *Function of variants. Red, green, brown, greenish.* Paris 1938. *Max Bill, Zurich.*

Below:
Vantongerloo: *Cosmic Element.* Paris 1945. Painted wood & nickel alloy. *Max Bill, Zurich.*

Footnote opposite:
6. Mondrian: 'Plastic Art and Pure Plastic Art, and other writings'. New York, 1945



Sculpture

In the three-dimensional language of sculpture the same discoveries were made. Sculpture ceased to dominate space as an image in mass; it became an integral whole with the space around it. It became an instrument for indicating that space, exploring its extension and potential. We can see a similar preoccupation with revealing space in Vantongerloo's painting and his sculpture. The painting here is made up of lines tracing manual gestures, and the sculpture of wires tracing the imaginary paths of impersonal forces, as in a nucleus.



Gonzalez: *Head*. 1933. Silver. Collection Madame Roberta Gonzalez, Paris.

Again different personalities employed different means for similar ends. The Gonzalez sculpture indicates a free and flexible space by its vital unbalance of masses and daring joints (made possible by welding); the Gabo by its transparency and weightlessness (made possible by the use of plastic) and its endless interpenetrating lines. To express his experiences of nature Gabo used a system of stresses balancing one another with constructive methods like an engineer's. In his 'Endless Column' Brancusi produced rhythm by repetition of a single form and added nothing. This form functions as a single linking element, without itself having any finality. It only seems to exist in fact by virtue of what it links: earth and sky (ascending and descending), movement and rest, and its miraculous synthesis of the essential forms of Oriental, African and Mediterranean art.

It is because of their linguistic freedom that in a study of movement I have cited these 'static' works. Precedents for the use of actual movement exist in mechanics, musical instruments and entertainment, but they remain simply materials like any other. Only one artist of the older generation created a sensuous means of expression from the use of real movement: Alexander Calder. His sculptures are superb, but Calder has perhaps had a small influence because his work, being strongly representational, has not suggested comparable linguistic possibilities to be developed. This motorized Calder (*page 20*) is an early and more abstract work.



Gabo: *Construction in space with crystalline centre*. 1938. Plastic. Collection Miriam Gabo.



Brancusi: *Endless Column*. 1937. Gilt steel, 97 ft. 6 ins. high. At Turgu-Jiu, Rumania. Photo by Brancusi.

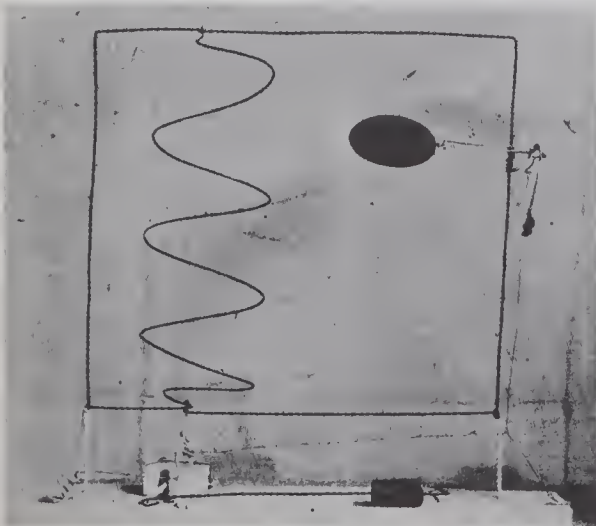
Anti-art: propositions and experiments in movement.

'Anti-art' is the Dadaists' polemical term. I have taken it to describe different kinds of work which are first and foremost conceptual, which arrive from outside the aesthetic tradition with the express purpose of liberating thought. It is itself a catalytic thought (contained in an object, a drawing or perhaps a piece of writing) which extends the language without ever becoming part of it. But the fact that it may never be realized – transferred from the realm of thought to the realm of plastic art – does not affect its value.

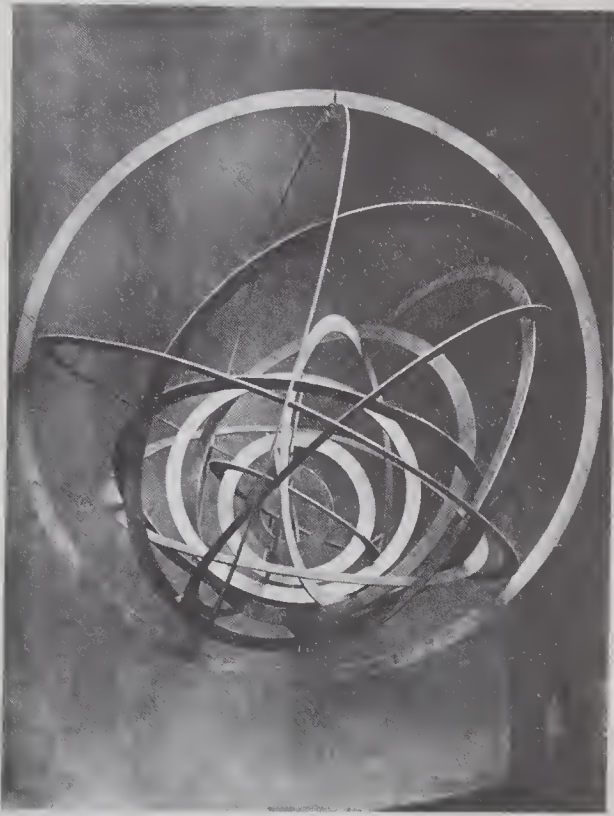
There is no hard and fast division between art and anti-art. But it does seem to be true that the more conceptual work was produced by artists collaborating with one another and the plastic art by artists (sometimes the same artist in each case) working alone. In the early part of the century tremendous steps were taken in broadening our idea of the work of art by the artists of revolutionary Russia, by the Dadaists and by the Bauhaus.

Rodchenko's 'Construction' and Gabo's 'Kinetic Sculpture' (page 22) were made in Moscow in 1920, Man Ray's 'Lampshade' and Duchamp's 'Rotary Glass plate' (page 23) (produced in collaboration with Man Ray) in New York in the same year. Gabo and Pevsner published their Realist Manifesto in 1920. Two years later Moholy-Nagy published his prophetic manifesto 'The dynamic-constructive system of forces' (with Alfred Kemeny) and began work on his 'Light Space Modulator' (page 24). Klee published his Pedagogical Sketchbook at the Bauhaus in 1925, Moholy-

Calder: *Construction*. 1931. Wire and metal. *Rose Fried Gallery, New York.*

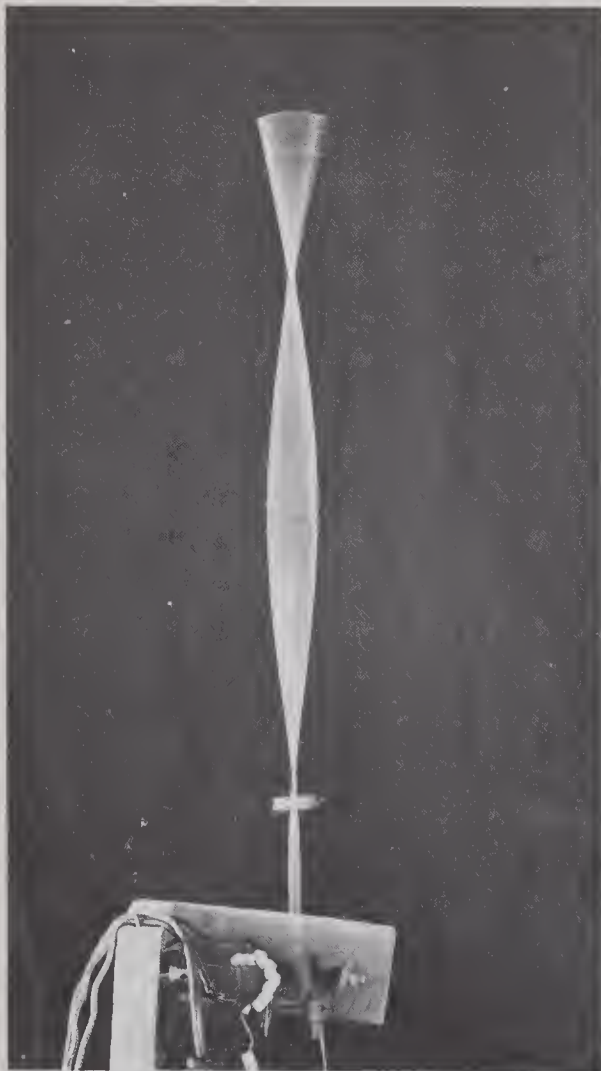


Man Ray: *Lampshade*. 1920. Paper spiral. *Remake by Editions Mat.*



Rodchenko: *Hanging Construction*. 1920. Wood.

Nagy his 'The New Vision' there in 1928. There was a fundamental unity of purpose behind these efforts, though individual motives were very different. Rodchenko's 'Construction' is a rational and purposeful affirmation of science; Man Ray's paper spiral is a throw-away gesture, a worthless object. One is an optimistic celebration of a new society; the other an ironical attack on an old. But they both show the same deep desire for the simple freedom of movement.



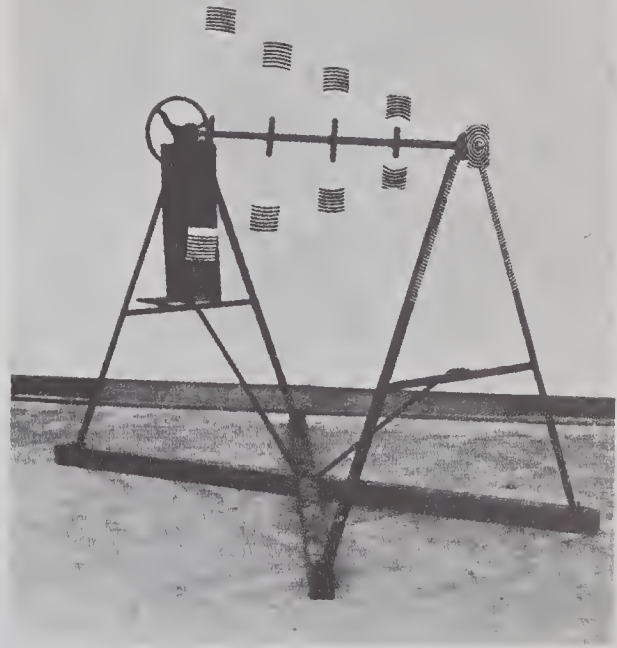
Gabo : *Kinetic sculpture*. 1920. Vibrating wire. *The Tate Gallery London*.

Duchamp's, Gabo's and Moholy-Nagy's machines are all demonstrations of a transformation process made possible by movement. The rectangular glass plates in Duchamp's machine revolve at speed and produce the illusion of a single surface, if viewed from the right-hand end. In Gabo's unique piece a wire is apparently dissolved by vibration and transformed into an illusory volume. Moholy-Nagy's machine is a motordriven construction of polished plates and rods which revolves in the beams of many coloured light-bulbs. The object's disintegration and transformation in the light becomes an environmental experience. In his *Pedagogical Sketchbook* Klee investigated, without 'aesthetic' purpose, the dynamic potentialities of the graphic line, the line conceived not as the boundary of an image but as an active force 'moving freely without goal'.

Gabo never developed the kinetic possibilities in his 'Kinetic Sculpture'. He realized its character as a proposition. He wrote: 'To bring Time as a reality into our consciousness, to make it active and perceivable, we need the real movement of substantial masses removable in space.'⁷ But he felt he could not do this with 'killing through the mechanical parts the pure sculptural content'. He felt he could not transfer it from the intellectual into the spiritual sphere, and went on to create his own 'static' language of transparent sculpture which has authentic spiritual force.

Moholy-Nagy on the other hand continued his enquiries into the possibilities of an art of real space and real time, of real forces producing an endless transformation of expression in which the spectator could be immersed. In his 1922 manifesto he formulated his convictions theoretically :

7. Gabo : 'Circle', 1937



Duchamp: *Rotary glass plate (precision optics)*. New York, 1920 with Man Ray. *Moderna Museet, Stockholm*.

'We must therefore put in the place of the static principle of classical art the dynamic principle of universal life. Stated practically: instead of static material construction (material and form relations), dynamic construction (vital constructivism and force relations) must be evolved, in which the material is employed as the carrier of forces.

'Carrying further the unit of construction, a dynamic constructive system of force is attained, whereby man, hitherto merely receptive in his observation of works of art, experiences a heightening of his own faculties, and becomes himself an active partner with the forces unfolding themselves.'⁸

Below :

Moholy-Nagy: *Light Space Modulator*. 1922-29.
Busch Reisinger Museum of Harvard University,
Cambridge, Mass. USA.

Opposite :

Yves Klein painting with fire. 1961.

Photo : Shunk-Kender.

9. Moholy-Nagy: 'The New Vision'



Moholy Nagy produced many ideas for 'dynamic constructions' of 'force relations' on a public scale which unfortunately he was not able to realize. In the 'New Vision' he traced a steady process of dematerialization in the work of modern artists (from form to force, from matter to energy), and suggested how it might be extended to the use of unstable materials like water:

'If we turn to the transformations of water, we come upon a surprising phenomenon – surprising not in its strangeness, but in its commonplaceness. We know water in rest, in motion, in gaseous form, in liquid and solid form. We know it as tiny drops, as the smooth reflecting surface of a pond, stretching far and wide. We know it as a placid or rushing brook, as a raging sea, as pattering rainfall, as a spraying fountain, as a drifting cloud of steam. We know it frozen: as snow crystal, frosted window-panes, icicles, etc. Its changes arise from an extraordinary adaptability to the forces acting upon it'.⁹

'An extraordinary adaptability'. This last sentence is a key to the works in Part 2. It suggests a structure with a more complex and dynamic kind of balance than anything in early abstract art. It's much more like the harmony a living body has: the co-ordination of functions in continually changing situations, where a body lives through its relations to things outside it and can't be considered an isolated phenomenon.

We can see this evolution as the search for a freer and more flexible language, because the work of younger artists has directly extended it. Moholy-Nagy looked forward in his imagination to an art beyond the concrete art of Mondrian and his generation. He saw that once

art dropped its representational role, once its space became real, it abolished its distance, its separateness from the outside world and the spectator. The integration of outside nature and the spectator into the work would naturally follow, movement naturally with it.

The dimension of time deprives the work of an isolated permanent existence and makes it relative. Time therefore involves the idea of *replenishment*, that the work is always new. Precisely because it is always changing and lives in the present. This doesn't mean that it's ephemeral in content in comparison with a work of the past (such as an architectural monument), but that it is continually renewed. Like, in fact, a living thing which decays and is then born again.

As I suggested at the beginning, movement, the

dimension of time, can't be merely grafted on to an existing language, because it implies a different space. A static language is finite; it has a beginning and end; it already exists. In the work of the artists which follows, space only comes into existence during the time the work moves or is moved.

These ideas were given a romantic and individualistic kind of expression in the Paris of the late Fifties by the painter and writer Yves Klein. Klein died in 1962 at the early age of 34, so he belongs to the same generation as Takis and Tinguely, whom he knew well. His ideas have been very influential in Europe, partly because he identified them with himself and put them across as personal drama and propaganda. His actual works, rather than the methods he



used to produce them, belong to an existing language of painting (in contrast to what Soto was doing at the time) and are sometimes disappointing. He even referred to them himself as 'the ashes of my art'.

What then was Klein's art? He wanted to close the gap between art and life, and remove the mystique of 'creation' and craftsmanship. He wanted simply to obtain a 'mark of life'. To do this, he got naked girls with paint-soaked bodies to dance against a white canvas, while he himself stood back and 'witnessed' the birth of his painting in white tie and tails; he drove with a still-wet canvas strapped to the roof of his car to obtain 'traces' of the wind; he 'painted' with fire, rain and so on. He conveyed his desires as intensely in his written descriptions of his activities as in the paintings themselves.

But his profoundest 'mark' in painting was also his simplest, the Monochrome, which is simply an imageless surface of intense blue. He described this with an ironical reference to representational art:

'I am a painter of space. I am not an abstract painter but representational and realistic. To be frank, in order to paint space I must be there in person, in space itself.'

In order to create a live art, Klein made himself the living element in his art and the works themselves the immediate traces of his existence in space. But with the artists who follow, the living element is inseparable from the work's structure and the artist has a more anonymous role.

Yves Klein with *Wall of fire*. The Museum garden at Krefeld 1961.





Technician producing a cloud of ice fog by throwing a can of water in cold air. Yellowstone National Park, Wyoming, USA. *USIS photo.*

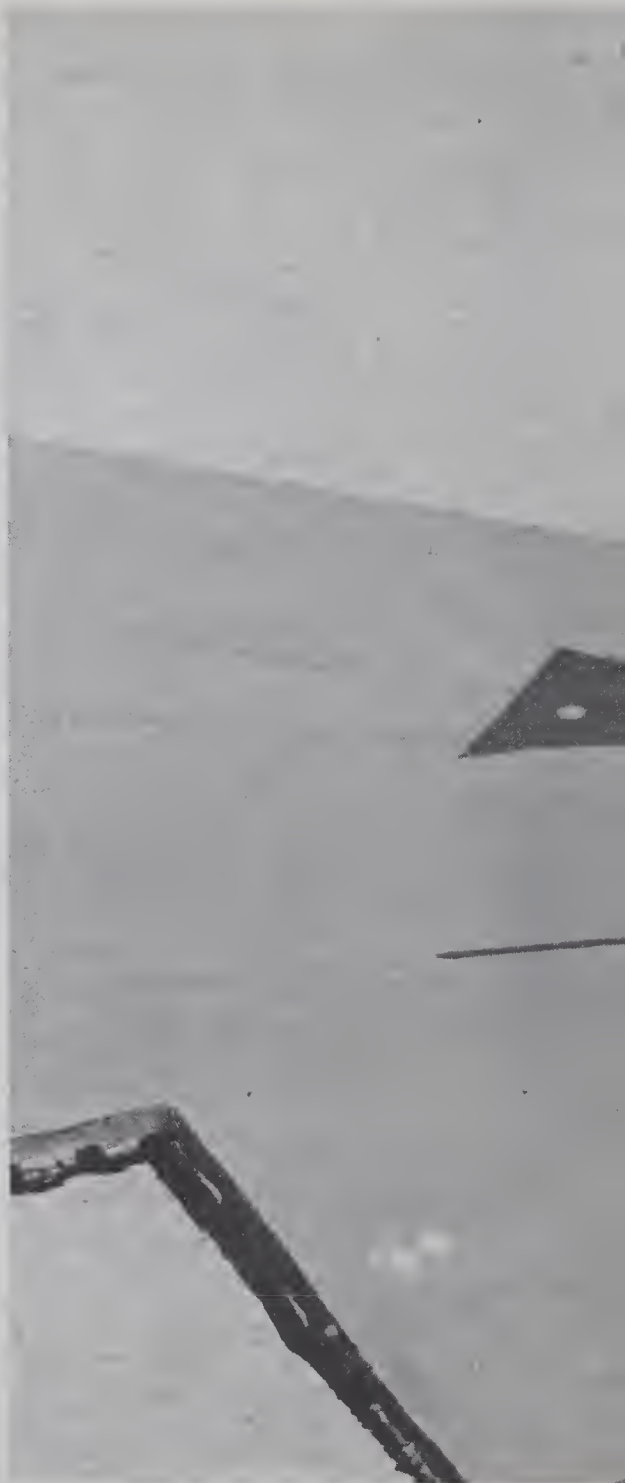
Part 2. A living structure
The elements, real forces

Takis

Takis has introduced a new element into sculpture: the magnet. This was no fortuitous adoption of an unconventional material. Takis had been looking for a way to intensify the presence of energy in his sculpture; at one blow the magnet provided him with an entirely new language of space. For the first time a live force is at the core of a sculpture, and the visible parts of the sculpture are subsidiary to that force, which is invisible. The magnet freed Takis from the architects' and engineers' methods of construction which, for example, Gabo had used. The constructive system in a Takis sculpture is a flexible network of electromagnetic energy, not unlike a planetary system.

'A magnet and a scrap of metal floating all naked – pointing to one centre – the only centre whose balance is pure happiness of spirit.'

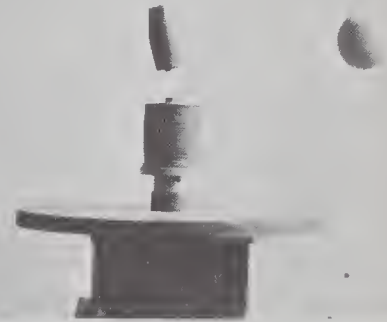
Takis: *First Telemagnetic sculpture*. 1959. Collection the artist. Photo: Martha Rocher.







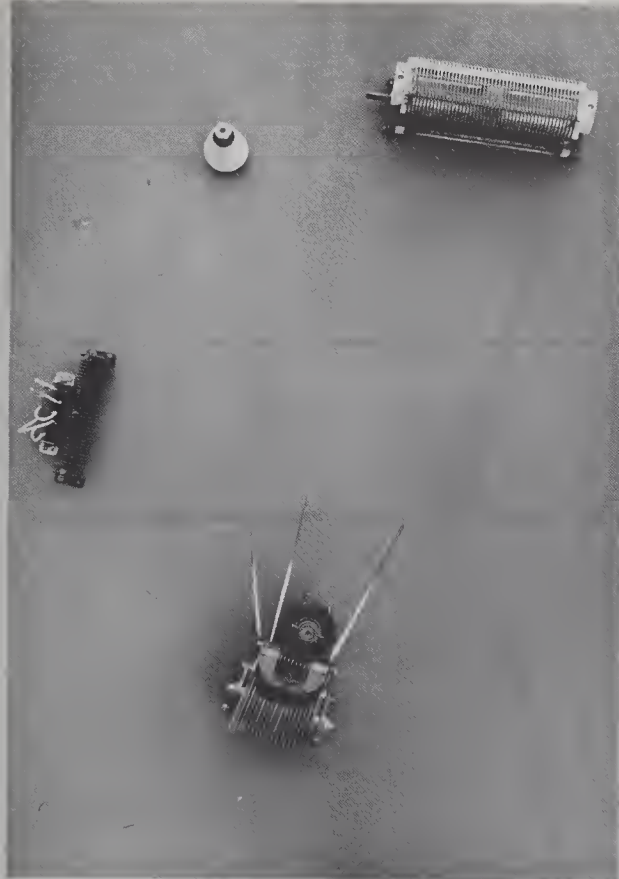
Takis: *Magnetic Ballet*. 1961. Electromagnet, 2 permanent magnets. *Private collection*. Photos: Guy Brett.



In this work, of which Takis has made many versions, the polarities of the magnet express their duality spontaneously in dance patterns. The principle is very simple. The upright form is an electromagnet which switches itself on and off regularly. When on, it attracts the positive magnet in the tip of the black projectile and repels the negative magnet in the white sphere (both are suspended from the ceiling). When the electromagnet is off, the projectile and sphere are attracted to each other. The static upright thus splits the polarities of the mobile elements. The black element is aggressive and active, yet sometimes centres with complete stillness to the core of the electromagnet. The white continues a passive circulation. While refraining from any kind of description Takis has seen the electromagnet as a simplified flower-form. Also this interpenetrating combination of the duality of motion and stillness is like a parallel, in the medium of electricity, to those Indian sculptures of Shiva,



Takis : *Telelight . Cosmic flower in a blue cage*. Mercury-vapour lamp and electromagnet. 1964. *Collection the artist*. Photo : Clay Perry.

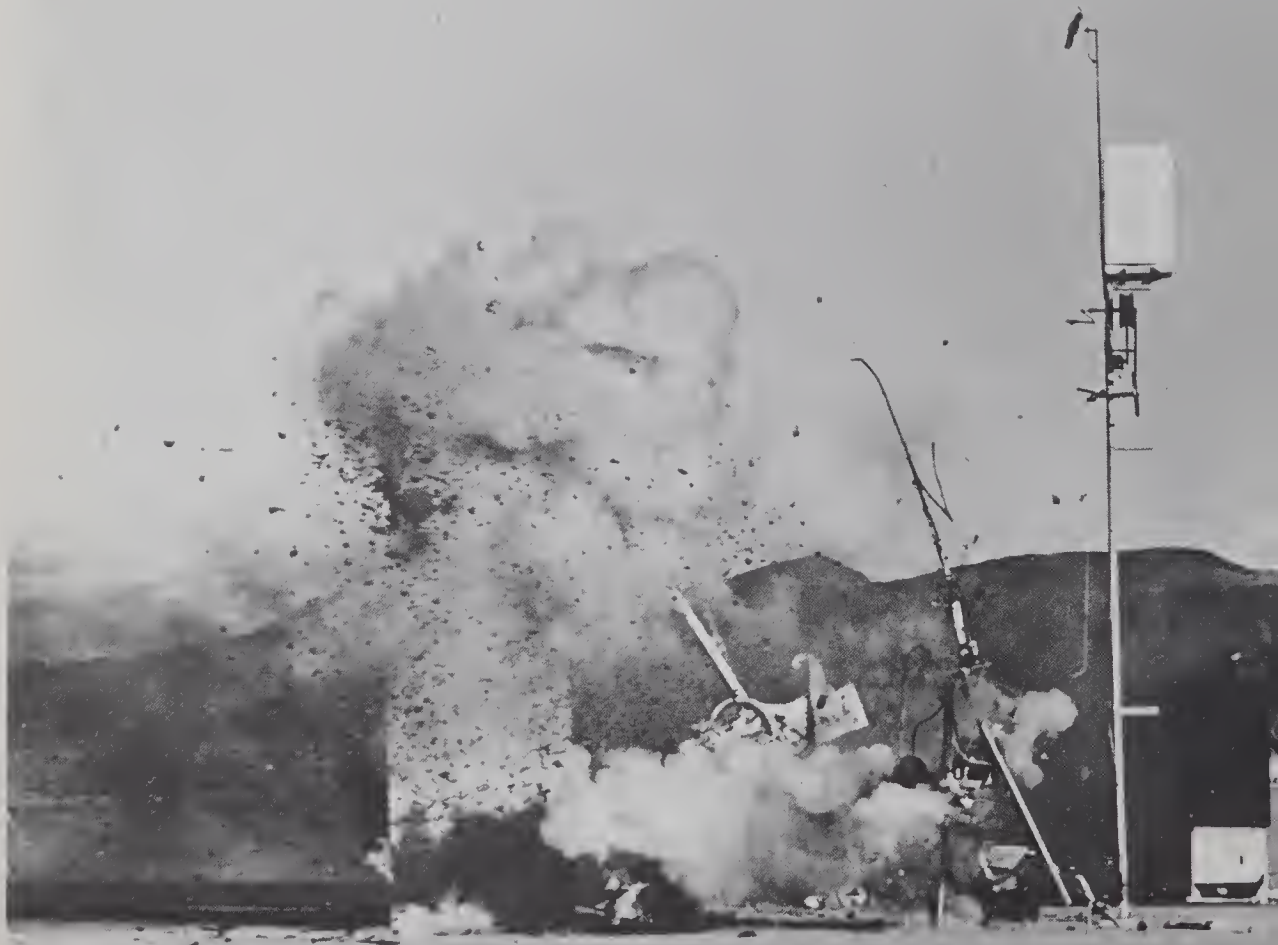


Takis: *Electromagnetic telepainting No. 4*. 1964.
Permanent magnet, electromagnet, steel & wire.
Photo: Jacqueline Hyde.

the Cosmic Dancer, where his arms are simultaneously in movement and at rest.

With the objectivity of an inventor Takis has never ceased finding fresh resources for revealing naked energy at the core of his sculpture. He has used signal-lamps, aircraft instruments, compasses, fireworks, a taut guitar-wire struck by a needle bounding in the waves of conflicting magnetic streams. In the two-part sculpture (*p. 32*) a blue mercury-vapour lamp controls the current running to the electromagnet. The genesis of the energy stimulating the dance of the white sphere is itself made visible as cold electronic blossom in the lamp.

In this wall-hung work, the white needles floating in the magnetic stream are disturbed by a small circular vibrator below them. Takis avoids a close-knit image. His composition suggests the conquest of distance and gravity. In Takis's sculpture, material is not moulded or assembled but brought into a situation where it reveals its ceaseless atomic life. The empty space between needles and magnet is the core of the sculpture, where all the tension is and there is nothing to be seen. This act of revelation is enough for Takis; he has no wish to exploit magnetism for dramatic effect. But it requires a real sympathy with material and its interchangeability with energy to present it with such bareness. The sculpture presents matter-energy as a single phenomenon, and we become aware of it through all our senses. It is impossible not to feel the force as something physical – though not 'tactile' because the word tactile suggests plasticity, a surface. Takis's sculpture seems to penetrate the body and orientate it more freely in space.



Jean Tinguely: *Study no. 2 for an end of the world*. Self destroying machine complex. Nevada Desert, near Las Vegas, March 1962. *Photo: N.B.C.*

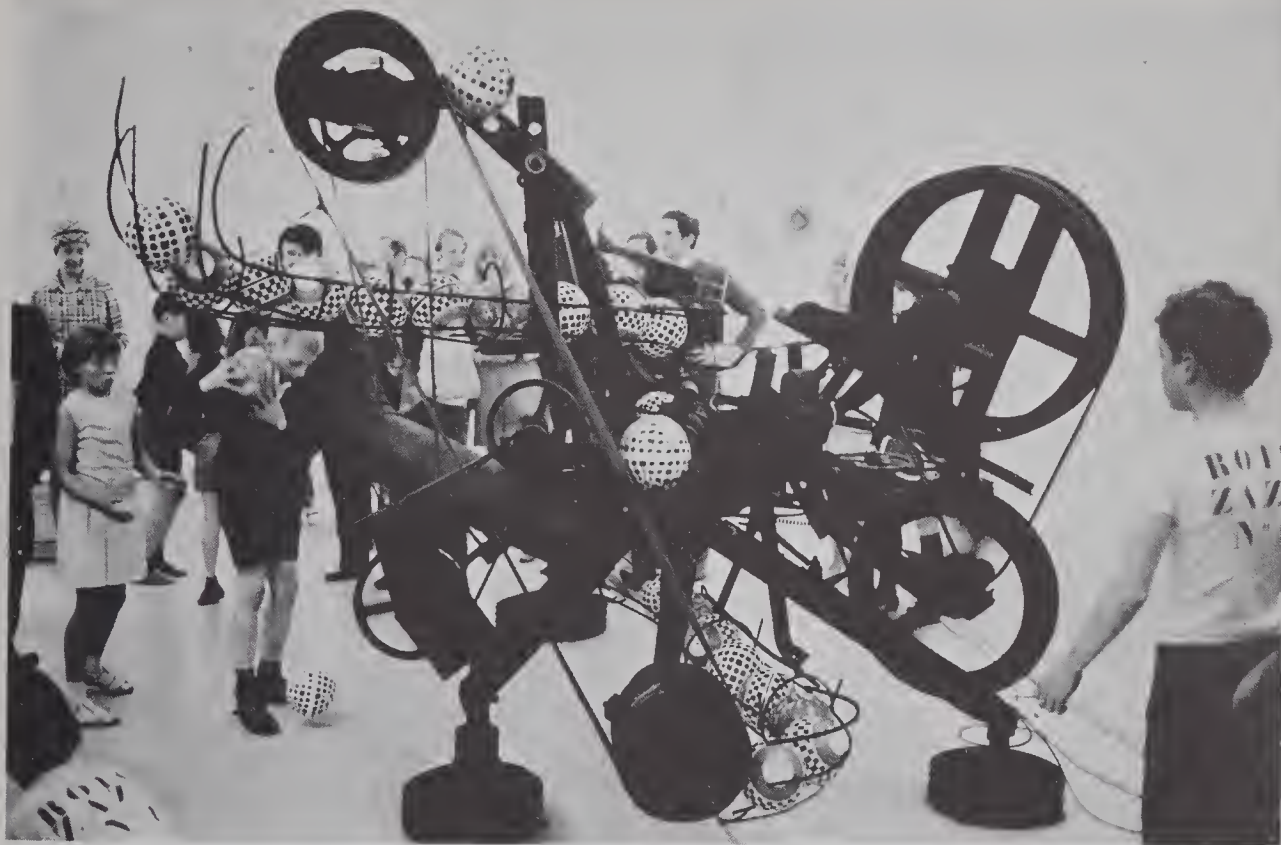


Tinguely

If Takis draws the machine towards perfection, the needles pulled in straight lines to the magnet yet free to move within the magnetic field, Tinguely draws the machine towards imperfection. Both Takis and Tinguely have at different times made public spectacles, using explosives. Takis's 'Firesignals' (he mounted fireworks on the stems of his tall tensile 'Signal' sculptures) were a precise manifestation of energy, the chemicals exploded like flowers. In Tinguely's famous monster self-destructive machines a complex of carefully chosen animated mechanical junk worked itself up to the point of explosion as 'a lunatic end to everything monstrous in the world' (Tinguely).



Jean Tinguely: *Fountain*. 1962. Photographed in the garden of the Kunsthalle, Baden Baden.

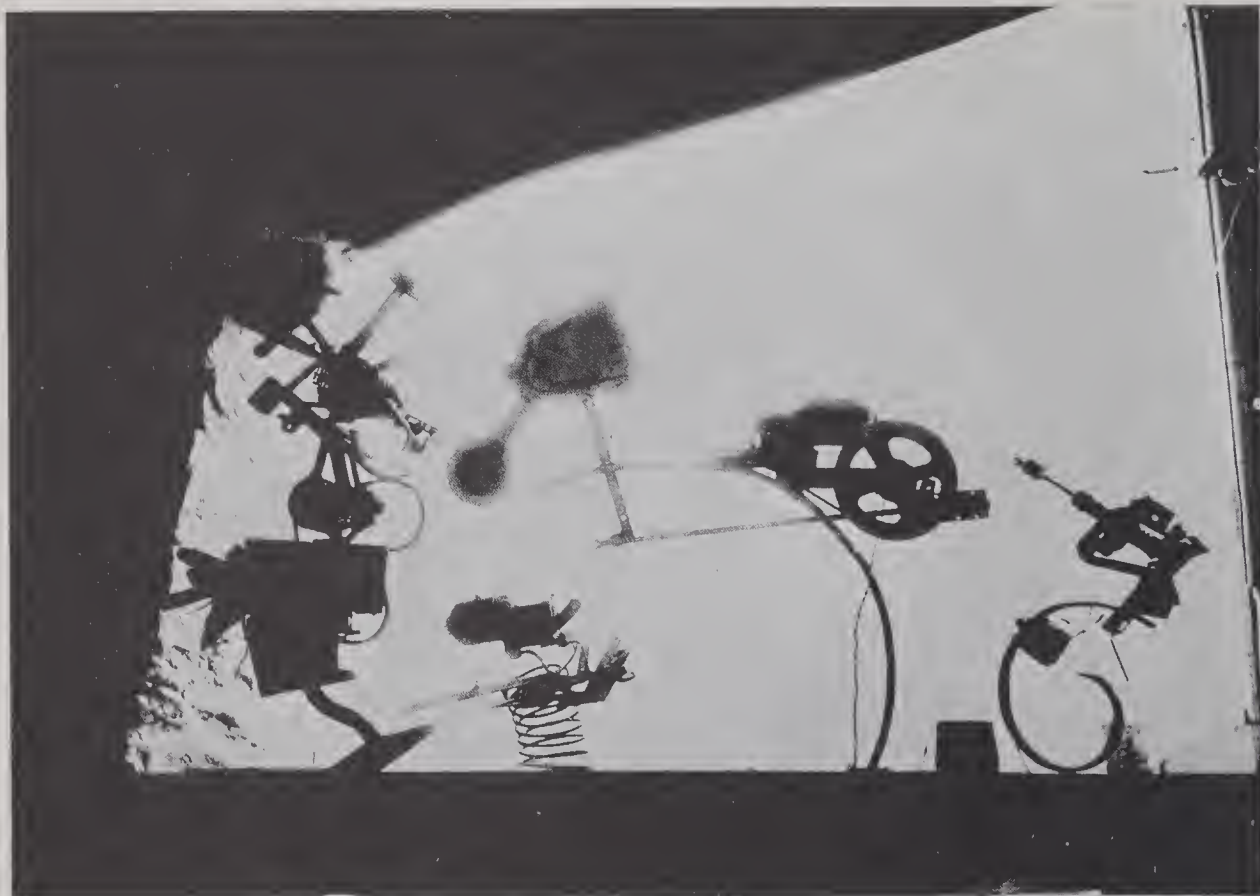


Jean Tinguely: *Rotozaza No. 1*. 1967. Iron, motors, rubber balls. *Galerie Alexandre Iolas, Paris*.
Photo: André Morain.

Tinguely has made an aesthetic out of 'mal' function. He has set mechanical parts free from the precise hierarchy of function. He makes great use of geared wheels but his gear systems are not obliged to produce the maximum energy for the minimum work; they can expend themselves in wild spontaneity. In 1959 Tinguely invented the 'Métamécanique', a spindly machine which careers about the floor, record-

ing a ceaseless graphic trace of its exertions on a roll of paper built into the machine. He has also made fountains in which a rubber hose is waved and bent by the machine, throwing the water out wantonly; and radio-sculptures in which a small crank turns the tuner backwards and forwards over the stations.

'My machines are innocent', Tinguely says.



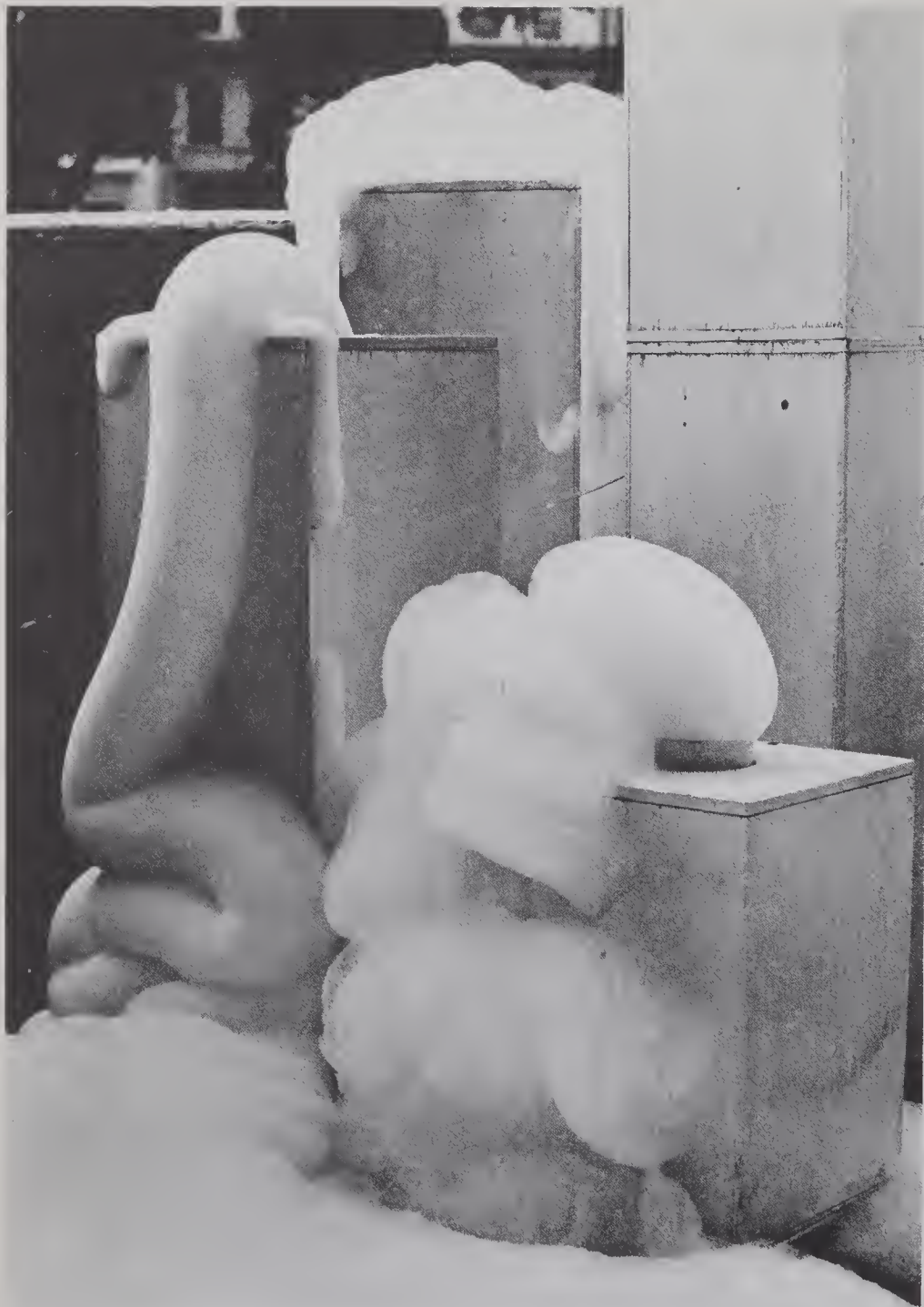
Jean Tinguely: *Pop, Hop, Op & Co.* No. 22. 1960-65.
Iron, motor. *Collection the artist.*

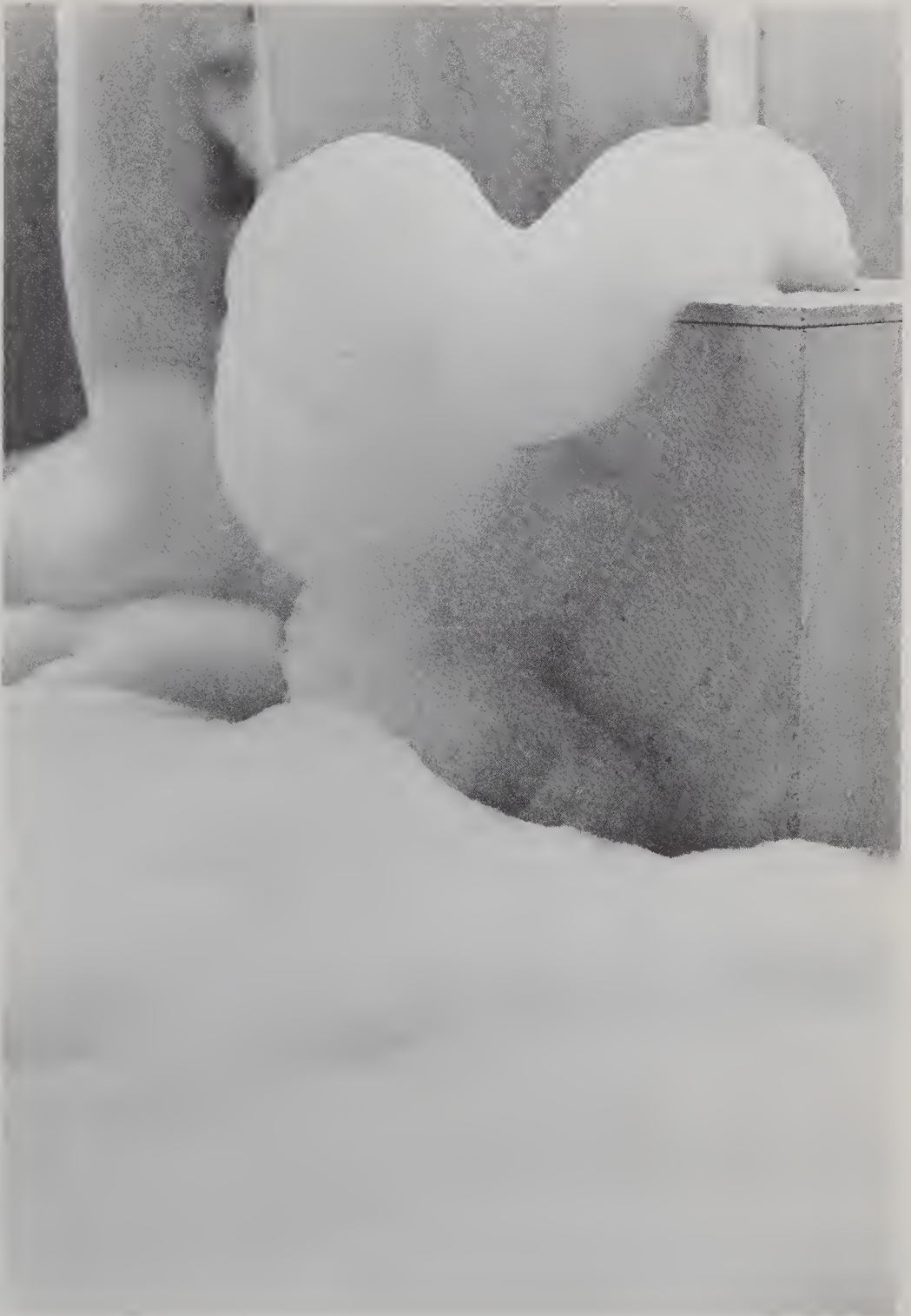
As K. G. Hulthen remarked, Tinguely's machines take the place of the old-fashioned circus. They are full of explicit humour and anxiety. They sometimes have the naive repetitive movements and blunt encounters of a punch and judy show. The quality he gives movement has an extraordinarily clear antecedent in a particular fantasy of Tinguely's countryman Paul Klee – that scrawny little drawing brilliantly titled the 'Twittering Machine', in which skeletal birds appear to be jerking up and down on a crankshaft, their heads forming a crazy line of musical

Opposite:
Jean Tinguely: *Radio sculpture with feather.* 1962.
Galerie Alexandre Iolas, Paris.
Photo: Adelaide de Menil.

notes. Tinguely has realized this vision in action, incorporating motors in his chaotic framework with joyous carelessness and never laboriously. In Tinguely's work movement and noise are completely inseparable in meaning. For this sculpture a radio was taken to pieces and rebuilt into the machine's anatomy. A mechanical arm turns the tuner backwards and forwards and waves the feather. Because of its link with the local radio-stations this sculpture presents a fresh anarchic attitude wherever it goes.







Medalla

In the work he has done in London since 1964 David Medalla has brought to light some of the deepest possibilities in an art of motion. His machines question radically the conventional barrier between the work and nature. At the same time they produce a complex and tender expression of energy which before had not existed in mechanical sculpture.

His ideas, whether realized technically in an independent object or not, have an unfailing conceptual freedom. In other words, when he uses a new material or process he goes beyond the repertoire of accepted formal devices (which might tame a material like, for example, water by allowing it to become a discreet graphic participant in a Bauhaus style construction of perspex). Medalla's machines have a roughness – and refinement – which is a fierce challenge to the picturesque in kinetic art. Because of the risks he takes he represents for us a kind of intermediary with phenomena.

In 'Cloud Canyons' continually-running air-pumps pour out foam from a mixture of soap and water inside a group of boxes of different heights. While the motors are running forms are ceaselessly created, modified and destroyed; when they are turned off no trace of the activity remains.

It is thrilling to consider the implications of this machine in the context of art.

It is a growing sculpture: it doesn't have an enormous variety of changes built into it, but evolves from within and reacts to outside influences.

It exists only in the present: the forms self-created have no absolute value, they pass away relatively quickly and it is the process of their forming which is communicated. Fresh structures are constantly coming into existence; the

On previous pages:

David Medalla: details from *Cloud Canyons*. Bubble-mobile no. 2. 1964. Wood and foam. Collection Paul Keeler, London. Photos: Clay Perry.



David Medalla: *Lament*. 1964. Sand machine. Sand, metal, wire, motor. *Collection the artist.*
Photo: Clay Perry.

'sculpture' is always new. Medalla's collective name for the foam-machines is 'Cloud Canyons', and like clouds the foam is a quiet immaterial element in continuous response to invisible energies acting on it: wind, atmospheric pressure, light, and many other things.



David Medalla : 3 views of *Mud machine*. 1967. Wood, wire sponges, mud, glass, electric light. *Collection the artist. Photos : Guy Brett.*





It is random: Medalla's foam is free to grow as it likes, taking into account the different heights of the boxes from which the foam emerges. It is outside the classical idea of order, but is it therefore chaotic? Though they made their work from permanent materials, sculptors like Arp seem to have been working towards 'random' form. They were dissatisfied with the manmade horizontal-vertical principle of order. Medalla's foam sets its own limits; it seems to flow with an intrinsic idea of ease, like a river. Its internal energy preserves it from mere amorphousness.

Medalla's imaginative freedom shows in the way he escapes aloof formalizations and immerses himself in a new material. In the 'Mud Machine' turning discs delve wire sponges at the end of long loose rods in the liquid mud and pull them over a lighted glass screen. The work is transformed once it begins to move because the movement has an utter lack of frenzy, a kind of slow enjoyment and exploration of the mud without ulterior purpose. Nothing is 'achieved' or defined by the naive trembling passage of the sponges over the glass, and this emphasises the beauty of their play.



Mira Schendel: *Droghinas*. 1966. Knotted rice-paper.
Private collection. Photo: Guy Brett.

Schendel

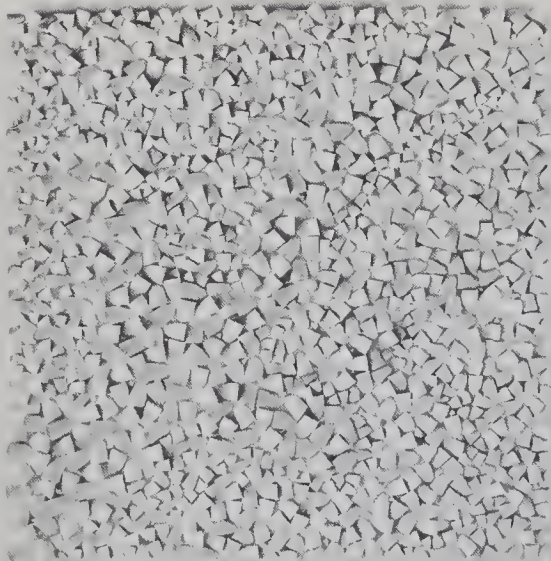
In open (or perhaps ironic) defiance of the idea of 'sculpture' are Mira Schendel's *Droghinas*. *Droghinas* is a Portuguese word meaning literally 'druglets', and also colloquially 'little nothings'. These are both structures of ricepaper. One of rumpled sheets which are strung up near the ceiling catching the light and the wind, and the other of the same sheets rolled up and knotted in a dense nucleic structure. Obviously they have no base, no necessary shape or position and they cannot be preserved for very long. When in 1966 Mira Schendel exhibited *Droghinas*, like these photographed, in the Museo Arte Moderna in Rio de Janeiro, she had them merely in a heap on the floor for the spectator to discover and use as he wished.

With their utter lack of technical or formal pretension, in spirit they are not unlike Man Ray's 'Lampshade'; recalling the Dadaists' use of absurdity, of laughter as a 'reaction against rigidity'. They refuse to take anything for granted in the way of the artist's professional 'clothing'. Yet they are more than intellectual propositions – if in fact they are intellectual at all. They seem to express a passionate search for how little can act as a stimulant to the perception of space – little not merely in terms of material, but also an elementary bareness of language. These paper structures signify an extraordinarily energetic, almost an over-charged space. They seem to imply a tremendous force while themselves remaining soft, flexible and transitory – the very first tentative discovery of the void. There is always this paradox – energy transcending the material – made very immediate and basic as visual information.

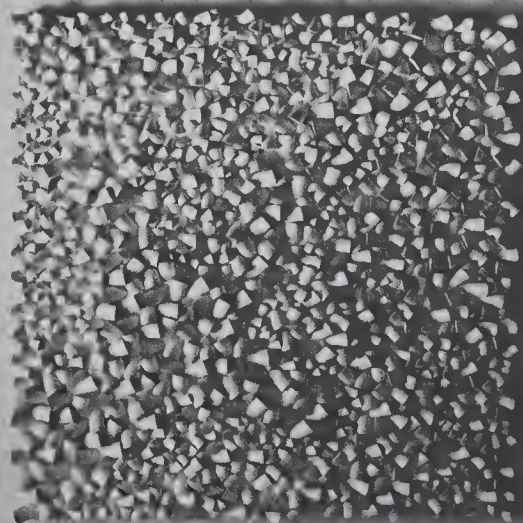


Mira Schendel: *Another Droghinas*. 1966. Rice-paper.
Private collection. Photo: Guy Brett.

Schendel's *Droghinas* do not describe any particular movement, but they are vital contributions to the language of movement because their fragility and energy indicate space as an active thing, a field of possibility.



Sergio de Camargo : *Relief No. 8*. Paris 1964. In different light conditions. *Private collection*. Photos : *Clay Perry*.



Camargo

Hundreds of tiny wood volumes, each cut at the end to make a plane which catches and distributes the light, according to the direction of the plane.

Camargo is a sculptor who uses the form of the relief to disintegrate volume, to shatter it with light. The strong sense of volume doesn't disappear but it becomes vague, atomised, continually changing the weight of its physical presence in reaction to changes in the quality of the light falling on it. Camargo paints his reliefs white to eliminate everything but the dialogue of mass and light.

Most of Camargo's work grows from a single element which is never lost sight of: the cylinder. It is a simple element but it was not adopted haphazardly. In fact the reason he can transform it so effortlessly into rhythm must be because he arrived at it gradually, by reflecting on his experience, and didn't adopt it as a ready-made formal convenience. It represents a synthesis of sculptural forces in a single sign: the rounded body of the cylinder (expressing volume) together with the flat end (which expresses direction and articulates the volume). Different sizes of cylinder, from a stick to a log, give the basic form an amazing range, like a scale of visual 'sounds'.

There are obvious similarities of language between Camargo's work and that of other kinetic artists, particularly in his reliefs which are halfway between painting and sculpture. Light changes the emphasis of an imageless rhythm of anonymous particles as the motor does in Graevenitz's work (*pages 78-81*), for example.



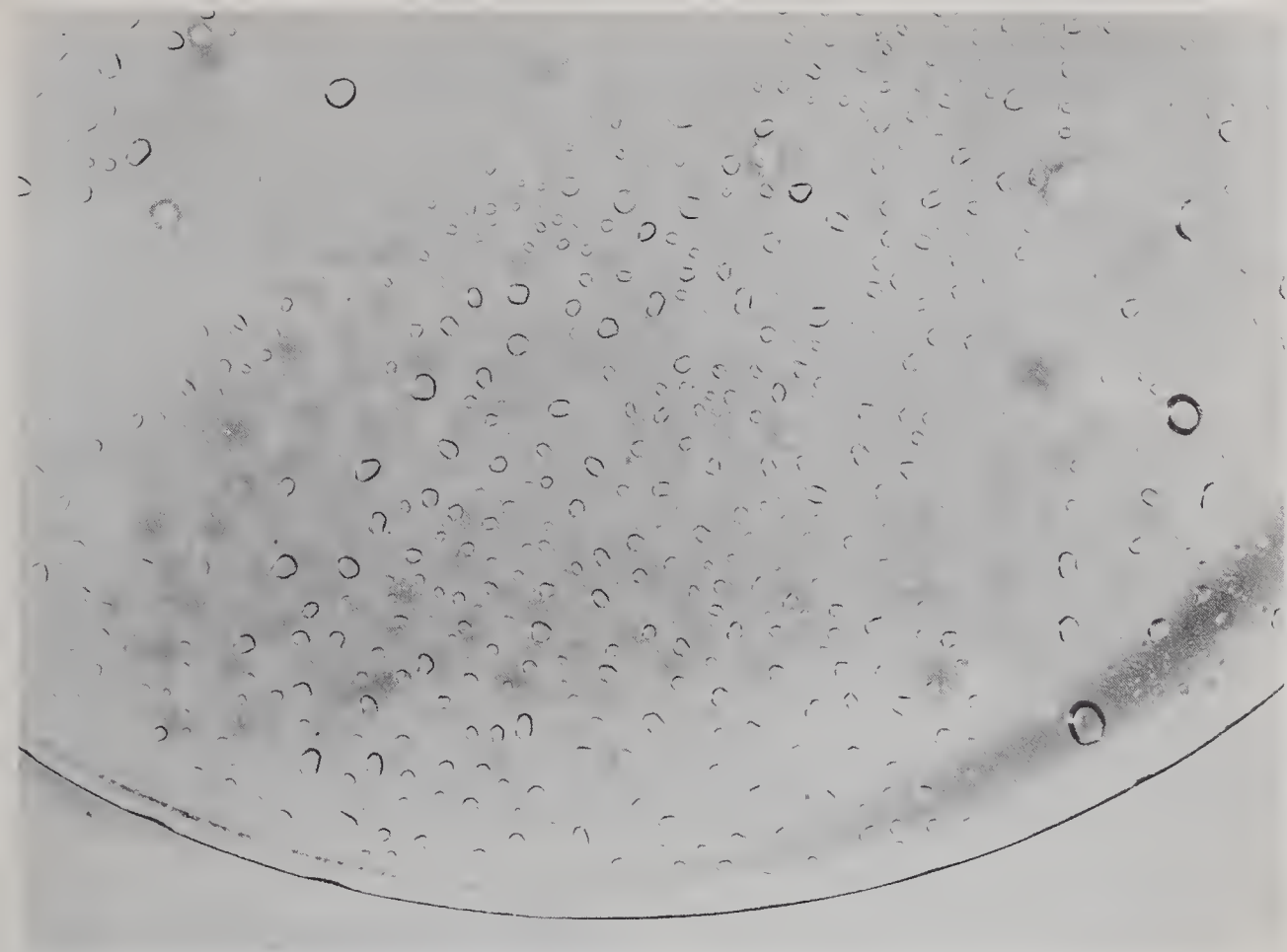
Sergio de Camargo: *Relief: 'Chant du couple en 16 temps'*. Paris 1966. *Collection Paul Keeler, London.*
Photo: Clay Perry.



Sergio de Camargo : *Relief No. 24/55*. Paris. September 1964. *Collection Paul Keeler*.

But Camargo's sculpture is a balance of intelligence and sensuality (concentrated in the opposites of each cylinder). It has the tremendous Brazilian feeling for organic life and physical ease of movement; at the same time Camargo never gets lost in the particular, and the logical clarity of his construction can always be seen.

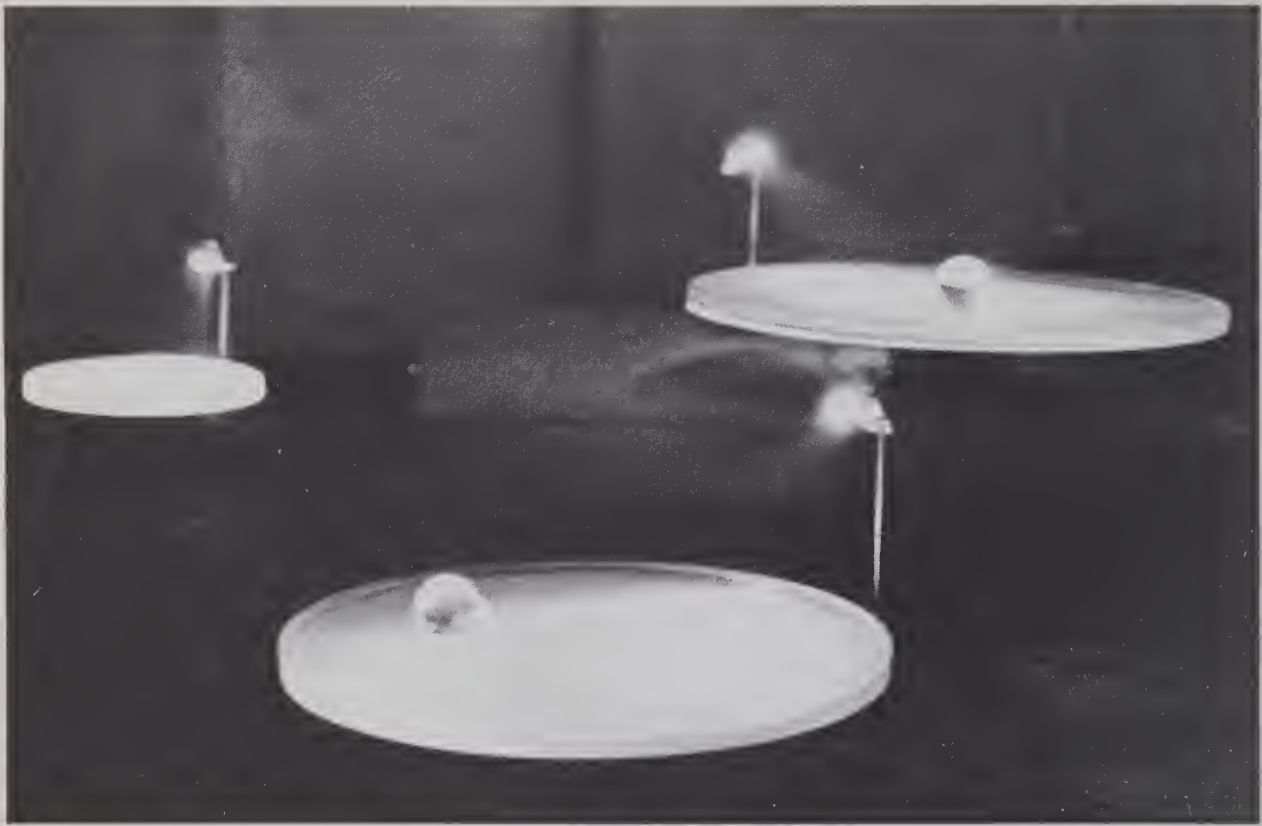
'Perhaps what happens with my work is that it liberates, releases in whoever approaches it some diffuse emotion, something like what we occasionally experience in front of certain faces or landscapes, or when we feel space, sand or the wind.'



Liliane Lijn: Detail of *Liquid Reflections*. 1966. Collection the artist. Photo: Gloaguen.

Lijn

Liliane Lijn's objects have evolved to their present form through a close study of materials and processes, chiefly of one material, light. Gradually she has discovered for herself light's characteristics, and searched for the technical means of concentrating them in a clear statement: a sculpture which expresses itself through its changing reaction to light-beams.



Liliane Lijn: *3 Liquid Reflections*. Perspex discs, water, lamps. 1966/67. *Collection the artist*. Photo: Guy Brett.

The materials she is now using, like perspex and actual liquid, enable her to extract an intense freshness from the light.

In these (*page 51 and above*), her most realized works to date, the clear liquid in the pool-like disc is given a quality of weightless suspension through the action of light. It forms under the top surface in thousands of natural lenses. The disc revolves electrically and it supports a ball (or group of balls) of heavy perspex which counter-rotate and move freely over the surface, linked to the liquid in the sealed disc by the constant activity of the reflection and distortion of light. Being able to trace free ellipses over the steadily-circulating disc, the ball lifts the work into another spatial dimension.

Bury

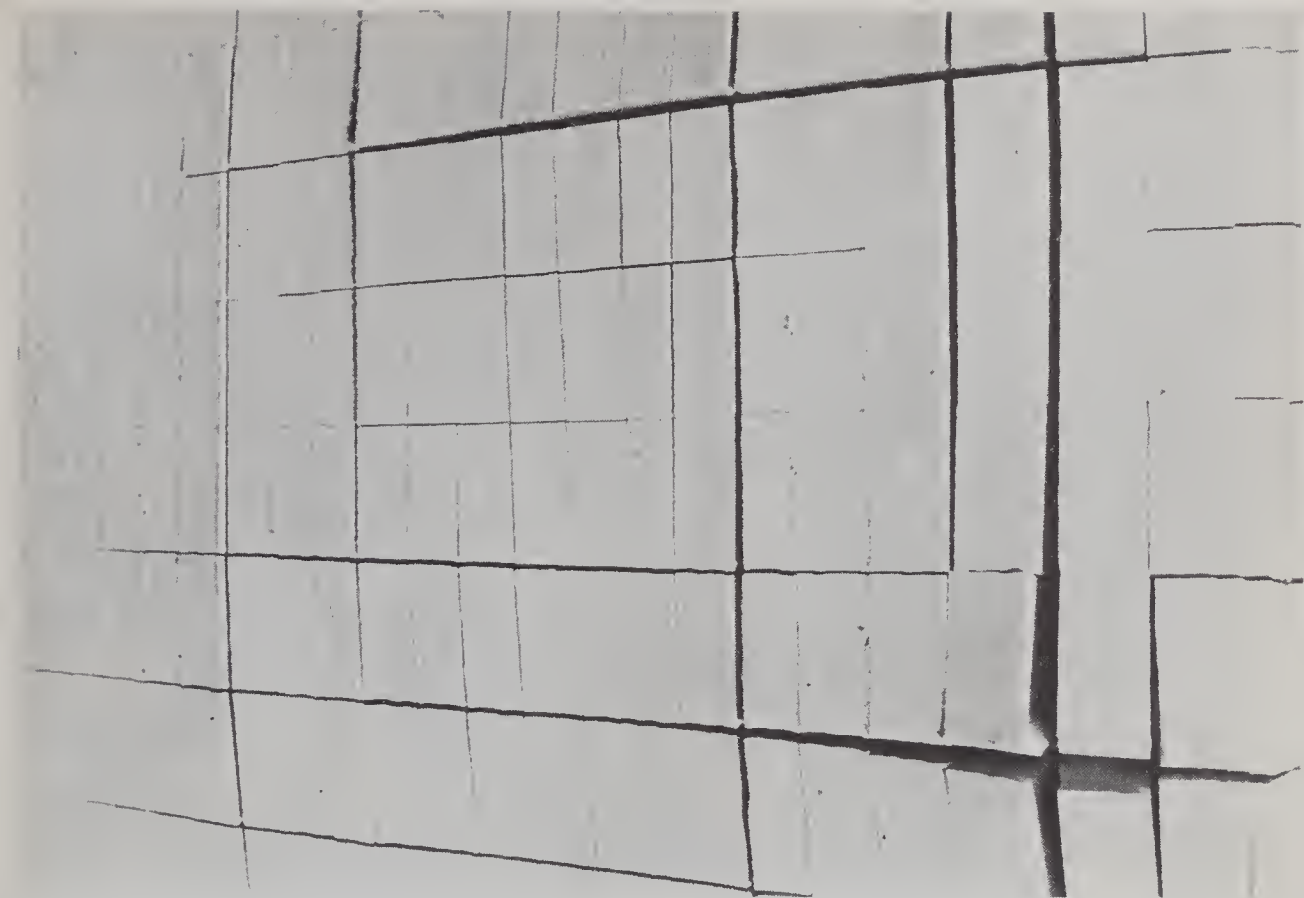
In contrast with most of the work of kinetic artists which insists on structural clarity, Pol Bury depends on structural obscurity. Bury's works are deliberately mystifying. One series, for example, incorporates wooden balls of different sizes resting on steeply sloping planes – you would expect the balls to roll off and bounce away. Instead they gently shift and graze each other. The denial of gravity is not a fact but a fantasy.

In Bury's sculpture the moving pieces themselves range from geometrical to near-naturalistic forms. But there is one characteristic that runs through all his work: the motor is always hidden. This means not only the electric motor which drives the object, but the whole of Bury's complicated technical system of wires and plates which transforms its revolutions into the minute stirrings of the visible elements. There is an irony here, a duality which Bury is aware of and plays to the full: though the motor is hidden we feel its power in the jostling of the balls, the little rods or stamen. It is the slightness and slowness of the movement which makes us aware of the extent of the hidden powers which are not reaching the surface. The object doesn't appear to be *working* like a machine, but to be *worked* by invisible generative forces, as if from under the soil. Bury's machines convey a repressed violence of an organic kind. It reminds me of the suppressed psychological violence, lull-before-storm, in the paintings of Bury's Surrealist countrymen Delvaux and Magritte. Bury's work of the early 60s was a withdrawn terrain all of its own. But recently he has reverted to bulky and more traditional sculptural forms.

Pol Bury: *Erectiles*. 1962. Hanover Gallery, London.
Photo: Shunk-Kender.





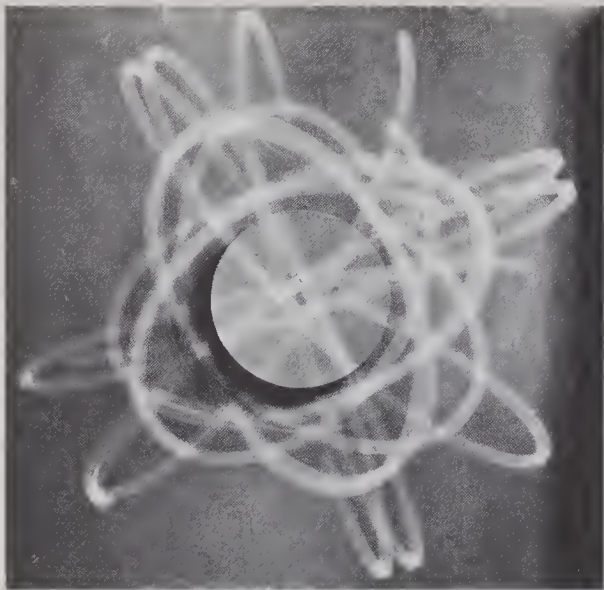


Gianni Colombo: *Pulsating structure*. 1959.
Polystyrene blocks *Collection the artist*.

Colombo, Le Parc

Kinetic art has, naturally enough, a strong didactic side. The use of new materials and techniques, the limitless possibilities of visual experiences they suggest have produced a new kind of man who is not afraid to call himself a 'visual art researcher'. This is only a name, of course, and it would not always be easy to draw the line between a work of art and a piece of visual research. Certainly, though, an immense storehouse of techniques, of kinetic visual processes usually with organic references is

Opposite:
Pol Bury: *The Lectern*. 1963. Detail.



Gianni Colombo: *Roto-optic*. 1964/66. Fast moving points. *Collection the artist*.

being built up, which might form a common vocabulary and be used in many different ways.

Gianni Colombo is one of the most resourceful and imaginative 'researchers'. Each work he does presents a different movement, a different experience, with simple means. He has made an expanding and contracting wall from polystyrene blocks pushed out rhythmically from behind (*page 55*); points of light moving fast enough to leave lines on the retina and crisscrossing in orbital paths; steel bands in fluid movement; a square defined by lines of light which grows and diminishes in size in the darkness, and many other studies. They are related by their concern with rhythm unfolding in time rather than by any stylistic references and they are presented with complete honesty.

The Argentinian Julio Le Parc is another researcher. In fact he is perhaps the only one who has wholeheartedly accepted the didactic principle (which links together the members of the group of artist-researchers he belongs to, the Groupe de Recherche d'Art Visuel in Paris) and put it into practice. He may be unconcerned (or unable) to bring an idea to the level of expression – formally his work has great limitations – but he spends no time polishing up what he has done or contriving a grand meaning for it. He simply keeps on inventing games: games for disorientating the spectator, games for deforming the surface, games for demonstrating velocity, vibration, reflection etc. His games for disorientating the spectator, distorting spectacles and hand-mirrors, shoes on springs etc. are too careful to rival the toughness and non-chalance of funfair games. I think his best gift is for mechanical movement: one especially good



Julio Le Parc : Detail from '*Ensemble de six mouvements surprises*' Formes en contortions. *Galerie Denise René, Paris.*

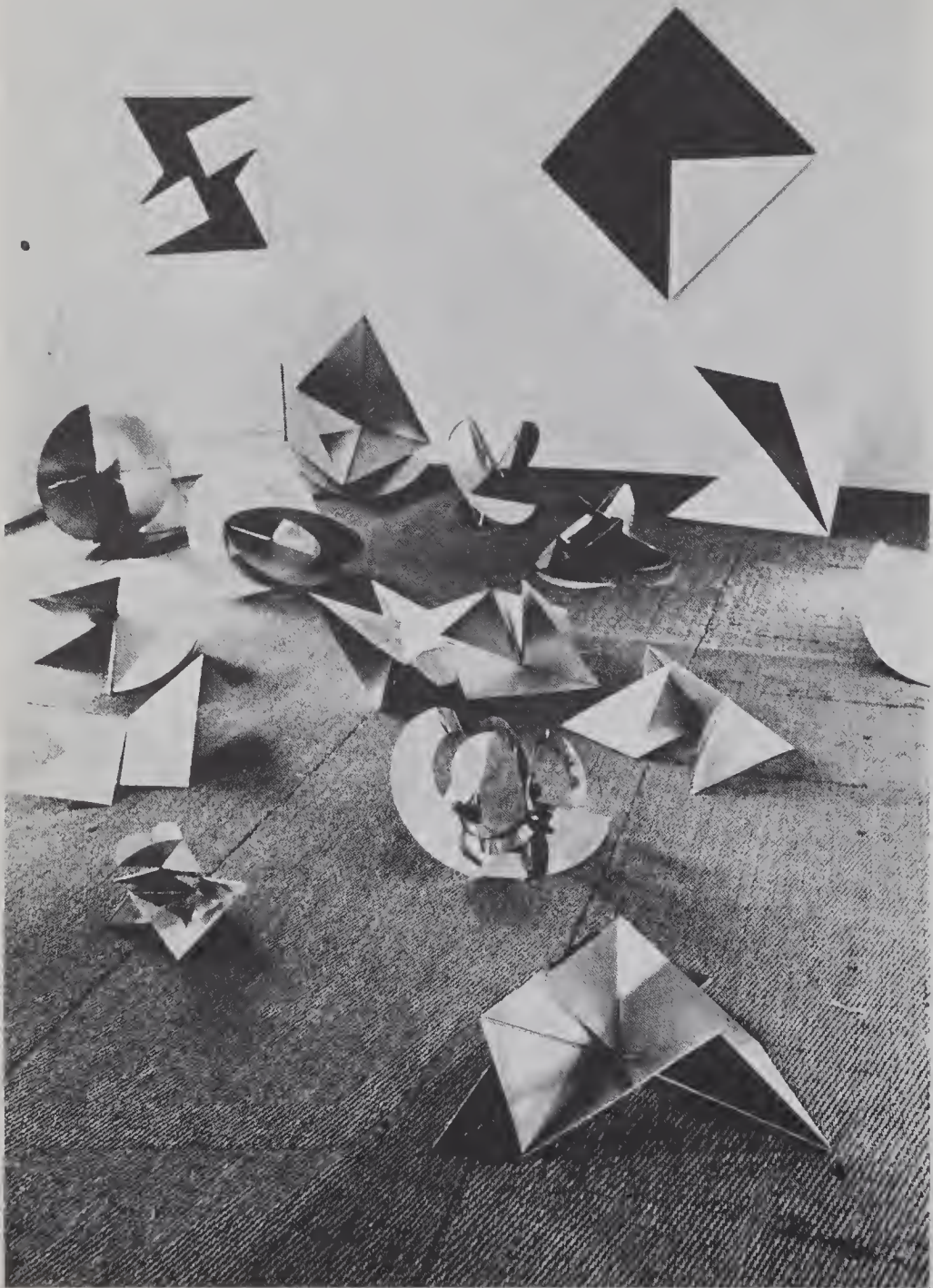
machine is a shallow box with the bottom shelved towards a fast-spinning rubber pivot at the centre. Pingpong balls congregating around the pivot are pelted out radially to the sides of the box.



Moholy Nagy envisaged the participation of the spectator in environmental spectacles. The part-theatrical activity of the Happening involves the spectator in an assemblage which extends in time as well as space and is open to all materials and media. The American Allan Kaprow was among the first to open up the possibilities of Environments and Happenings, in the late fifties and early sixties. He used :

'Words, sounds, human beings in motion, painted constructions, electric lights, movies and slides – and perhaps in the future, smells – all in continuous space *involving* the spectator or audience ; these are the ingredients . . . There is no 'script', or 'story', no 'dance', no 'score', no 'set', no 'music', no 'stage', no 'audience' really, since the latter has become only a passive participant in the work'.

The Happening breaks the barriers between these traditionally separate entities and communicated through the correspondences between them, often revealed by chance and surprise. At the 'Evenings' of Happenings at the Armory in New York in October 1966, each artist collaborated with a 'performance engineer' and complex technological equipment. Approaching the question of participation from a different direction, two Brazilian artists, Lygia Clark and Helio Oiticica, working in Rio, have gone right to the heart of the spectator's activity in dialogue with the work.



Opposite:
Lygia Clark: *Reliefs and articulated metal sculptures*
(*'Animals'*) 1959-64. Signals London 1965.
Photo: Clay Perry.

Clark

A photograph of a Lygia Clark sculpture can obviously only present its external form. And this becomes more and more misleading as her work evolves and she gives greater intensity to the process of participation. In fact her latest works are simply ideas which have no expression at all until the spectator discovers it for himself in manipulating the work. The works' expression and the manipulation are one and the same thing and only perceptible to the manipulator. In words this may sound confusing, but it is not so in practice. The evolution of her work is not difficult to follow because of its technical simplicity, accurate and honest thought, and her deep awareness of the human vitality she wants to reveal.

The illustration opposite shows the first sculptures she made which the spectator is able to transform. She has described their character precisely:

'My work demands manipulation if it is really to express itself'.

'The "animal" has his own and well-defined cluster of movements which react to the promptings of the spectator. He is not made of isolated static forms which can be manipulated at random as in a game; no, his parts are functionally related to each other, as if he were a living organism; and the movements of these parts are interlinked. The interlinking of the spectator's action and the "animal's" immediate answer is what forms this new relationship, made possible precisely because the "animal" moves – i.e. has a life of his own.'¹⁰

Lygia Clark conceives of the sculpture as a cluster of geometrical forms which have an organic structure only revealed in time and modified by the spectator's choices. The decisive discovery which takes these objects beyond

10. Lygia Clark: Signals Newsbulletin vol. 1 no. 7. May-July 1965



constructivism is the hinge, which she has compared to a backbone. The 'animal' has no hierarchy of form ('no wrong side' is Clark's way of putting it), but it does still have an architectural kind of structure which rests firmly on the ground, and it has a static expressiveness independent of the process of manipulation.

Her next works were in completely flexible materials (rubber, copper etc), ribbon forms cut out from discs and glued to form a moebius loop. They are called 'Grubs' (after an animal with no backbone!). And here Clark uses another title to describe the object and the manipulation of it together as a single phenomenon, 'going' – a precise and poetic verbal equivalent. Here the structure is even more closely identified with the rhythm of the spectator's manipulation: they have no base, no centre of gravity, no beginning or end. The strong feeling of organicness they give to anyone who plays with them comes from their elasticity, their wonderful lack of constraint in the medium of space, which is surely Clark's intention.

The 'dialogue of hands' which she and Oiticica made together is another daring step in the process of 'interiorizing' the object and giving the greater reality to the spectator's act. Here the 'work' is an elastic moebius band which links the wrists. The hands, their sensations and movements, become the sculpture, intensified by the band which acts like a hinge.

Lygia Clark: *Grub*. Green rubber. 1964. *Private collection*. Photo: Guy Brett.

Opposite:

Lygia Clark & Helio Oiticica: *Dialogue of hands*. Elastic moebius band. 1966.





Up till this moment, in Clark's work, the spectator's act had been guided by the work in a language of spatial relations. He was changing the combination of spaces in front of him (or that his hands made) and finding new ones. It is a relatively detached visual language. In her new work (*pages 58 and 64*), and she has made others on similar themes, the sensation is much more complex and physical. It is impossible to convey in a photograph though it is definitely partly visual. The air-filled plastic-bag has a pebble pressed into the corner outside and the bag is squeezed between the hands. The weight of the pebble acts like a spring, keeping the sensation of fullness in the palms. It is like another body which makes us aware of our own.

It is, certainly, a sculpture, giving (though never descriptively) complex sensations of life – breathing, tenderness, sex – through very simple concrete means. In so far as this work is merely an idea, and the expression belongs to the spectator's handling of it, it is of course available to everybody and carries no material exclusiveness.

It is very revealing to compare Lygia Clark and Takis as sculptors. Actual energy is the subject of both their work. With Takis, energy is a strong mysterious force which you can get an inkling of but never approach very close to. Lygia Clark encourages the spectator to use his own energy to become aware of himself. This is something very unusual, and it seems to be a specifically Brazilian contribution to art, a kind of kineticism of the body. The Brazilians, like Lygia Clark and Helio Oiticica, have shown little interest in mechanical movement or the optical transformation of matter. If anything, their work has become technically more primitive as it has evolved. But also more fundamental.





Helio Oiticica : *Cape No. 2*. 1965. *Collection the artist.*

Opposite :

Helio Oiticica : *Cape No. 1 (Parangolé)*. 1964. Many materials. *Collection the artist.*

Oiticica

A very intense and subtle sensation of colour has been a vital part of Oiticica's involvement of the spectator. These photographs, unfortunately, can only give an idea of the substance. Oiticica's 'Parangolés' (Capes) are complex networks of different materials and colours, with hidden pockets and bags containing colour-powders to be touched by the wearer. Polythene, gauze, sacking, silk, muslin etc. surround the spectator in sensual modulations of colour.



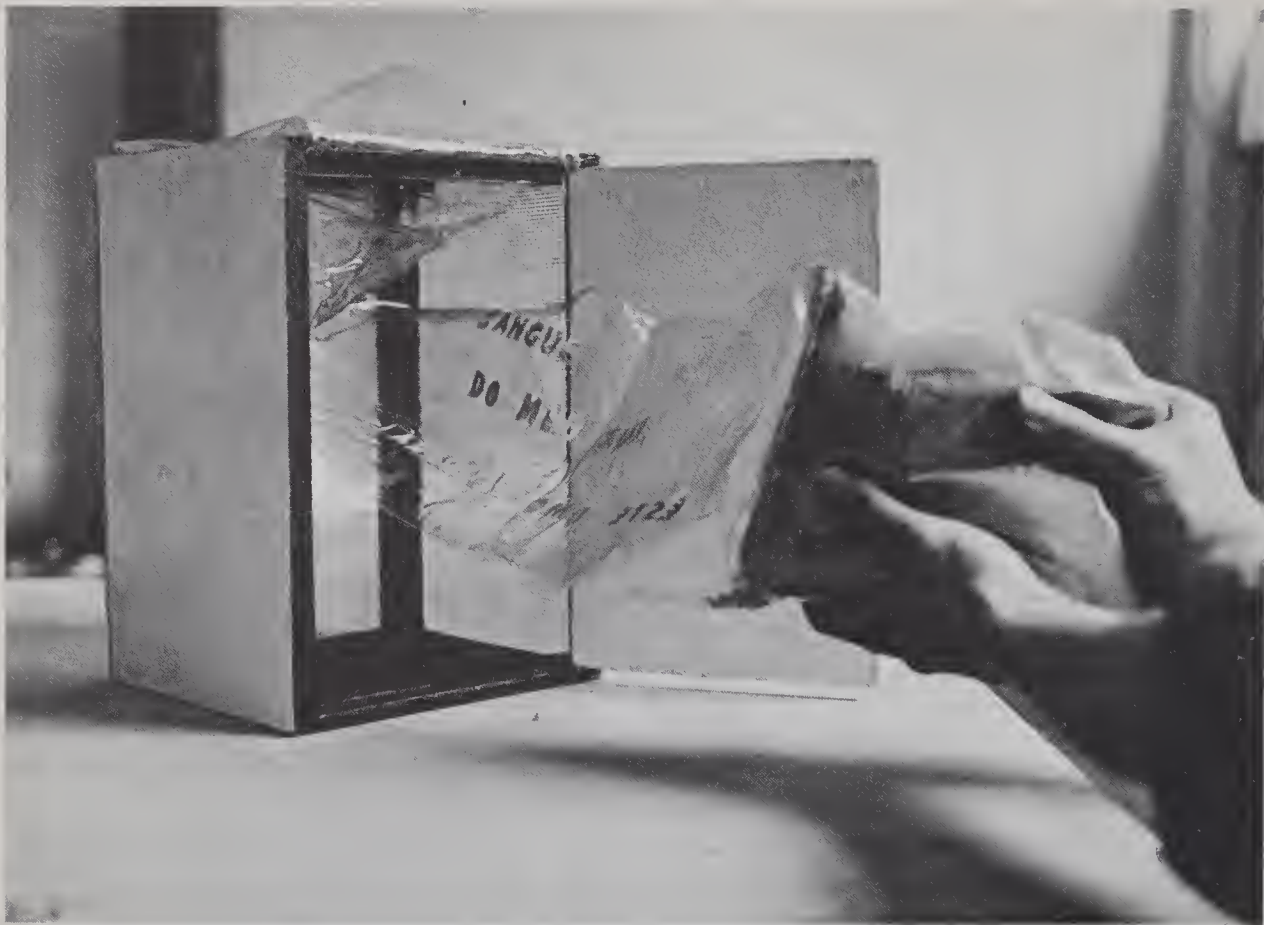
Helio Oiticica: *Glass Bolide No. 6*. 1965. Glass, earth, gauze. Collection the artist. Photo: Guy Brett.

This is not a formal experience of colour or an atmospherical one. The materials make it very primitive and direct, as something handled. Oiticica has expressed the same idea very lucidly in object-form in his series of 'Bolides': containers (basins, bottles, transformable boxes)

with colour-pigment, earth, pebbles, or more recently, directly appropriated things in quantity like shells, and eggs. 'Bolide' is a Portuguese word meaning 'fireball', and it is an exact description. Colour appears as a kind of nucleic energy-centre, an intense focus in the surrounding space, because we partly perceive it through our sense of mass and weight.

Combining the concentration of the Bolides with the flexibility of the Capes, Oiticica has recently produced a further series of extraordinary objects. The spectator opens the 'Box-Poem' (*page 70*), takes out the bag and reads the words with the heavy blue bag in his hands. The taking out of the bag, the blue, the soft weight, the words, all fuse in a chord of sensation. The words are printed on a tongue of plastic connecting the bag and the box, so the 'poem' is always experienced within the context of first discovering it in the box and later returning it. It is not possible to assign this object to the language of painting, sculpture or poetry separately. The meaning seems to enter your body and mind simultaneously during the course of an almost ritualistic series of movements. Language only comes into being during the action you perform, as it does, for example, during a primitive religious ceremony. Yet even these movements, this action of the body, can be sublimated. Another recent work of Oiticica's is a cubic basin made of concrete plaques, filled nearly to the top with water. At the bottom, so you can see them through the water, are the words cut out in metallic letters: 'MERGUIRO DO CORPO' (PLUNGING OF THE BODY). Oiticica writes: 'The sensation is one of the act of looking into an abyss: maybe the temptation of plunging synthesised by the poetic words.'¹¹

11. Oiticica: letter to Guy Brett. April 1967

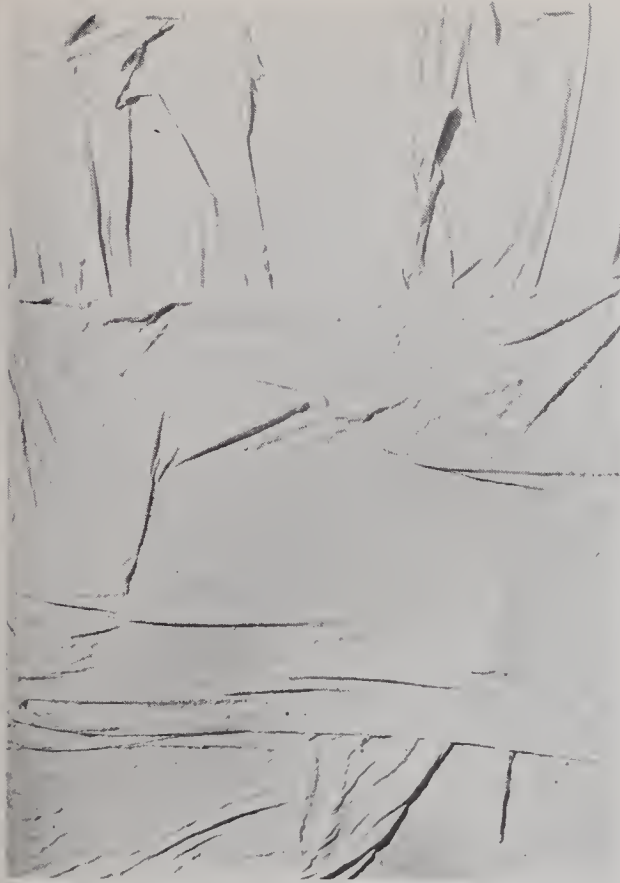


Helio Oiticica: *Box Poem*. 1966. Wood, plastic, bag of light blue pigment. *Private collection*.

Photo: Guy Brett.

words: Do meu sangue
Do meu suor
Este amor vivera

through my blood
through my sweat
this love will live



Manzoni: *Achrome*. Collection M. Visser.

Fontana: *Concetto Spaziale*. 1964. A recent cut canvas. Fontana first pierced his canvas in 1949.



As we saw, Mondrian in painting discovered the sufficiency of pure relationships as a language capable of profound emotional power. But only at the cost of a severe material limitation; to keep to absolute flatness. In fact, even as they cleared away representational illusion and worked with the real space of the picture-surface the abstract painters produced the crisis of that space. If we take Mondrian's work as a kind of watershed in modern painting (as Cézanne's was at the end of the last century), two main directions were taken, away from his flatness, but from the basis of his concrete thinking: American painting, with its unprecedented breadth and plasticity, and the work of painters in Europe which proceeded from the discoveries of the abstract artists towards detaching their elements and transforming them into kinetic energy through optical means.

The 1950s in Europe was in some ways a transitional stage which saw several inspired gestures attempting to liberate thought about the painting and pictorial space. Among these were Yves Klein's all-blue canvases (the Monochrome) which were his 'representation' of the void; Piero Manzoni's all-white surfaces activated by fur, random folds and creases in cloth etc; Fontana's cut canvases; and Vasarely's positive-negative repetition paintings. All these essentially remained close to the technical means of traditional painting. A Venezuelan painter working in Paris, J.R. Soto, was really the first to find a means of detaching the elements from static formal relationships, and he has made a language out of them.

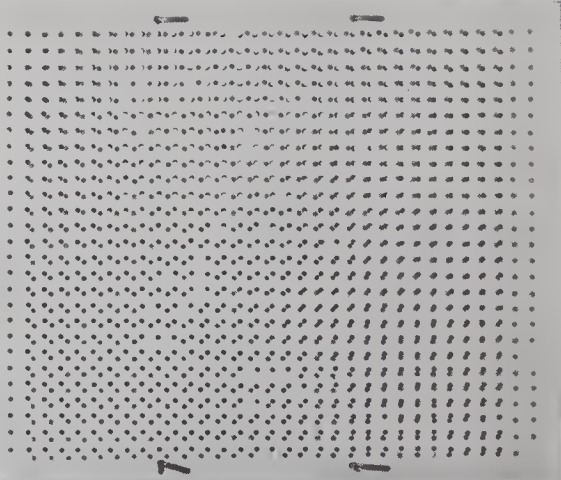


J. R. Soto: *Repetition: yellow & white*. 1951. *Collection the artist*.

Soto

The precision and honesty with which Soto searched for this mobility in painting from 1950-56 is one of the most inspiring things in recent art, and it is recorded in a long series of works of which these are a few. He was never waylaid into the compromise of adopting descriptive means. He has worked always with elements which are of no interest in themselves and looked for mobility by trying to find some sort of new relationship *between* them. It was because he found mobility *between* the elements, that he liberated the surface of the painting.

The vital 'between' device he discovered in 1956: superimposition. Before then he had made paintings of geometrical forms repeated (by implication *ad infinitum*), so the individual form disappeared in rhythm, exactly as it does if one repeats a word over and over again. The last repetition paintings were with dots. By superimposing, a few inches apart, two Perspex sheets painted with dots, he found that the distance between them was negated perceptually: they merged in the spectator's vision. Both surfaces lost their precise location in space and the dots seemed to create their own fluid, unstable space. He brought the sensation to its most intense in the last Perspex works he made, the *Spiral*. He had arrived by his own road at a physical phenomenon long known to science, the moiré pattern. But even if we recognize this, it doesn't alter the implications of Soto's use of it in the context of painting. Since 1956 Soto has developed his painting from these beginnings. He uses a constant lined screen as a ground, so that its effect becomes like that of a musical score. In front of it there may be fixed square plaques whose edges vibrate as the spectator moves past, hanging rods, or wires,



J. R. Soto : *White points on black points*. 1954.
2 Perspex sheets. Collection Carlos Raoul Villanueva,
Caracas.



J. R. Soto : *Spiral*. 1956. 2 Perspex sheets. Collection the
artist.

or a ball of nylon twine, all of which are free to swing.

'Modulation of Blue' is typical of Soto's recent work. The thin metal rods hang by their centres on nylon threads from the projecting rod at the top. The rods brush the surface freely. They are not firmly confined within the rectangle of the painting. Over the lined part their material substance is dissolved into vibrations. Over the other, monochrome, side of the painting they keep their substance. Because of Soto's judgement of scale, of visual weight, and his deep instinctive reaction to qualities of movement, this is no demonstration of an optical phenomena but a calm and delicate painting.

The space in Soto's paintings is a pictorial space. Parts of the work move freely in space and Soto makes no attempt to hide the fact, but the essential part of each work, where the relationships between element and ground come into being, is seen as two-dimensional, a surface, not *on* which things move, but which is itself in perpetual dissolution and transformation.

It is an illusion, and you know it is, because Soto's openness of construction gives you plenty of opportunity to see element and ground separately and in their solid state. But the illusion, the 'imaginary space', is given, ironically, the force of truth.

And it is the apparently stable, commonsense validity of appearances, not the validity of the illusion, that you find yourself questioning. There is no image and no definite form in Soto's space, but a sort of climate of serene transformation.

Soto's are very open paintings. They can state their conceptual limits openly and honestly because they transcend them by means of internal relations, which as Soto has said 'have an

Opposite, below :
J. R. Soto: *Modulation of Blue*. 1965. Collection the artist. Photo: Clay Perry.



autonomous existence'. Soto emphasises the autonomy of the relations by never hiding the incidentals: the supporting rod and wires, or the projecting shelf from which the elements hang. Illusion too is employed actively and 'concretely'. It is never made a thing of mystification; it establishes a concrete relationship with our perceptions, however diffuse the experience may be.



J. R. Soto: *Mural work with blue & black hanging rods*. Venice Biennale 1966. On the left three paintings are seen from the side. *Photo: Clay Perry.*



J. R. Soto: *Square on the diagonal*. 1965.

Graevenitz

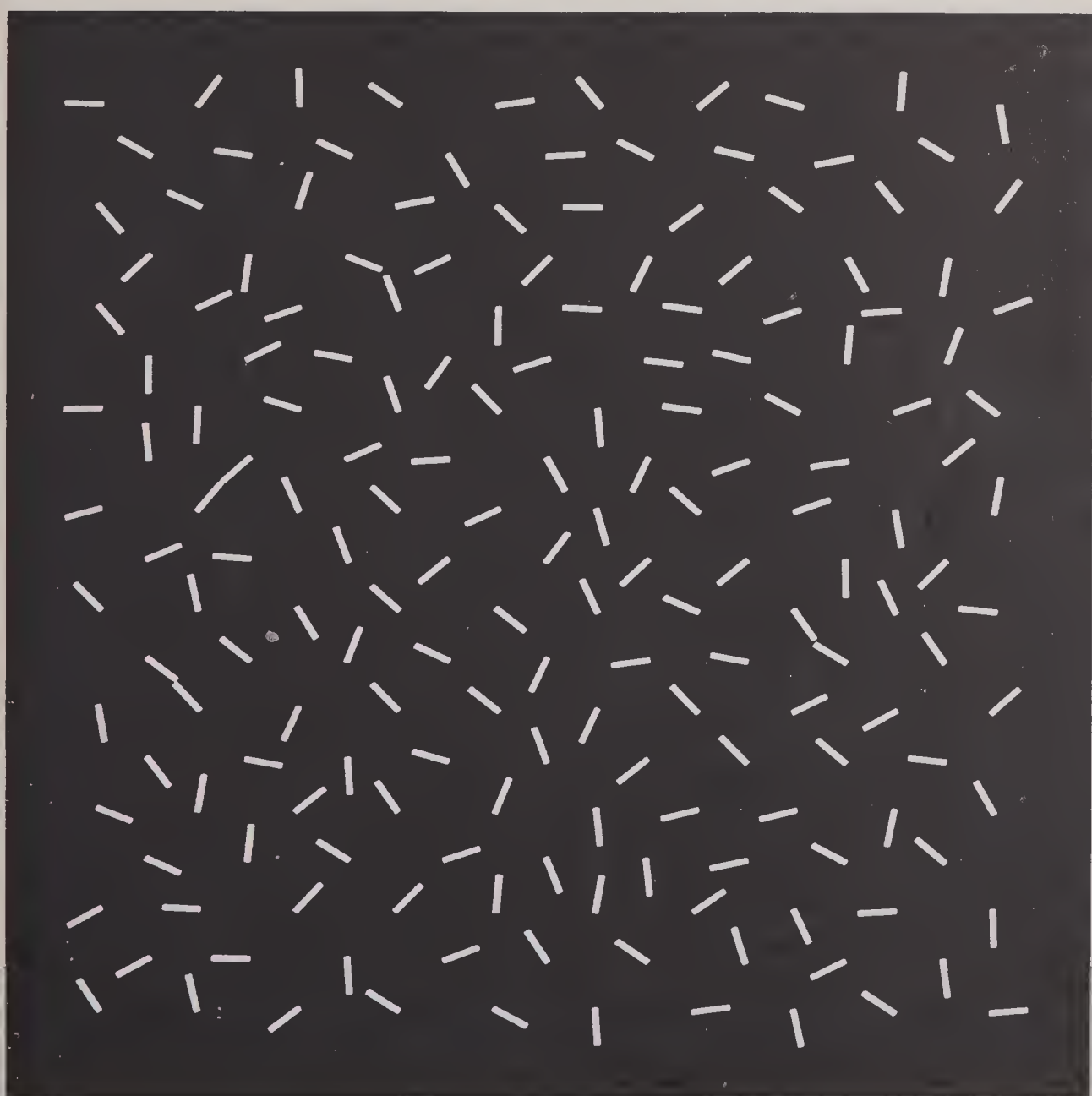
The same is true of Gerhard von Graevenitz's work. The life of the painting lies in relationships which are, as simply as they can be, relationships of movement, which reveal themselves in time.

It is a very elementary language in which movement seems to arise from nothing. In the black object with white strips, each paper strip is glued to a pivot at one end and turned at random by a motor system behind. No element does more than revolve, but in doing so a network of interacting movements springs up which envelopes the surface in rhythm.

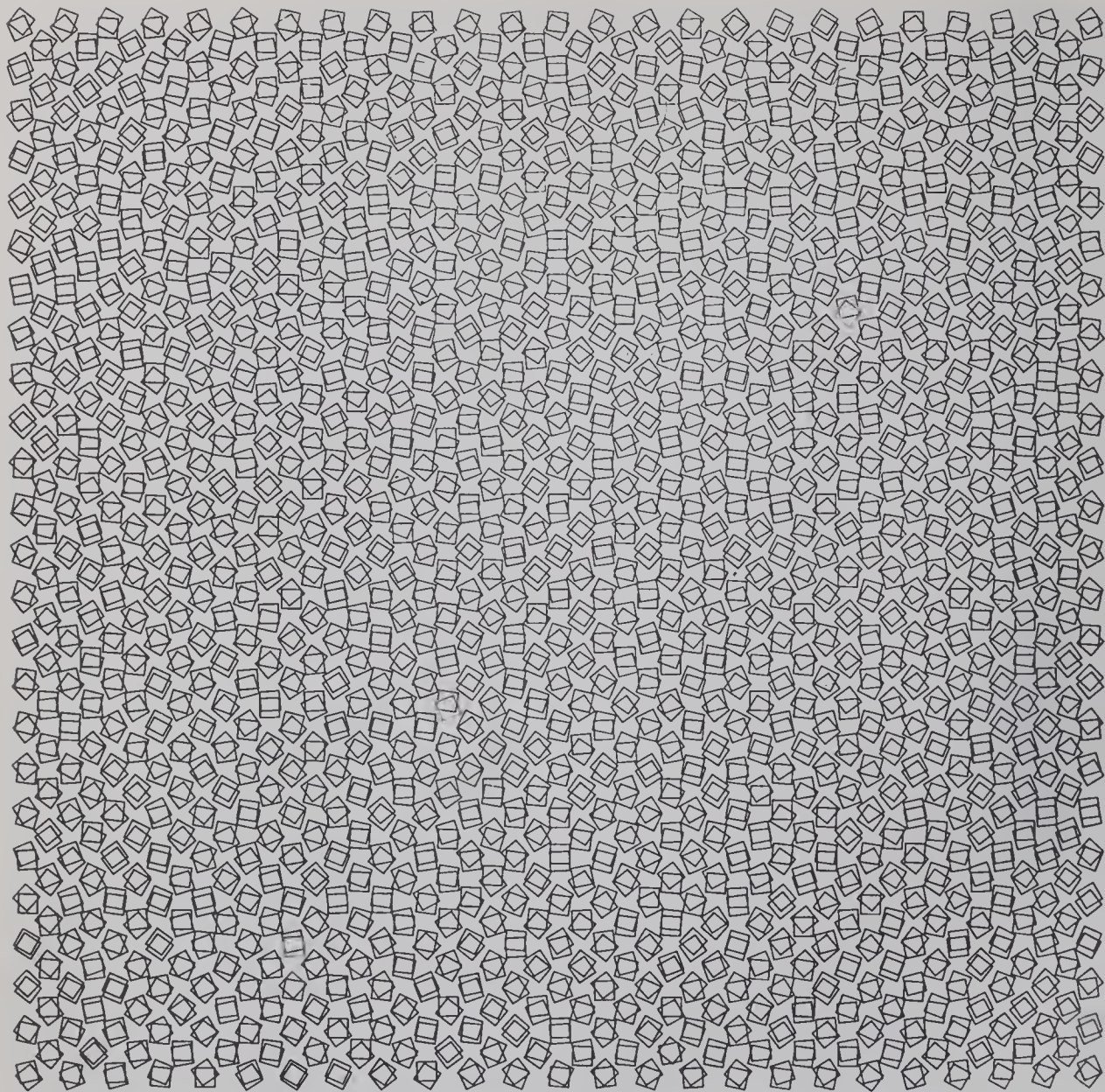
The relationship of the part to the whole is very like what happens in wave motion (the principle is demonstrated very clearly in a machine in the Science Museum, London). Each particle moves simply up and down, but by being properly phased with the particle next in line it disappears in a convulsive wave movement, which is real though it has no material existence. The surface in Graevenitz's work never produces anything as predictable as a wave movement. He is not concerned to convey this kind of precise formal information. The relationships are left to chance. What emerges is again diffuse, the gentle breathing of the whole surface.

Graevenitz's work is very clear and firm in its principles. It is easy to see what links him with the other kinetic artists. The painting's organization is open, the movement is quite without beginning or end. The spectator feels he can take what he likes from the work and participates in its continuous process of self-creation. This is not a move towards anarchy, but towards greater freedom and communication.

Instead of flat strips this object (*page 81*) has small X-shapes of polished aluminium which draw the light in and make a dense centre. In



Gerhard von Graevenitz: *Square kinetic object: black with short white strips*. 1965. Collection the artist.
Photo: Clay Perry.



Gerhard von Graevenitz : *Serigraph*. 1964.



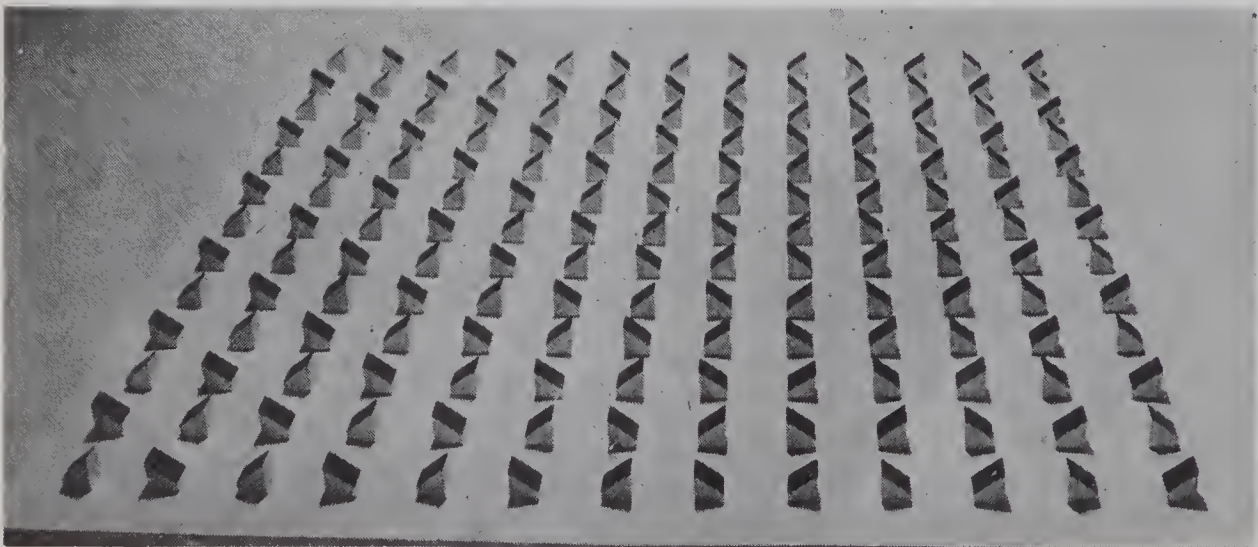
Gerhard von Graevenitz : *Object with reflecting elements.*
1963. *Collection the artist.*

other works Graevenitz has cast direct light-beams on to rows of reflecting elements, producing an incredible activity on the surface, as beams swivel, break, switch direction, leap out, join and fade.

Debourg

Like Graevenitz, Narciso Debourg is working from an absolutely regular (non) composition. Debourg is another Venezuelan working in Paris. With him, the visual modulation of the surface is not great in any quantitative sense. He always seems to keep the elements far enough apart to avoid any trace of traditional plastic effect, and in the relief illustrated every tilt in one direction is opposed by one in the other. There are no 'formal' relationships to find ; on the formal level the painting is empty. But the effect of the angled planes and the intervals is to produce optically the sensation of a delicate, impalpable surface – in its entirety.

Narciso Debourg : *Relief*. 1959.



Cruz-Diez

A third Venezuelan, Carlos Cruz-Diez, uses a more traditional formal vocabulary, but has developed an amazing technical system for mixing and changing colours on the surface in reaction to the spectator's movement. Very narrow louvres made of card or transparent coloured plastic, intercept or modulate the colour painted on the ground between them, as the spectator's line of vision changes. Very often, from far to the side, nothing is visible on the surface at all. And when the colours do appear they do so gradually and without being firmly attached to the surface. This particular work is black, white and silver.

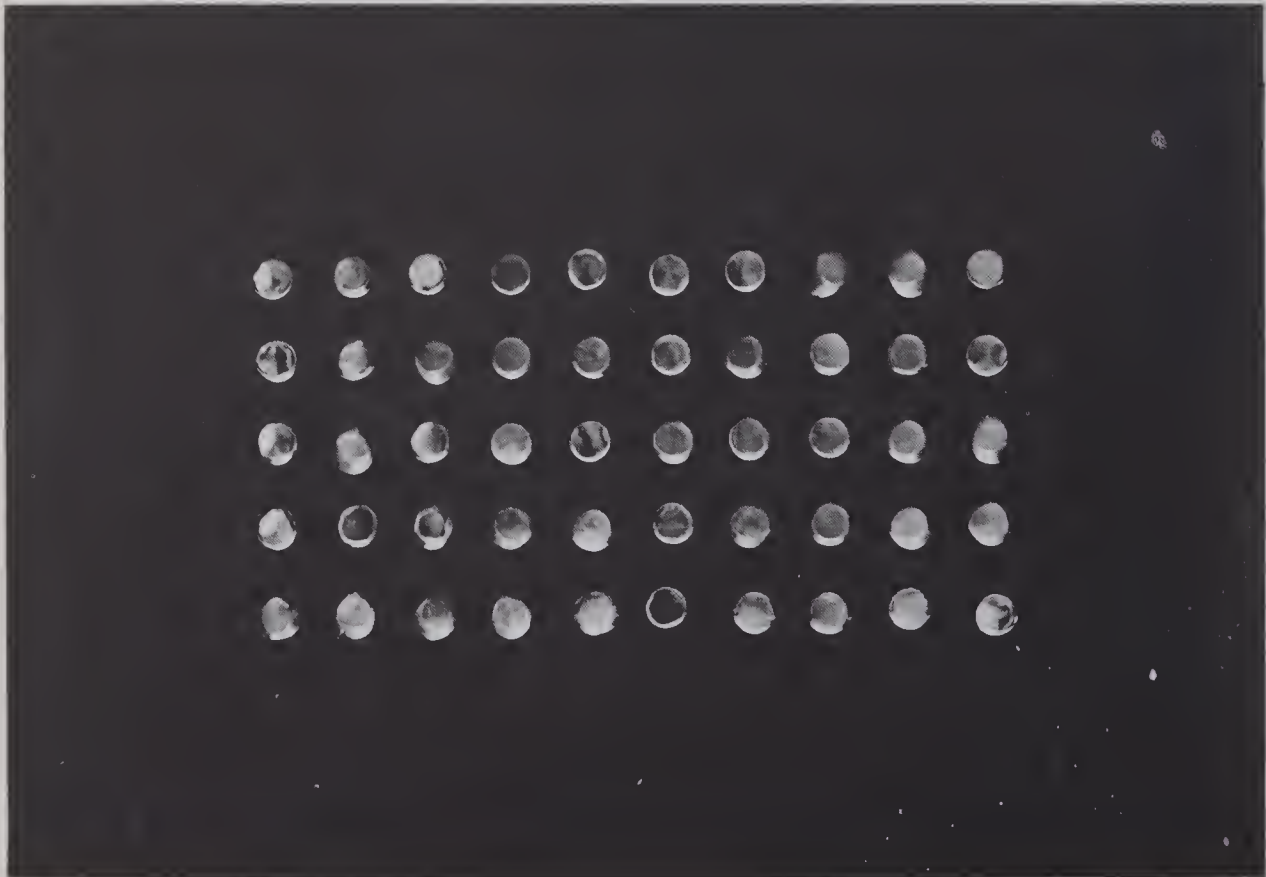


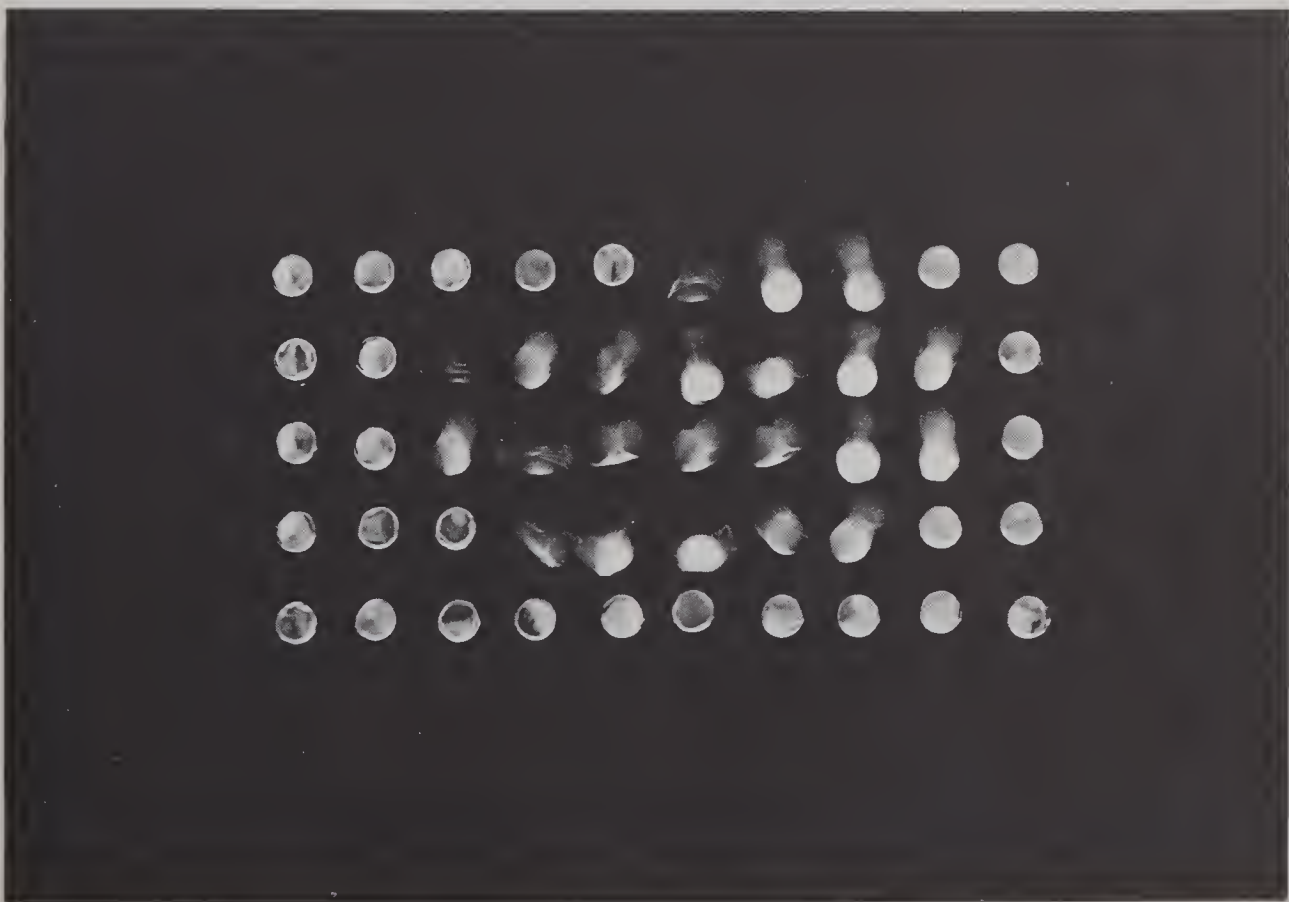
Carlos Cruz-Diez: *Physichromie No. 127*. 1964.
Collection Lord Esher. Photo: Clay Perry.

Agam

Yaacov Agam has also made use of a principle similar to Cruz-Diez's, though less intricate. The forms which appear, are broken up, disappear and change into others as you go past, belong to the language of geometrical abstract art. His most exciting treatment of the surface has been his 'Tactile paintings'. Rows of coloured discs mounted on springs are scattered and set in furious vibration by passing a hand across them.

Yaacov Agam : *Sounding Image 11*. 1964. Marlborough-Gerson Gallery, New York.



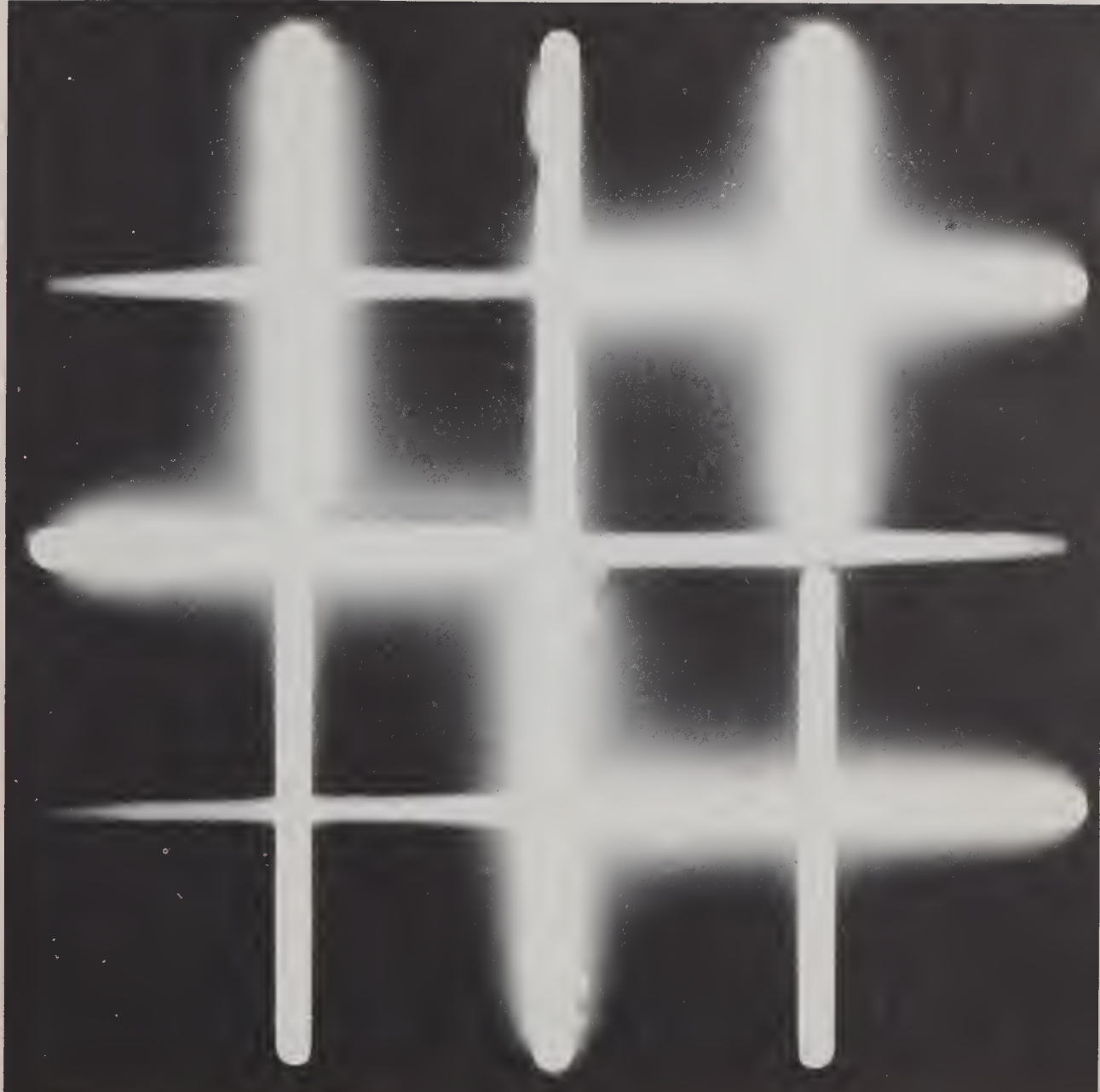


'Electric light', Dan Flavin wrote recently, 'is just another instrument.'

Nevertheless electric light is responsible for the biggest technical mystique that affects the field of present kinetic art. It is true that Moholy-Nagy prophesied that in keeping with a general 'lightening of material' which he detected taking place throughout art, painting would move from the use of pigment to the use of electric light. He talked of kinetic light 'displays' and of 'painting' with light. Unfortunately large numbers of artists have interpreted his words too literally, making electrically powered and illuminated versions of dull graphic imagery projected on screens. The work of Malina, Schoeffer and John Healey, for example, must have become widely-known chiefly because of its technical novelty, though even this palls beside the equipment American artists will rig up for a single evening's Happening.

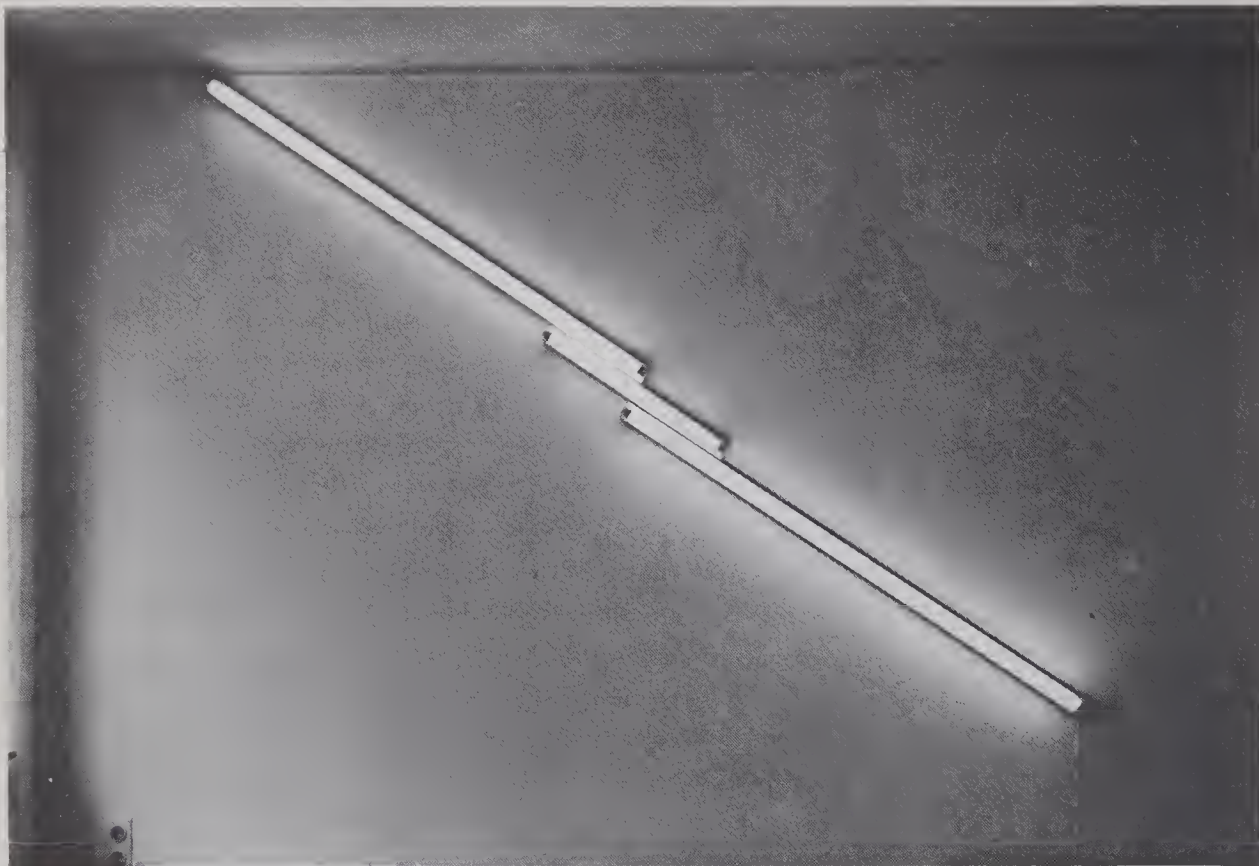
The instrument of electric light up till now seems to have been used creatively very little. Takis's mercury-vapour lamps and light-signals are outstanding, and light is an integral part of Liliane Lijn's and Graevenitz's languages. Two artists who certainly transform it have also used it in a very elementary form, François Morellet and Dan Flavin.

François Morellet's light works are really wall spaces which are carved up violently by neon strips arranged in horizontal-vertical compositions or in rows. An automatic switch swops the



François Morellet: *Neon lights with two superimposed rhythms*. 1965. *Galerie Denise René, Paris*.

light from panel to panel in the dark. The almost instantaneous changes of position manipulate startlingly one's experience of space.



Dan Flavin: *Untitled September 13, 1966*. Daylight
fluorescent light. *Galerie Rudolf Zwirner, Cologne*.
Photo: Barbara Brown.



Dan Flavin: *Untitled (to Karin) September 9, 1966.*
Daylight, warm white and cool white fluorescent light.
Collection Karl Visser, Amsterdam.
Photo: Barbara Brown.

The fluorescent light Dan Flavin uses is less graphic than neon. It has a soft, quiet aura. Dan Flavin's elements are fluorescent tubes of different lengths and colours, which can be arranged in any way he chooses. This depends on his reaction to the space he has to use, and this space is really the subject. The tubes bisect the space and also charge it: one tube may cross a corner, another may lean diagonally against a wall. Corners, floor, ceiling are knit without stress into a whole. The space might certainly be divided up in the same way by any similar tubular shape, but in Flavin's work the space is *lit*, which is in a sense a perception of a gently pervasive climate, rather than of form.

'The Indians long ago knew that music is going on permanently . . .' (John Cage)

I've wanted to work, not towards a definition of 'kinetic art', but away from one. To define kinetic art (which the mere use of the title does in a sense) is to present it as a style, to stress surface characteristics, and thus to hinder the perception of correspondences between the work of these individuals and others who may use different means of expression. Movement is used in different ways by these artists for opening the possibilities of language. It is impossible to be definitive because we are in the midst of the breakdown of traditional patterns, and a definition, like a dictionary definition, can only be made in terms of traditional patterns.

I've tried to approach the use of movement not as an isolated element but as a whole structure, to see the new relationship of the work to nature and to the spectator which comes into being through the use of movement. I linked it to the growth of the language of modern art since (roughly speaking) the Impressionists. This has become more and more a language which can't merely be described as visual. A self-sufficient visual art was really the creation of the Renaissance. With the Renaissance the work of art detached itself from religion and became a self-sufficient object of contemplation which the cultivated man could buy and place in his house: the visible world in miniature. Renaissance art coincides with the birth of modern science and both are manifestations of the belief that a finite material universe exists that can be investigated from the human point of view: for the detached acquisition of knowledge or the detached aesthetic emotion. The eventual outcome of the Renaissance view was the cultivation of the *objet d'art*, of art for art's sake, and the proliferation of specialist categories: painting, sculpture, drawing, fine and applied art and so forth, to mention only those

within visual art alone. Art grew its own course of education, aimed at art 'appreciation'. The twentieth century is breaking down this system of categories, of categories each with the monopoly of some aspect of human experience. Art has opened itself to the world again. A painting like Malevich's famous *White on White* canvas of 1918 is symbolic of a kind of cleansing of traditional formal structures, a return to silence, to the state of listening. Instead of representing a 'world in miniature' art has become a sign of this state of receptivity. Yves Klein wanted merely to collect an imprint of life. 'All that is phenomena manifests itself', he declared, and he wanted to collect that manifestation without tampering with it. Things are pregnant with language, and all our senses are receptive to it. Forms, colours, sounds, words, weights, temperatures, smell, space, light, altitude: they have values peculiar to themselves all of which are interrelated.

A work by Takis, for example, communicates not merely visually but by a unity of sound, light and physical force. In it we discover perhaps the correspondences between our own senses and their balance in our living system. With Lygia Clark's and Oiticica's work, language seems to come into existence in some way *between* our various sense-perceptions, as if inseparable from the total physical and mental consciousness of moving-in-time. When the meaning of the work of art flowers in ourselves

in this way, the artist's activity may merely be limited to producing ideas which the spectator may carry through. The work's expression is not fixed. It is unknown, an expression of each person's individuality.

We are obliged to form quite a new relationship with works like David Medalla's foam-sculpture, Mira Schendel's *droghinas*, or Dan Flavin's light-spaces, because they deny historical time. They exist in an eternal present. Because they are always being renewed, afresh from the beginning, they suggest a kind of liberation from historical time and from the oppression of past accumulation of material.

These works seem to demand a new place in the world. They may still come to you through the traditional channels: through art galleries and museums, or indeed through books such as this, but they imply something different. The technical simplicity and material anonymity of many of them negates the activity of buying and selling; others are to be handled, worn, thrown away. This lack of interest in everlasting external material symbols expresses great faith in the act of communication and the creative potential of everybody. A desire seems to be gathering strength throughout Western society for a state of mind and life like that of primitive man (and of Oriental man), neither of whom have experienced the same split as ourselves between interior and exterior reality.

Notes on the artists

Yaacov Agam was born in 1928 at Richon-Le-Zion, Israel. He studied at the Bezalel Art School, Jerusalem, and has lived in Paris since 1951. In 1953 he exhibited his first 'polymorphic' paintings, and paintings with parts to be re-arranged by the spectator, at Galerie Craven, Paris. His technique of painting on prismatic surfaces which change the image from different angles of vision he has applied on a large scale in a ceiling for the Palace of the Nation, Jerusalem (1964), and a wall for *SS Shalom* (1962-3).

Pol Bury was first a figurative Surrealist painter but gave up the technique of painting in 1953. He was born in Belgium in 1922 and now lives at Saulx-les-Chartreux, a small town near Paris. His first mobile works were abstract compositions of planes which slid over and under one another, moved at first by hand, later by motor. In 1959 these geometrical forms gave way to filigree wires and stems projecting from the surface (*érectiles*) and the slow patternless movements which have become characteristic of Bury, together with the slight rustling and stirring sounds of the hidden mechanical parts. He exhibited together with Soto and Takis in the 'Structures Vivantes' exhibition at Galerie Diderot, Paris, 1962.

Sergio de Camargo was born in Rio de Janeiro in 1930. Studied with Pettoruti and Fontana at the Altamira Academy in Buenos Aires. He went to Paris at the age of eighteen with his father, stayed to study philosophy at the Sorbonne and made his first sculptures. He paid several visits to Brancusi in his studio. His early sculptures were influenced by Laurens and Picasso; after some experiments in formal abstraction, he broke down these known languages for himself with a series of fragmentary, explosive plasters made by casting finger-holes in sand, and pressing plaster into rumpled pieces of cloth. The first white wood reliefs were made in 1963. In 1965 Camargo began work on a free-standing wall 25 metres long and 3½ high for Niemeyer's Foreign

Ministry in Brasilia. The wall is made from square-sectioned concrete blocks with diagonally cut ends in only two sizes. It is a great achievement in the rhythmic articulation of an immense surface, chiefly because it is very simple and expansive. It was finished in 1967. Camargo lives in Paris.

Lygia Clark was born in Belo Horizonte, Brazil, in 1920 and lives in Rio de Janeiro. In 1947 she studied with the Brazilian landscape architect Roberto Burle Marx. In 1950 she went to Paris and studied for 2 years with Léger, Dobrinsky and Arpad Szènes. In 1959 she was a co-founder of the Brazilian neo-concrete group MAM, which was inspired by the discoveries of the abstract artists, particularly Mondrian, and believes in 'elaboration of a work of art, and proposes a form of interior knowledge in the moment of elaboration'. Clark's early works were abstract paintings; in the late fifties she made reliefs, 'modulated surfaces', symmetrical and elementary in form and colour, but constructed with shallow changes of level, rather as if they were folded paper. She developed their spatial character until in 1960 she made the first articulated sculpture from aluminium. Profoundly conscious of the essential ideas in her work, she has made a parallel version of her sculpture in book form, using paper, cardboard and string. She has written texts on the metaphysical implications of spectator participation which are among the best and most perceptive things written about movement and time in art (published in *Signals* Newsbulletin concurrently with her retrospective at *Signals*, May-July 1965). Lygia Clark lives and works in an apartment building just off Copacabana beach in Rio.

Gianni Colombo was a founder-member of Group T (Anceschi, Boriani, de Vecchi) and also took part in the organization of the international movement 'Nouvelle Tendance', which exhibited widely in Europe 1962-4. Colombo also works in industrial design. He was born in Milan in 1937 and still lives there. Since 1959 he has

been working in an area he calls 'cine-visual perception'. His first structures were hand-operated; later he used motors and recently he has been using electric light to manipulate an environmental space. His work was seen in America in the 'Directions in Kinetic Sculpture' exhibition, organized by Peter Selz at the University of California, Berkeley.

Carlos Cruz-Diez was born in Caracas, Venezuela, in 1923 and studied at the School of Fine Arts there. He worked as the artistic director of an advertising firm and as a teacher of typography before going to live in Paris in 1960. He still does a good deal of layout design. His first paintings, using the principle of narrow slats to filter the colour and form according to the spectator's line of vision, he made in 1959. He calls these paintings 'Psychromies', to emphasise the physical sensation of the colour changes.

Narciso Debourg, painter and singer, was born in Caracas in 1928 and was at the School of Fine Arts the same years as Cruz-Diez. He went to Paris in 1949. His early reliefs were made with regular arrangements of solid elements, cubes or cylinders, which deflected the light. He began using hollow elements in 1964. Debourg participated in the Bewogen Beweging exhibition at the Stedelijk Museum, Amsterdam, and the Moderna Museet, Stockholm in 1961.

Dan Flavin was born in 1933 in New York. He studied at the Cathedral College of the Immaculate Conception preparatory seminary of Brooklyn 1947-52; the US Airforce meteorological technician training school at Rantoul (Illinois) 1953; University of Maryland adult education extension programme in Korea 1954-5; New School for Social Research, New York City, 1956; Columbia University, New York, 1957-9. As an artist he is self-taught. He has exhibited in New York (1961-), Los Angeles (1966) and at Keulan, Germany, (1966). He is also a writer.

Gerhard von Graevenitz was born in Schilde, Mark Brandenburg, Germany in 1934. He studied economics at the University of Frankfurt, then art at the Kunstakademie Munich 1957-61, and has since lived in Munich. 1959-60 he edited and published his own magazine *Nota*. In 1960 he opened and directed the Gallery Nota in Munich. He was one of the co-founders of 'Nouvelle Tendance' in 1962. His first individual exhibition outside Germany was at Signals, London, in 1966. In America he participated in 'The Responsive Eye' exhibition at the Museum of Modern Art, New York, and in 'Directions in Kinetic Sculpture' at the University of California. Besides his motorized paintings Graevenitz has made doublesided reliefs with solid elements which the spectator can spin himself.

Yves Klein. May 1957: first exhibition of blue Monochromes ('International Klein Blue'), Galerie Iris Clert, Paris: 'I did not like the *nothing*, and it is thus that I met the *empty*, the deep *empty*, the depth of the *blue*'. Klein proposed the void as a physical entity.

April 1958: Exhibition of the Void, Galerie Iris Clert. Empty gallery painted white. Klein occupied the gallery, mentally 'creating' works of art, some of which were sold.

1958: architectural projects (with W. Ruhman). An architecture of the elements, with protective walls of fire and water-jets.

March 1960: 'Anthropometries'. Klein 'paints' with naked models to the accompaniment of a 'symphonie monotone' with 20 musicians. Galerie Internationale d'Art Contemporain, Paris.

April 1960: paintings with wind and rain ('Cosmogonies').

1961: paintings with fire. Columns and walls of fire (gasjets) in the garden of Museum Haus Lange, Krefeld. Catalogue by P. Wember.

Yves Klein was born in Nice in 1928 and died in Paris in 1962.

Liliane Lijn was born in New York in 1939, lived in Paris 1959-66, and from 1966 in London. In 1959 she met Takis, whom she married. Her first objects using a light source directed into a block of perspex injected with polymer acrylic she made in 1963. In the same year she began to make 'poem-machines', motor or hand-turned cones or drums printed with words, letters and signs. The words were written by Nazli Nour and later by an American poet, Leonard Marshall. Lijn's first exhibition in England was with David Medalla at Indica Gallery in 1967.

David Medalla, painter, sculptor, poet and dancer, was born in 1942 in Manila, Philippines. 1954-6, he studied modern philosophy and Greek Drama at Columbia University, New York. In 1960 he arrived in England, where he lives. 1964-6 he edited the Newsbulletin of Signals London. His first bubble machines and sand machine were made and exhibited in London in 1964. His most recent individual exhibition was at Indica Gallery, London, 1967, where besides an ensemble of bubble-machines, he exhibited the 'Mud Machine' and machines which animate rhythmically pulverised materials like rice, glue-pearls, sweets and coal. During 1967 he was working on a 'peelable' sculpture, in which the spectator 'discovers' smells, weights, shapes, sounds, textures – as he peels an object of many materials. He is continually presenting ideas in the form of written projects for sculpture. A list of projects was published in *Signals* (Sept. 1964) and others in a special issue of *Studio* devoted to kinetic art (March 1967). Several of the most recent have been for spacetime environmental experiences which involve all the senses of the participating spectator. One will comprise 'a swimming pool with submerged illumination, a room with no gravity, and a room where the naked body will encounter, at random intervals, fragrant showers of a resinous gummy substance, and storms of silver and gold dust accompanied by flares of light and musical sounds.' (*Studio*)

François Morellet, member of the Groupe de Recherche d'Art Visuel, in Paris, was born in 1926 and lives in France. He has participated in the Groupe's exhibitions, indoor and outdoor events, and also exhibited alone. All stages of his work from his earliest paintings in 1946, are illustrated in a book he published himself at 83 Rue Porte-Baron, 49-Cholet, France.

Julio Le Parc, member of the Groupe de Recherche d'Art Visuel, was born in Mendoza, Argentine, in 1928. He went to the School of Fine Art in Buenos Aires and won a scholarship which took him to Paris in 1958. The Groupe was founded in 1959 by 6 like-minded artists who reacted to the fashion for tachism and were inspired by the painting and writing of Vasarely, with his belief in the anonymity of the artist and the accessibility of the work of art.

Helio Oiticica was born in 1937. Except for a visit to New York he has always lived in Rio de Janeiro. His work has been little seen in Europe but next year (1968) an exhibition of his work is to be held at the Whitechapel Gallery, London. Oiticica's colours, materials and the movement his work invites is very close to the popular life of Brazil, though his artistic concepts have something in common with the thought of the primitive Indian tribes. He has arranged and participated in manifestations of his *parangolé* capes in the Museo Arte Moderna and other parts of Rio with the Negro dancers of the famous Mangueira samba school. His first efforts to create an environmental space with a 'magical' ambience were labyrinths of screens in close-keyed orange-yellow colours. He elaborated the sensory experience of the spectator in these 'penetrables' with powder, sand, sponge, pebbles, carpet etc., but recently drastically simplified it with powerful combinations of nondescript and even colourless elements such as canvas and water.

Mira Schendel was born in 1919 in North Italy and lives in Sao Paulo, Brazil. She began painting in 1949; at first she was influenced by Mondrian's work. In 1964 she began a series of drawings which must be the barest and most intense exploration of graphic language in recent art. These drawings are all made on upright sheets of thin rice-paper of the same size, by tracing on the back of the paper pressed to an inked glass. It is a perception of space in which the graphic line, the gesture, acts as a direct stimulant, charging the space in the moment of the act. In 1966 her drawings and 'Droghinas' were shown at the Museo Arte Moderna in Rio.

Jesus Rafael Soto, painter and guitarist, was born in Ciudad Bolivar, Venezuela, in 1923. Won a scholarship to the School of Fine Art in Caracas in 1942 and stayed there until 1947. In the same year, at the age of 24, he was appointed Director of the School of Fine Arts in Maracaibo, but 3 years later he resigned and left for Paris. With Otero, Cruz-Diez and Debourg, Soto had formed the avant-garde of painting in Caracas, and in Paris the deep understanding the South Americans had of the origins of abstract art placed them in direct challenge to the post-war École de Paris. Soto himself believed that Mondrian in his final ('Boogie-Woogie') paintings had begun to detach the elements through optical means, and this gave him his sense of direction.

1950-2: relief-paintings of repeated geometrical elements.

1952: paintings with colour-dots inspired by serialism in music.

1954: first superimpositions, overlaid perspex sheets. First superimpositions of separated perspex surfaces, painted with dots.

1955: spiral superimpositions and 'Kinetic Structures'.

1958-62: 'informal' works using the moiré principle.

1962: paintings with suspended bars, fixed plaques etc.

1965: first vibration structure of mural scale made for the Nul exhibition, Stedelijk Museum, Amsterdam.

During the years he formed his language until about 1963 Soto worked in comparative obscurity. Since 1964 he has exhibited widely in Europe, South America and USA. In 1965 a full-scale retrospective was held at Signals.

Takis was born in Athens in 1925 and made his first sculpture in 1946. Lived in London 1954-8, Paris 1958-66.

1955: bronze 'Idols' with flexible wire necks, arrow- and piston-headed flower sculptures.

1956: 'Signals': antenna-sculptures with long wire stems.

1959: first 'Telemagnetic' sculpture.

Nov. 1960: Takis puts a man (poet Sinclair Beiles) in space with magnetic power. Galerie Iris Clert, Paris.

1961: first 'Magnetic Ballets', first mercury-lamp and cathode sculptures.

1965: first 'musical' Telemagnetic sculptures.

1966: 'Light Signals', and works with compasses, instruments, etc.

Takis has written an autobiography (*Estafilades*, Editions Julliard, Paris 1961, to be translated shortly into English) and a series of dialogues on art and life (collected Signals Newsbulletin Oct.–Nov. 1964).

Jean Tinguely was born in 1925 at Fribourg, Switzerland. In his teens he was active in a left-wing anti-fascist youth movement. At the age of 18 he was building sound-making watermills in the forest at Basel, while attending the School of Fine Arts there. 1945-52 he made constructions of iron wire, metal, wood, paper, edible sculptures of grass. In 1952 he went to Paris, where he developed 'metamechanism', the 'meta' prefix signifying his concept of the introduction of chance into mechanical systems. He first produced reliefs of inter-gear wire wheels. In 1958 he collaborated with Yves Klein in an exhibition at Galerie Iris Clert: 'Vitesse Pure

et Stabilité Monochrome'. In 1959 he bombed Düsseldorf with copies of his manifesto, *For Statics*, and in the same year exhibited at the Paris Biennale his 'Metamatic' painting machine, which produced 40,000 works. His 4 autodestructive machine-events were:

March 1960: Museum of Modern Art, New York, 'Homage à New York.'

June 1961: Figueras, Spain, 'Toro de Fuego'.

September 1961: Louisiana Museum, Copenhagen. 'Study for an End of the World'.

March 1962: Nevada Desert, near Las Vegas. 'Study no 2. for an End of the World' in collaboration with NBC. Apparently Tinguely felt disappointed with this last one because it went out of his control, not through the action of chance, but through the delays and anti-climaxes caused by the technical complexities of filming it.

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