Architecture 2.0
The Immersive

Option studio

Instructor: Simon Kim
Assistant: Andrew Gardner
Consultant: Mark Yim, ModLab

The Immersive is about positioning research and development as the central motivator in design production

We understand that the dynamic condition of experience is already present in our environment whether we decide to engage it in design or not, so what happens when this dynamic condition is attached to the object?

The studio will explore what are the architectural implications of responsiveness as the potential relationships between space and occupants and among parts of a system.

Format

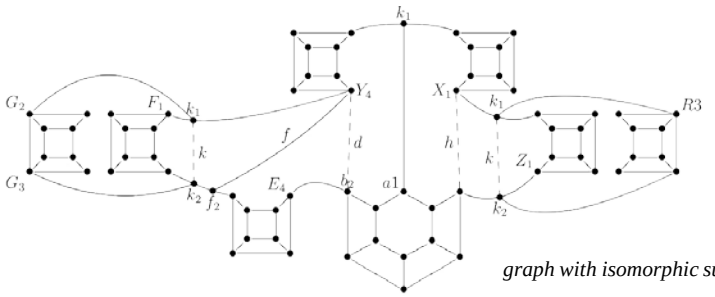
1. Introduction
2. References
3. Objectives

What if these theories are really true, and we were magically shrunk and put into someone´s brain while he was thinking. We would see all the pumps, pistons, gears and levers working away, and we would be able to describe their workings completely, in mechanical terms, thereby completely describing the thought processes of the brain. But that description would nowhere contain any mention of thought! It would contain nothing but descriptions of pumps, pistons, levers!

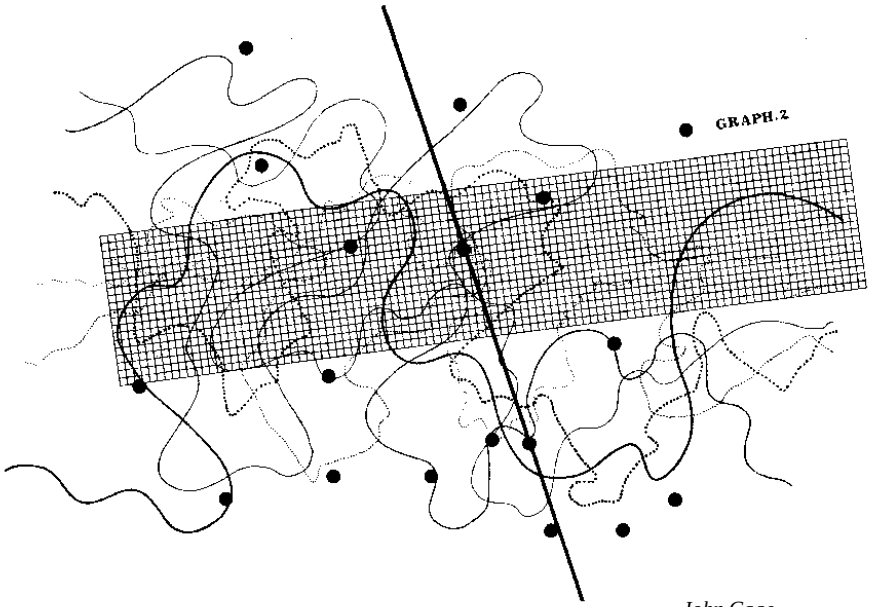
Wilhelm Leibniz

Duration is opposed to becoming precisely because it is a multiplicity, a type of multiplicity that is not reducible to an overly broad combination in which the opposites, the One and the Multiple in general, only coincide on condition that they are grasped at the extreme point of their generalization, empty of all "measure" and of all real substance. This multiplicity that is duration is not at all the same thing as the multiple, any more than its simplicity is the same as the One. **Bergsonism**, Gilles Deleuze

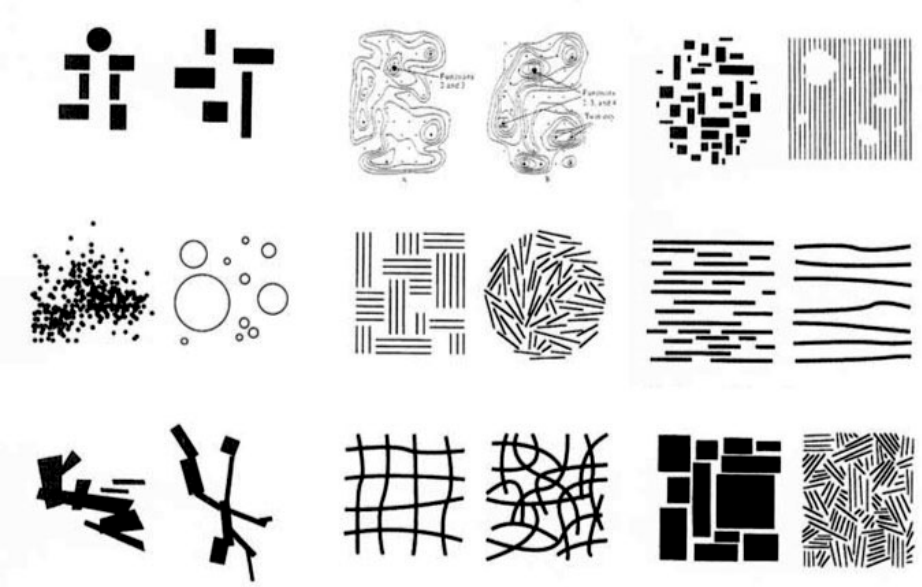
The truth is we change without ceasing...there is no essential difference between passing from one state to another and persisting in the same state. If the state which "remains the same" is more varied than we think, [then] on the other hand the passing of one state to another resembles—more than we imagine—a single state being prolonged: the transition is continuous. Just because we close our eyes to the unceasing variation of every physical state, we are obliged when the change has become so formidable as to force itself on our attention, to speak as if a new state were placed alongside the previous one. Of this new state we assume that it remains unvarying in its turn and so on endlessly.
Henri Bergson



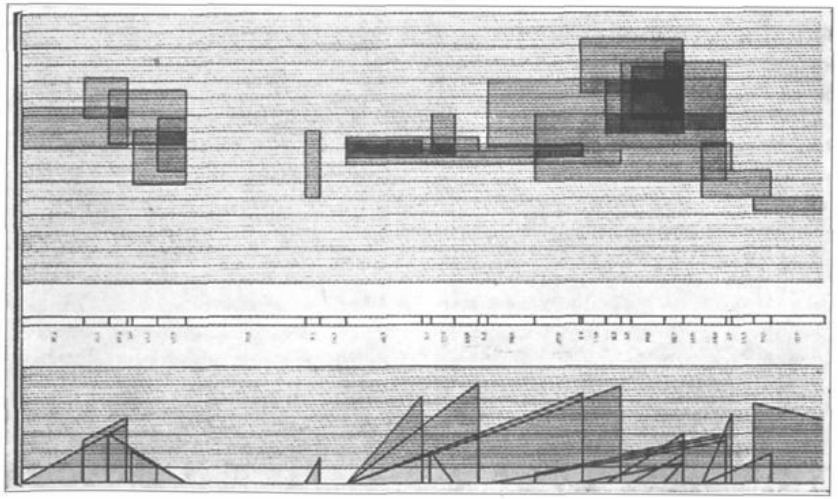
graph with isomorphic substructures



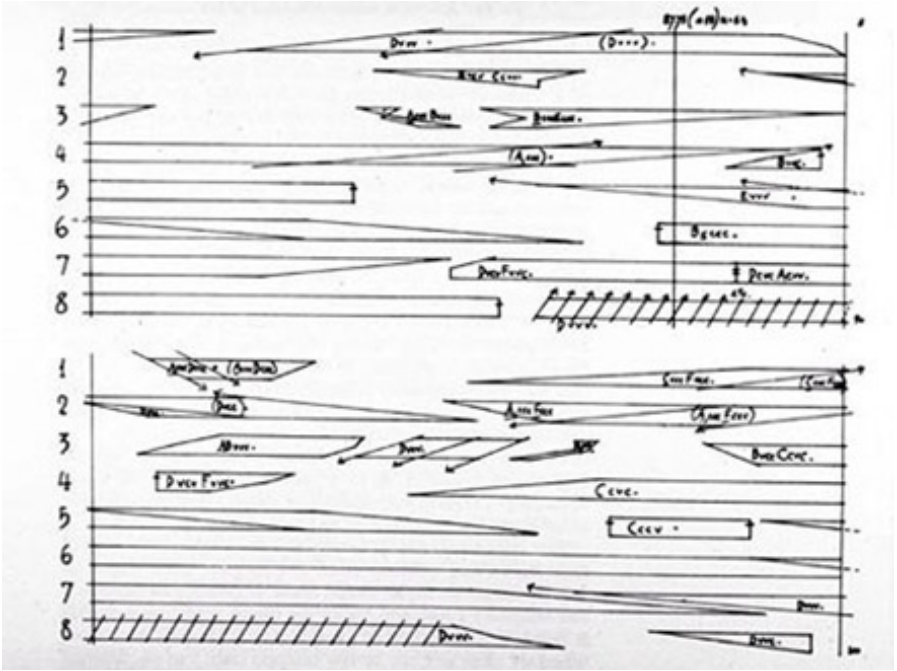
John Cage



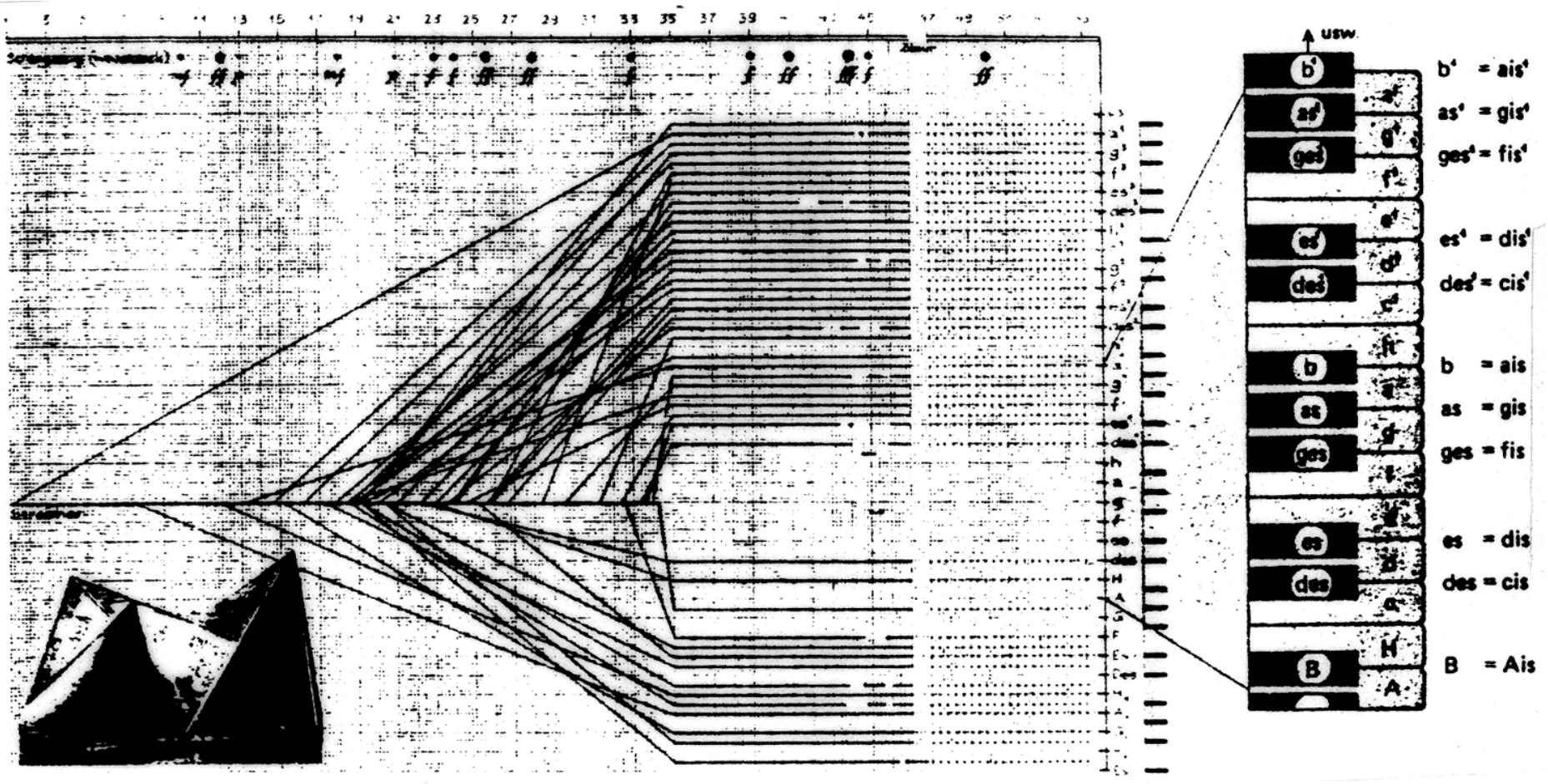
Stan Allen



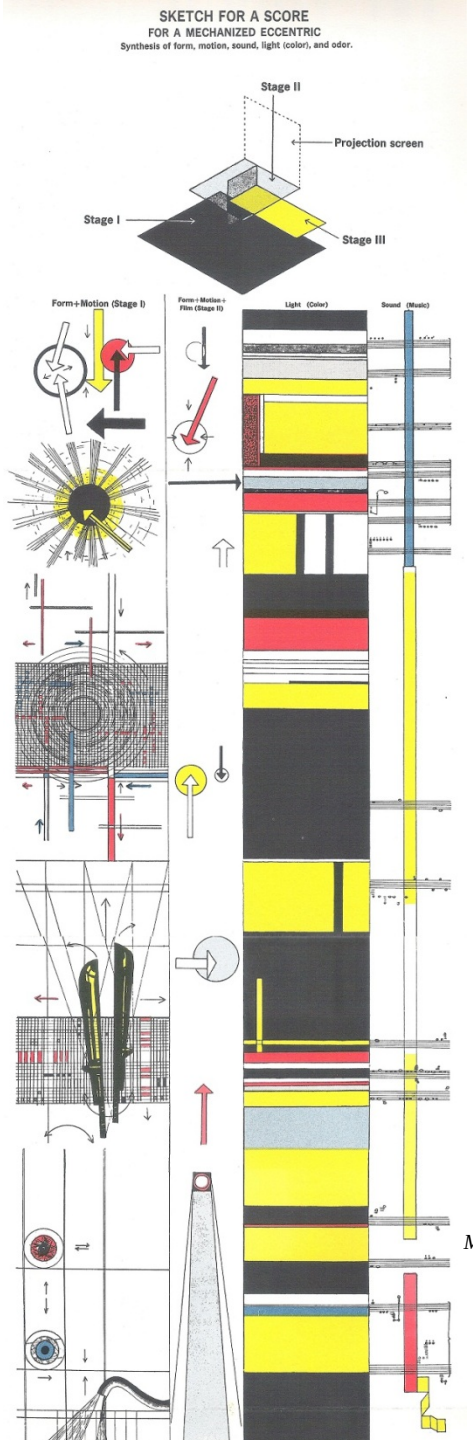
Stockhausen



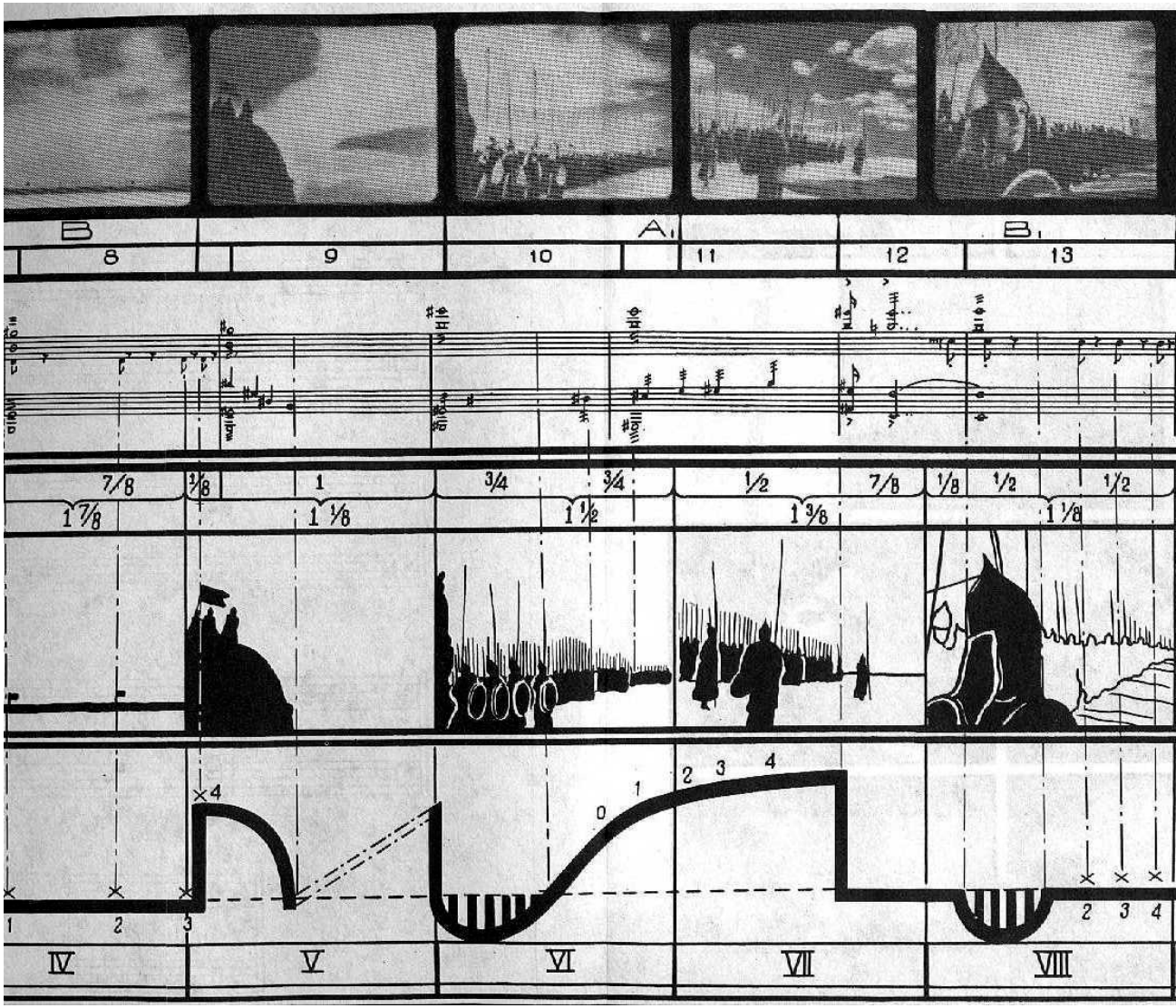
John Cage



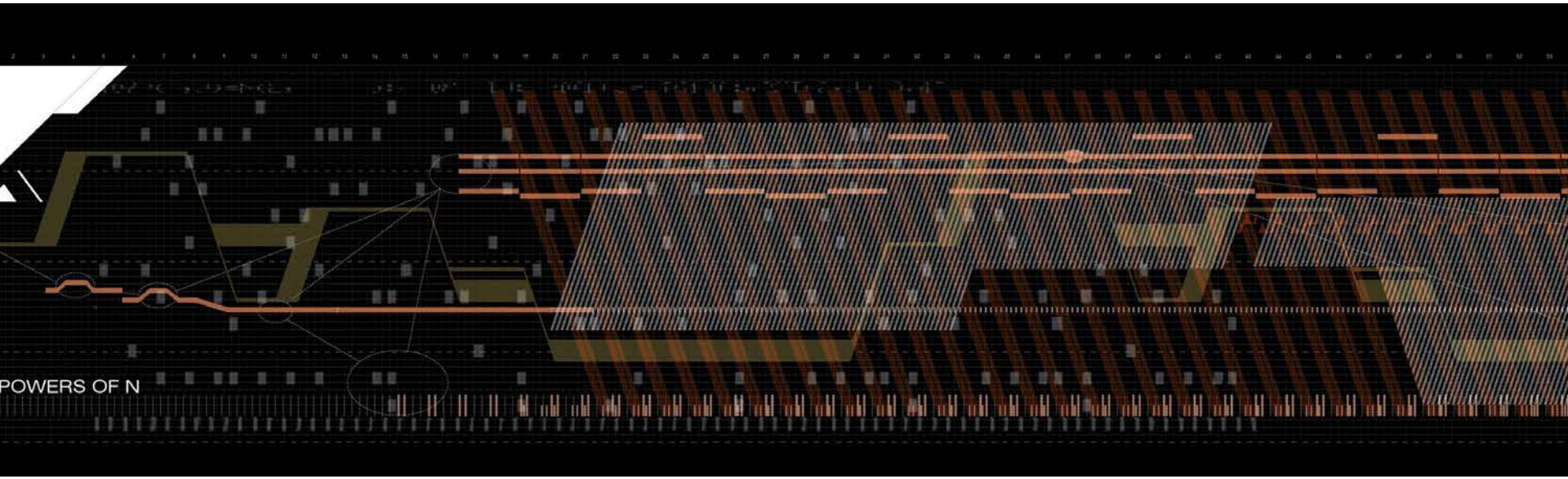
Iannis Xenakis



Moholy-Nagy



Eisenstein, Alexander Nevsky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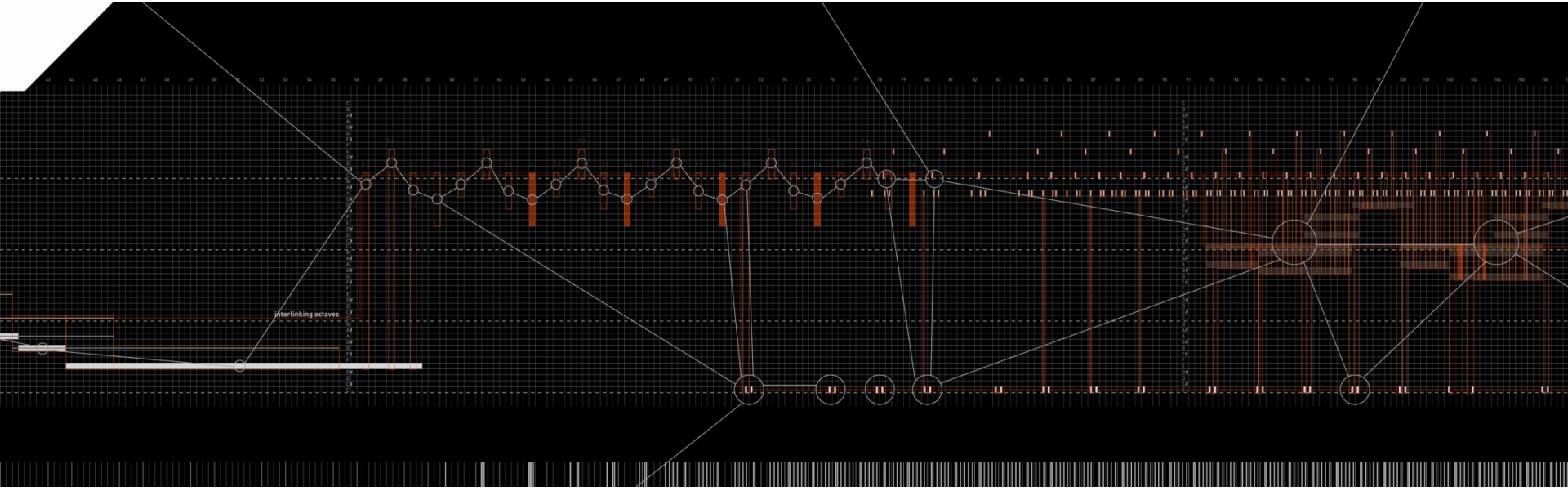
interlinking octaves

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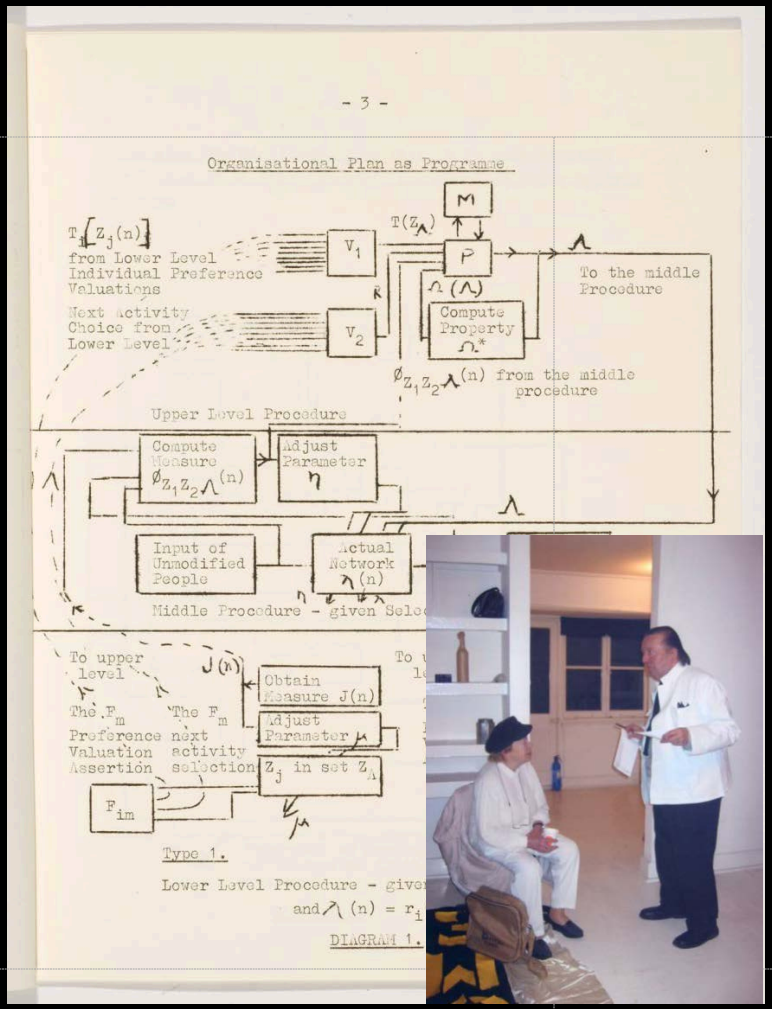
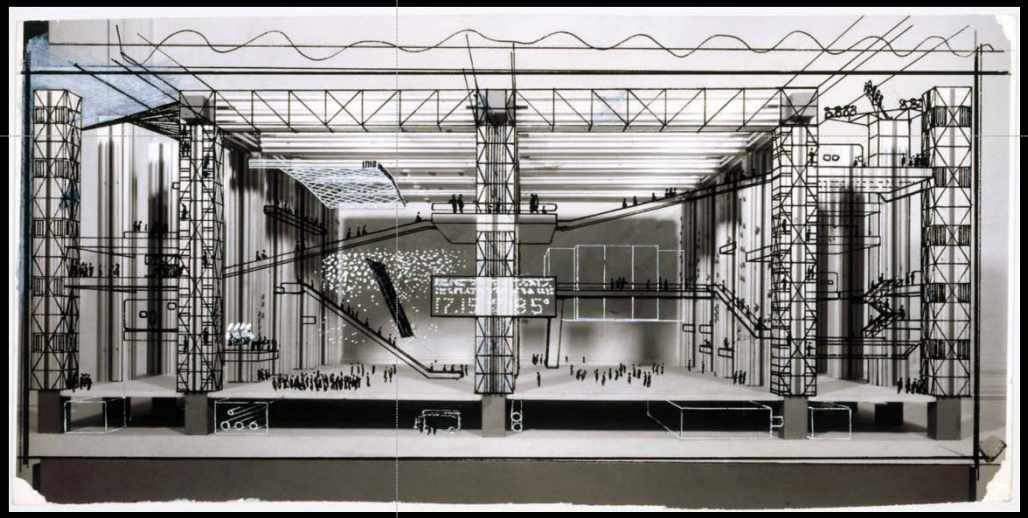
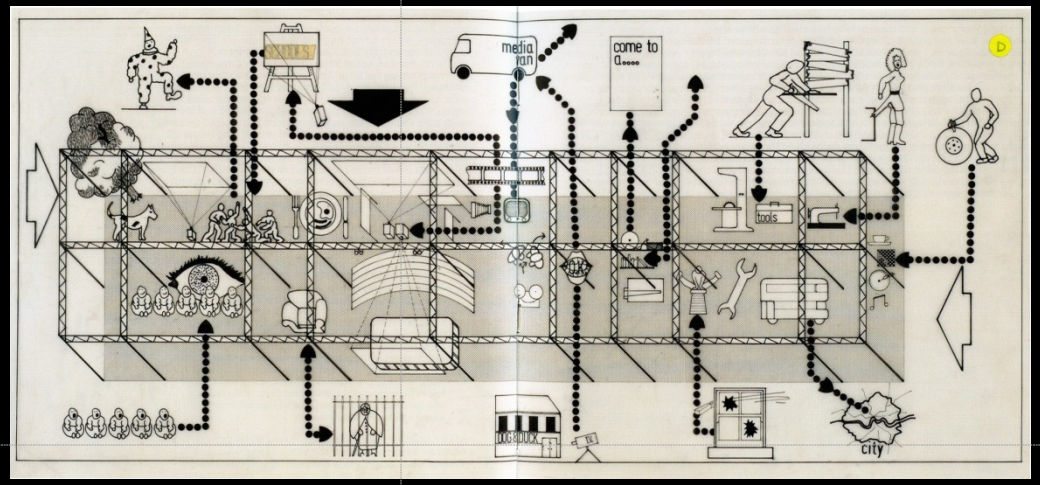
Gottfried Wilhelm Leibniz

Cedric Price
Fun Palace, 1961

Client: Joan Littlewood, Theatre Workshop Director
Cybernetics: Gordon Pask







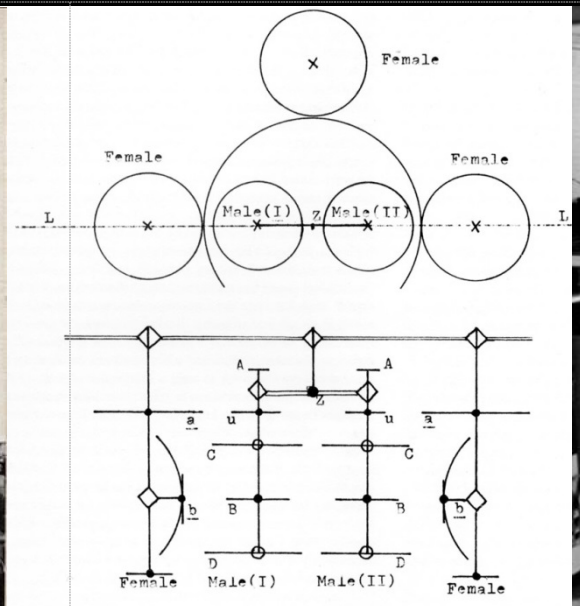
Pask and pal Wood, right, give Eucrates I a workout. Callouts under sets of bulbs read: Question, Answer, Stimulus, Clues, and finally Response.

Photos by BIPS

Eucrates I project, more successful than Pask's previous ventures into invention, is under the sponsorship of Solartron, a British industrial concern which is billing it as teaching aid.

Some sixty cigarettes a day seem to sustain Pask as he ponders the problems of electronic circuitry in his modest kitchen. Friends call him the "man who never sleeps," 6 hours in 3 days.

In the true do-it-yourself tradition, Pask makes his own chassis in the workshop of Systems Research Limited, an organization devoted to improving automation. He is co-proprietor.



ig. 34 A rough sketch of powered mobiles.
a Horizontal plan
b Vertical section taken through line *L* in horizontal plan.
A = drive state display for male
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C = upper 'energetic' receptors
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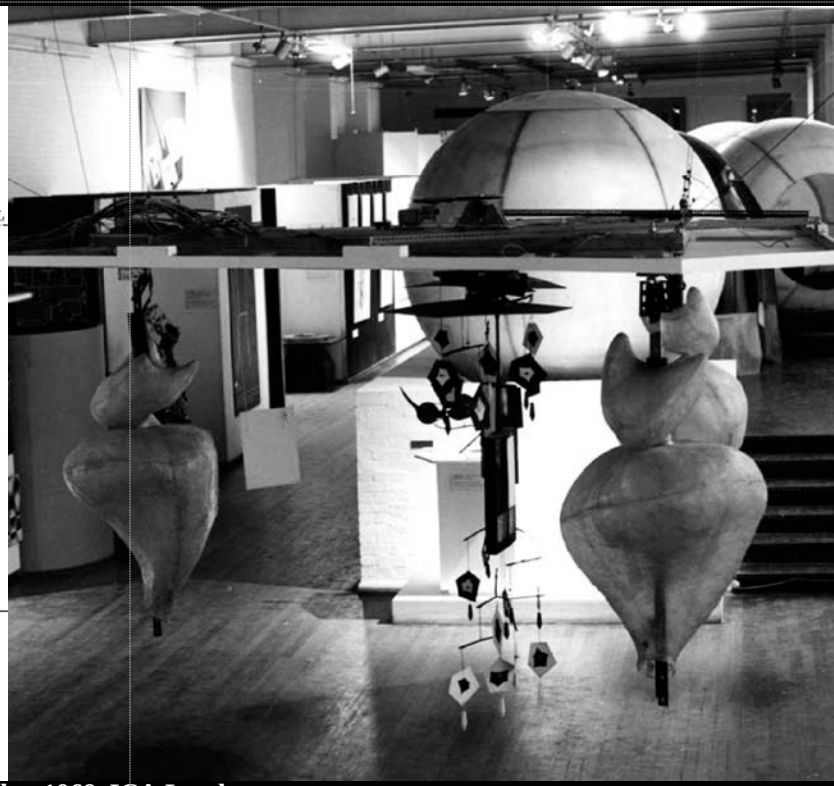
U = non-'energetic', intermittent signal lamp
a = female receptor for intermittent positional signal
b = vertically movable reflector of female
Z = bar linkage bearing male I and male II

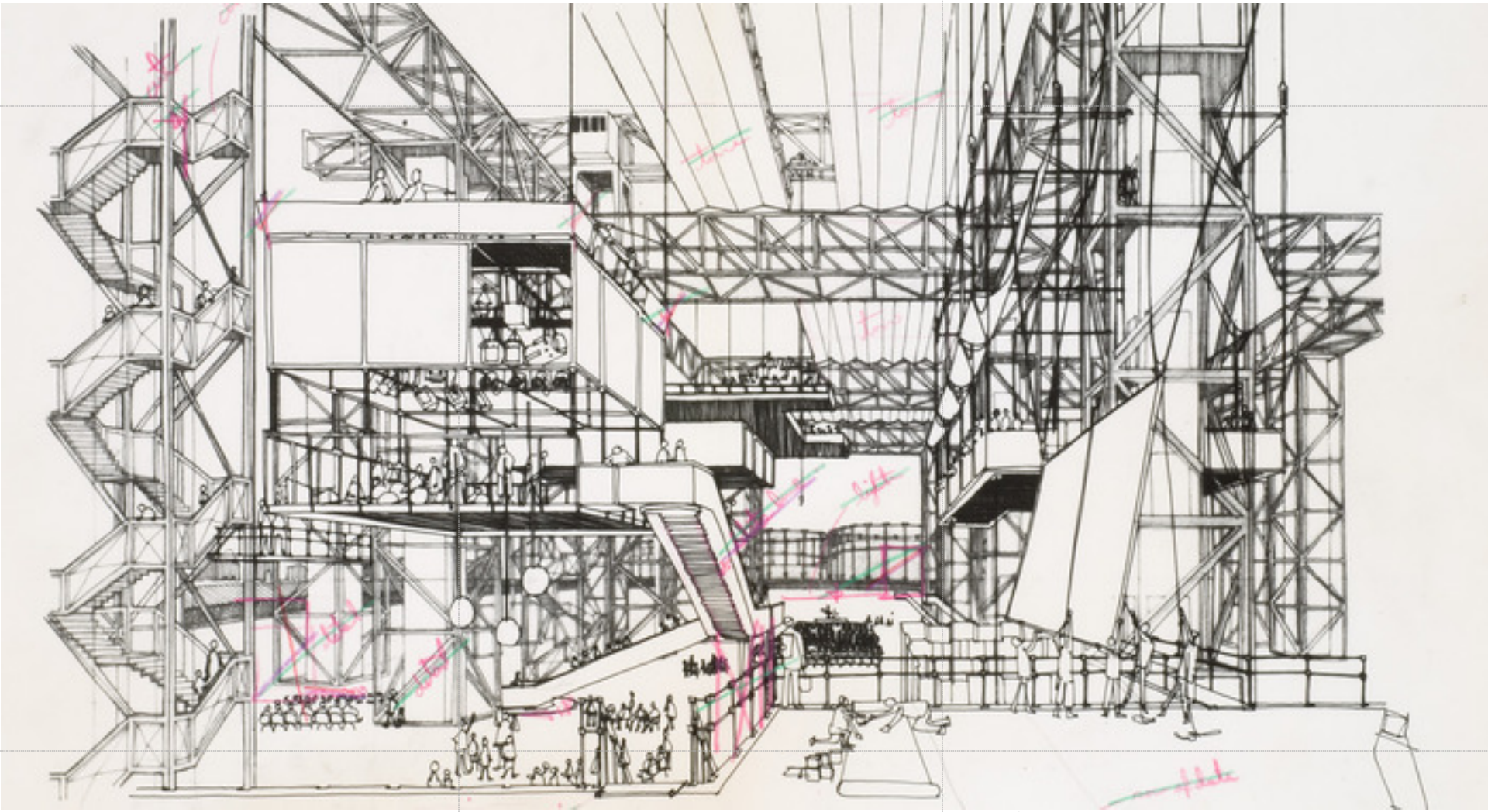
= Drive motor
= Free coupling
= Fixed coupling
= Bar linkage



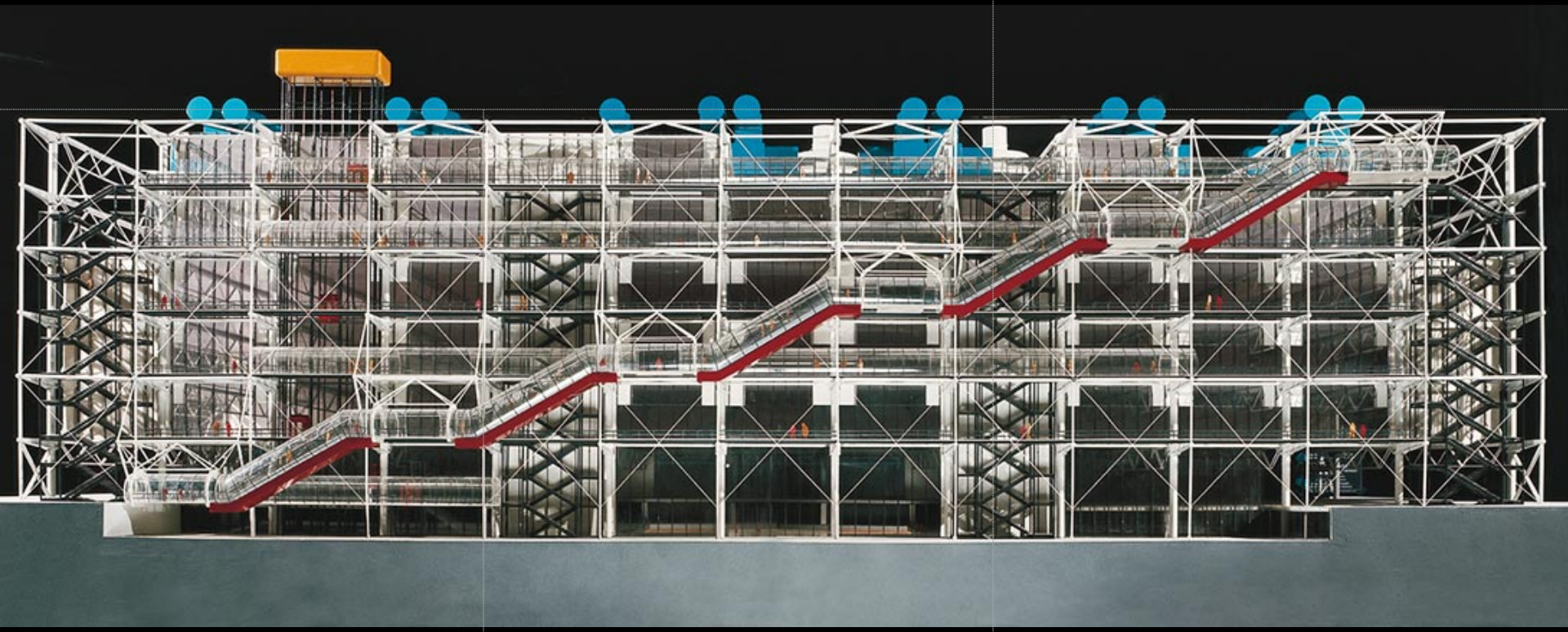
The Colloquy of Mobiles, 1968, ICA London

Cedric Price
Fun Palace, 1961

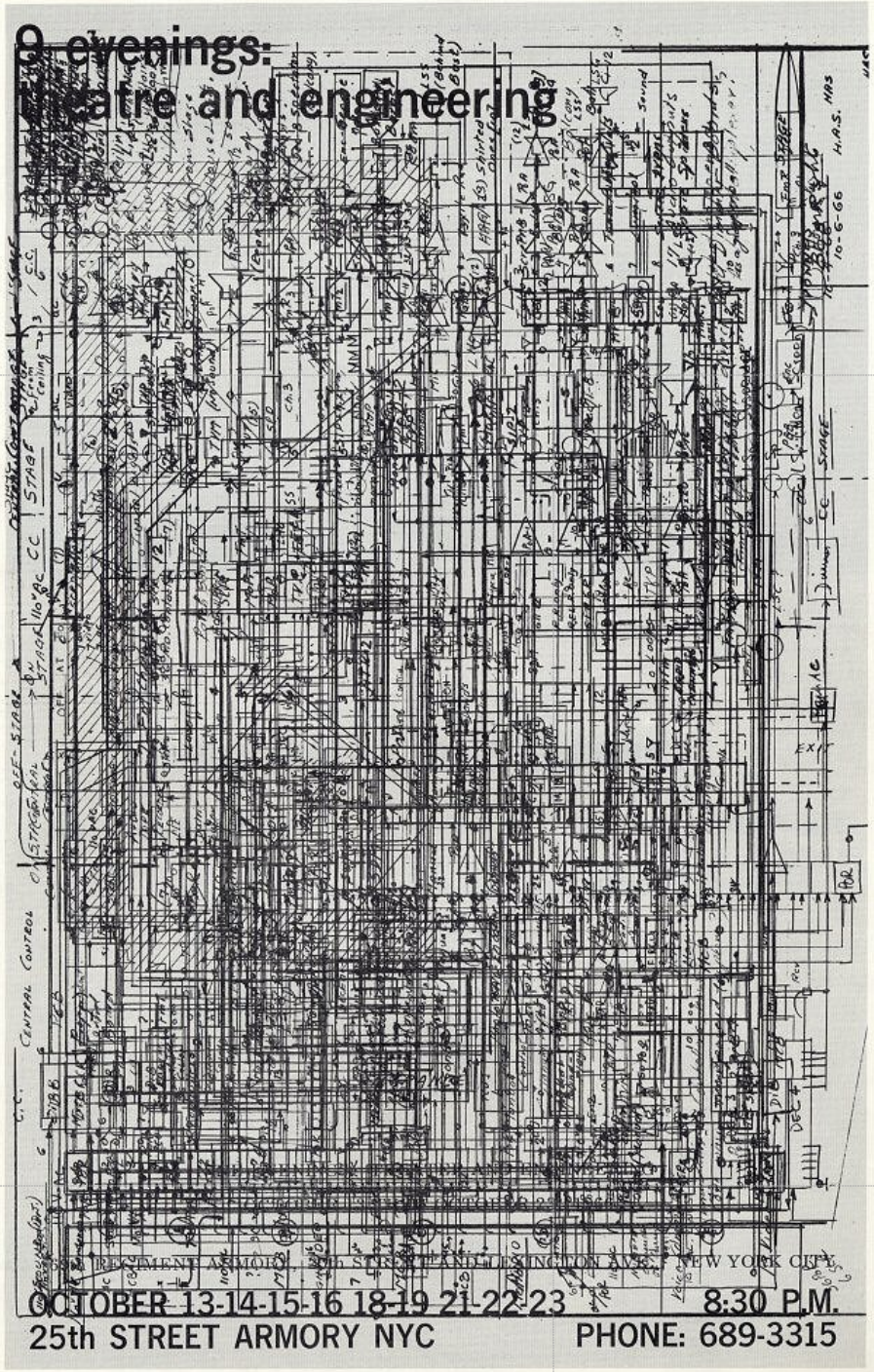
Client: Joan Littlewood, Theatre Director
Cybernetics: Gordon Pask



"Choose what you want to do – or watch someone else doing it. Learn how to handle tools, paint, babies, machinery, or just listen to your favourite tune. Dance, talk or be lifted up to where you can see how other people make things work. Sit out over space with a drink and tune in to what's happening elsewhere in the city. Try starting a riot or beginning a painting – or just lie back and stare at the sky."



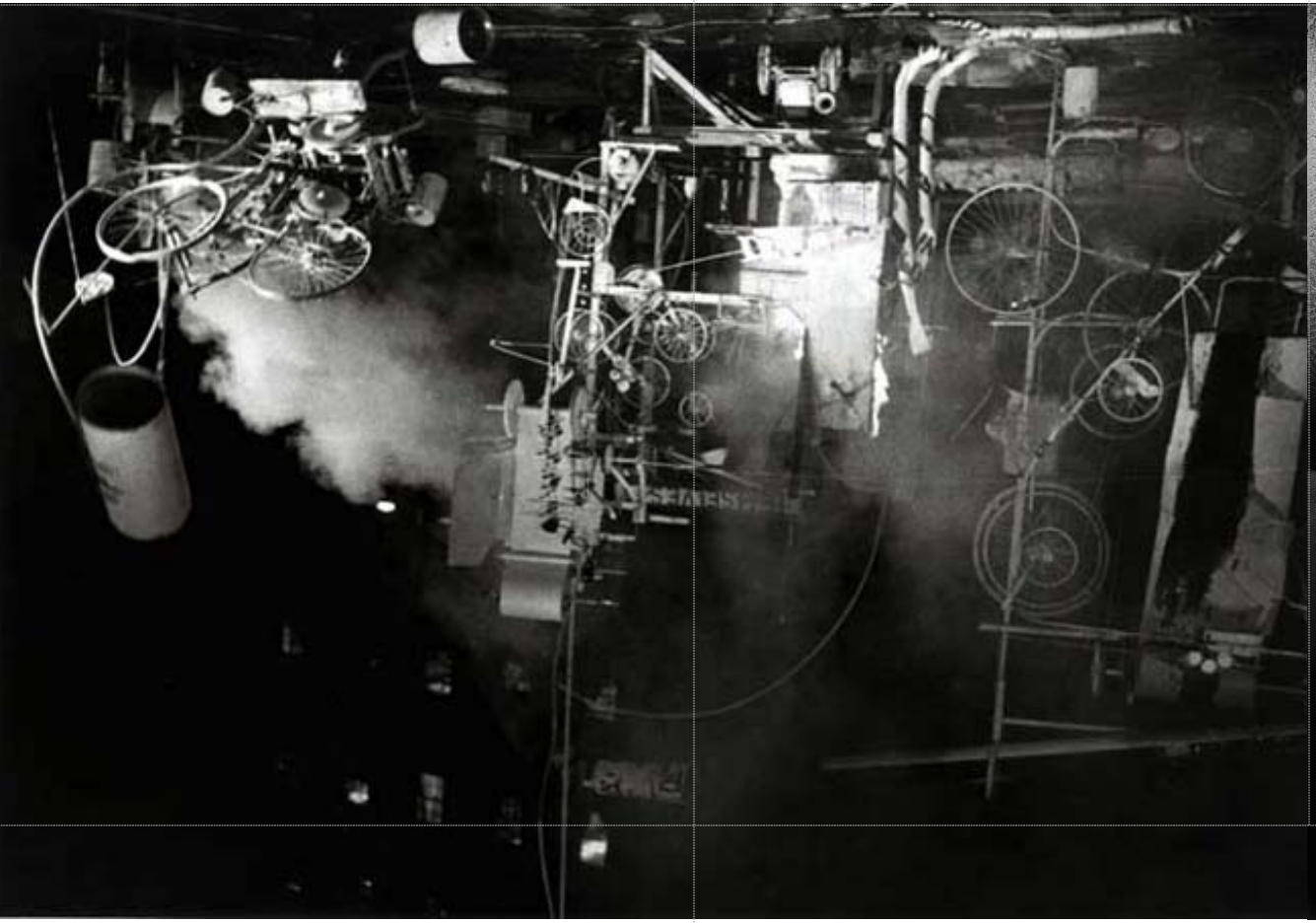
9 evenings: theatre and engineering



25th REGIMENT ARMORY, 26th STREET AND LEXINGTON AVE., NEW YORK CITY

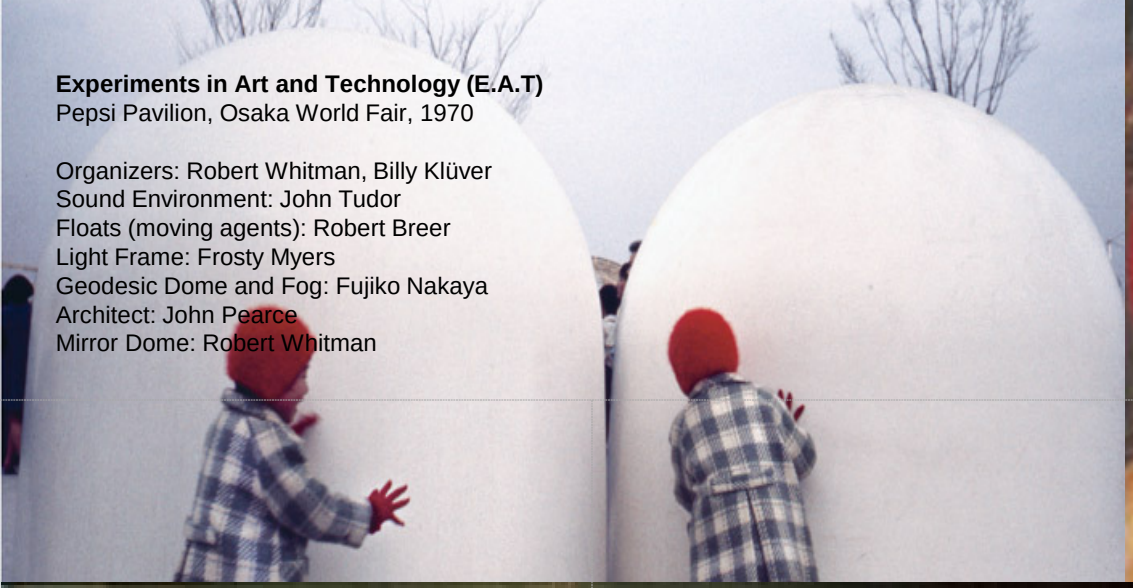
OCTOBER 13-14-15-16 18-19 21-22-23 8:30 P.M.

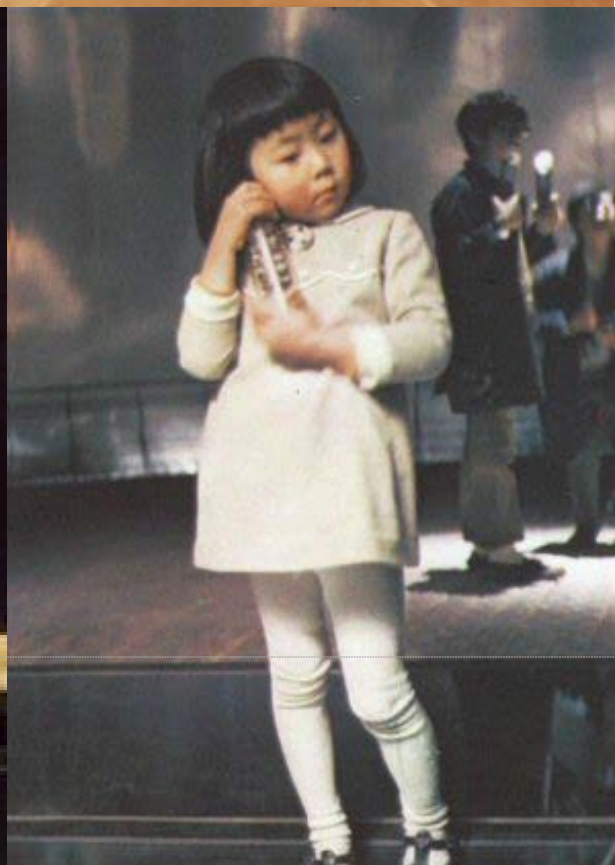
25th STREET ARMORY NYC PHONE: 689-3315



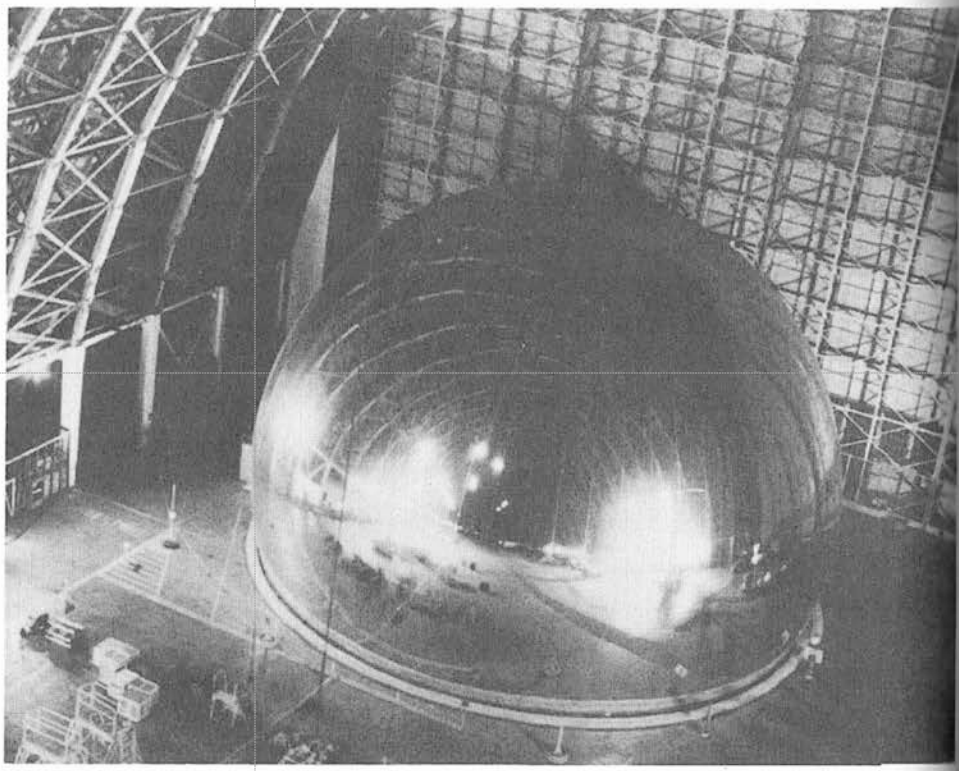
Experiments in Art and Technology (E.A.T)
Pepsi Pavilion, Osaka World Fair, 1970

Organizers: Robert Whitman, Billy Klüver
Sound Environment: John Tudor
Floats (moving agents): Robert Breer
Light Frame: Frosty Myers
Geodesic Dome and Fog: Fujiko Nakaya
Architect: John Pearce
Mirror Dome: Robert Whitman

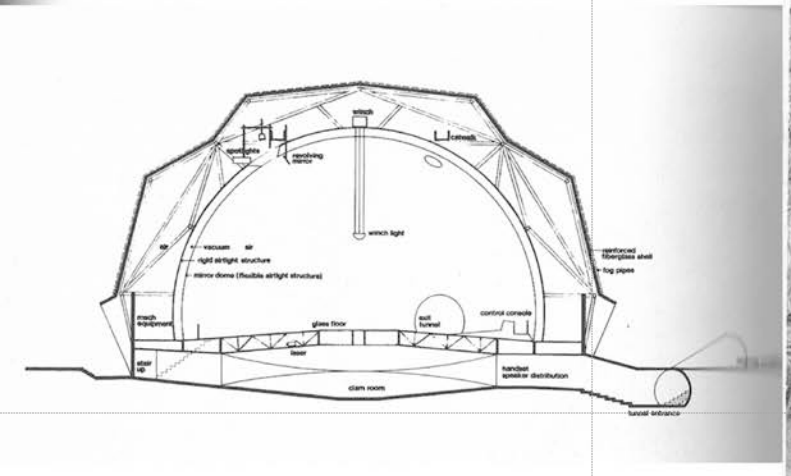


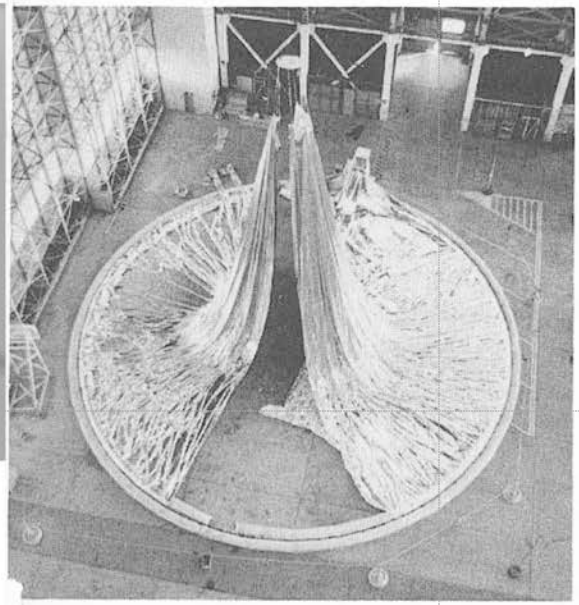


Mounting polyvinyl chloride panels, summer, 1969.



Full-scale model of the mirro
installed at Marine Corps Ai
Station, Santa Ana, California, September
1969. Photo: David McDermott

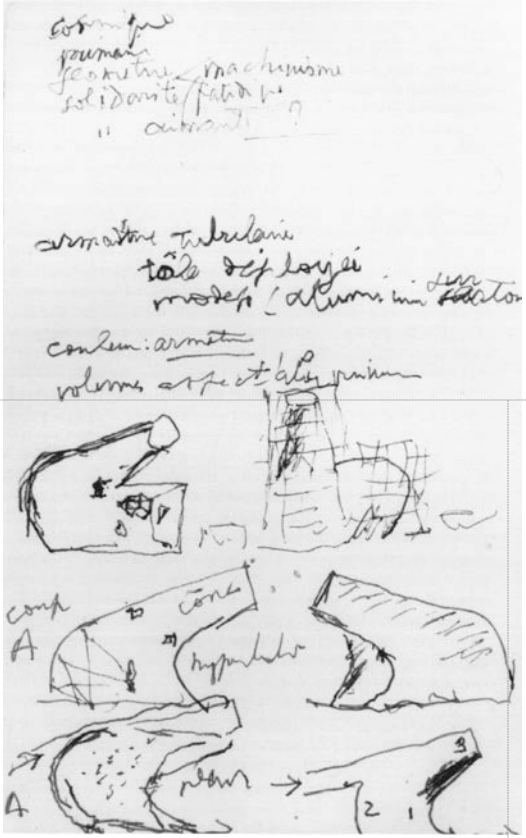


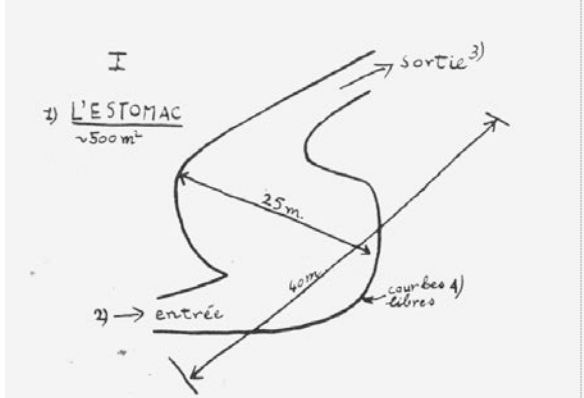


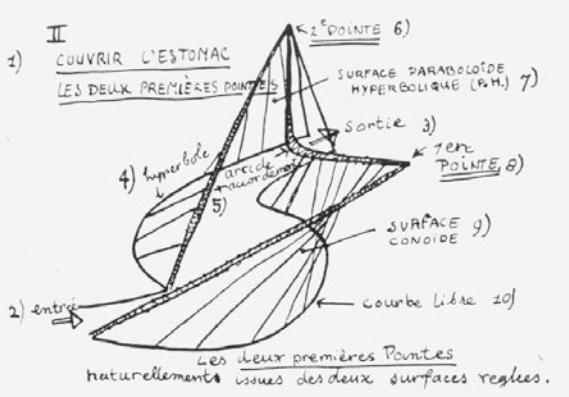
After initial tear.
Photo: David McDermott:

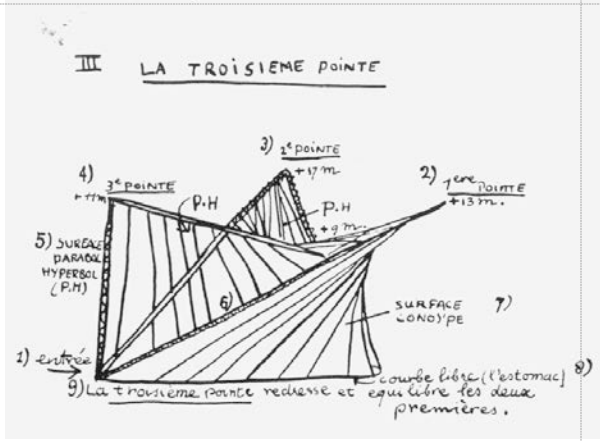
Le Corbusier
Philips Pavilion, Brussels World Fair, 1958
“Poème électronique”

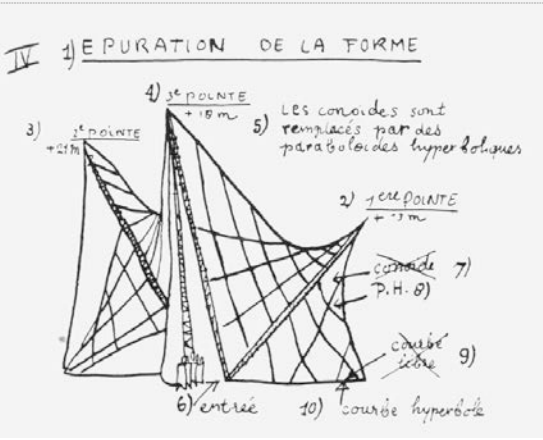
Sound Environment: Edgard Varèse
Designer: Iannis Xenakis
Film: Philippe Agostini
Graphic Design: Jean Petit
Structural Engineer: Hoyte Duyster











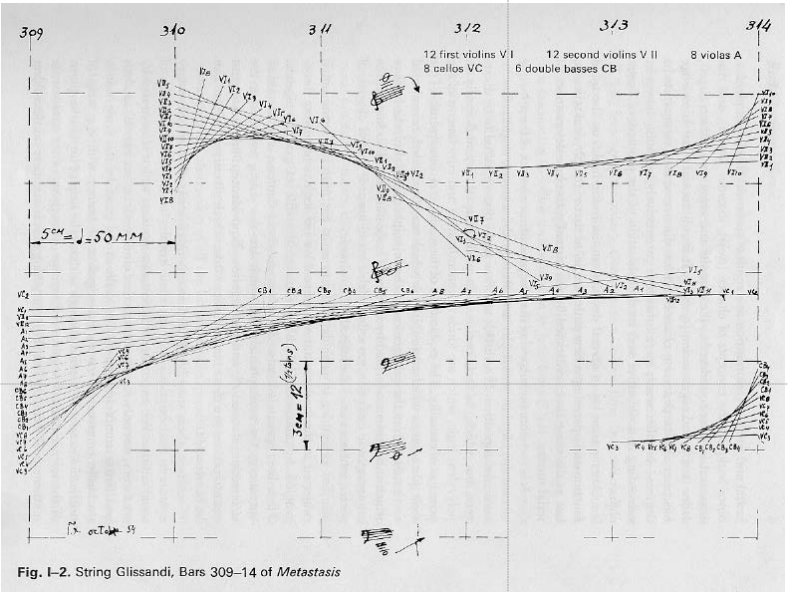
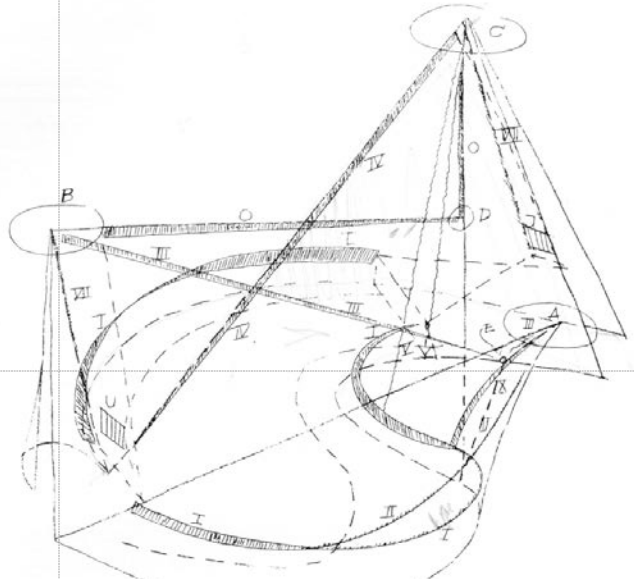
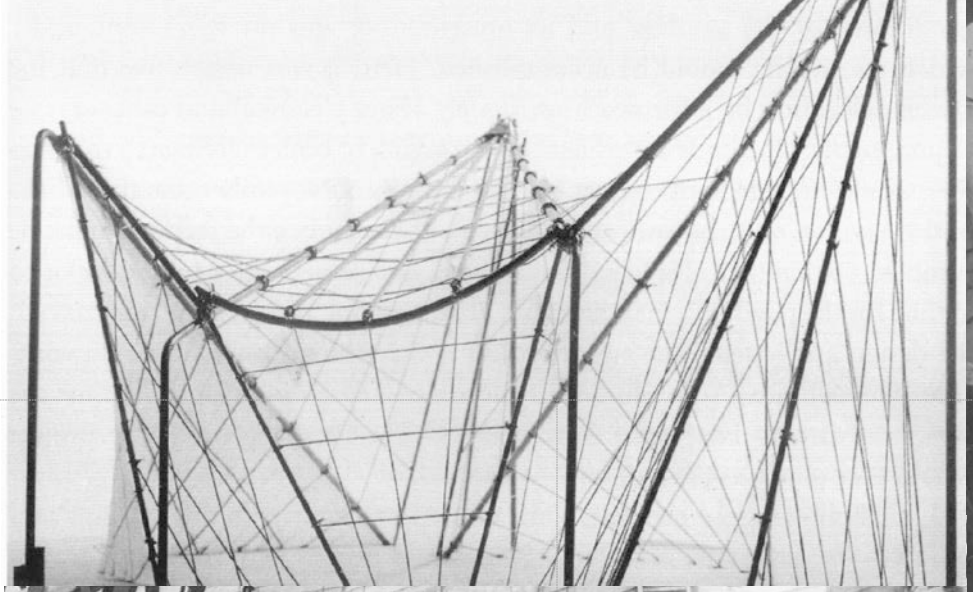


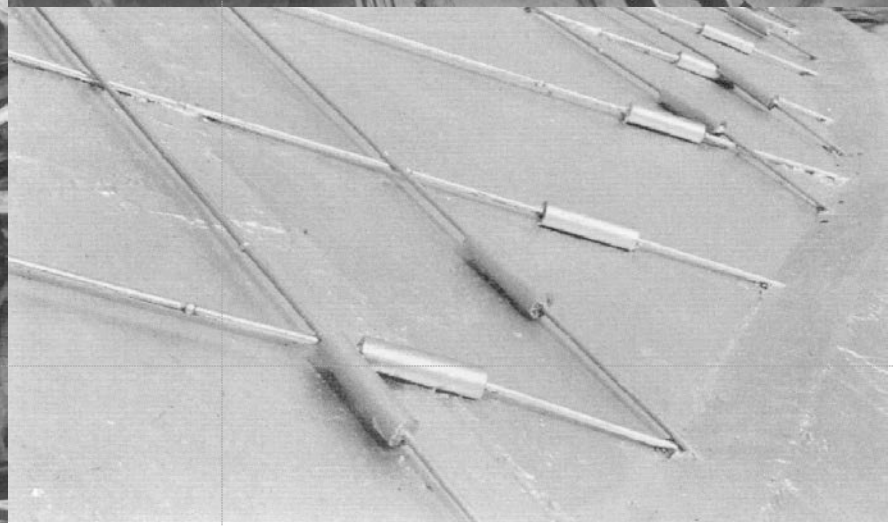
Fig. I–2. String Glissandi, Bars 309–14 of *Metastasis*

5-15
Diagram of the "Sound Routes." Iannis Xenakis. [*Philips Technical Review*]

Route I horizontal
II I ▸A
III B ▸E ▸A
IV U ▸C
O B ▸D ▸C
VI along the warped surface
VII B ▸U
VIII C ▸J
IX A ▾







Séc	Volumes Mat	Volumes Pos	Durées Notes	Durées Vision	Durées Différence	Séc	Tritons	Paroles
81				Les quatre suivants	T.113	81	Les quatre suivants dans les trous éclairés en couleur bleu et rouge.	
82						82		
83						83		
84			Toutes ces têtes seront animées, c'est-à-dire qu'il faut à tout prix éviter la monotonie et la lenteur. Cela doit être vivant	Tête de nègre Congo	T.114	84		
85				Tête de nègre Maori	T.116	85		
86				Tête de nègre Mayogo	T.117	86		
87				Tête de fille Kabyle	T.118	87		
88				Courbet: femme couchée MAL 27	D.121	88	Les tritons en couleur bleu et rouge.	
89				Art Attique MAL 19	D.124	89		
90				Art Soudrien MAL 11	D.125	90		
91				Egypte MAL 68	D.128	91		
92				Dame d'Amécho MAL 94	D.130	92		
93				Art Soudrien MAL 11	D.125	93		
94				Odeur MAL 171	D.133	94		
95				Art Celtique MAL 212	D.135	95		

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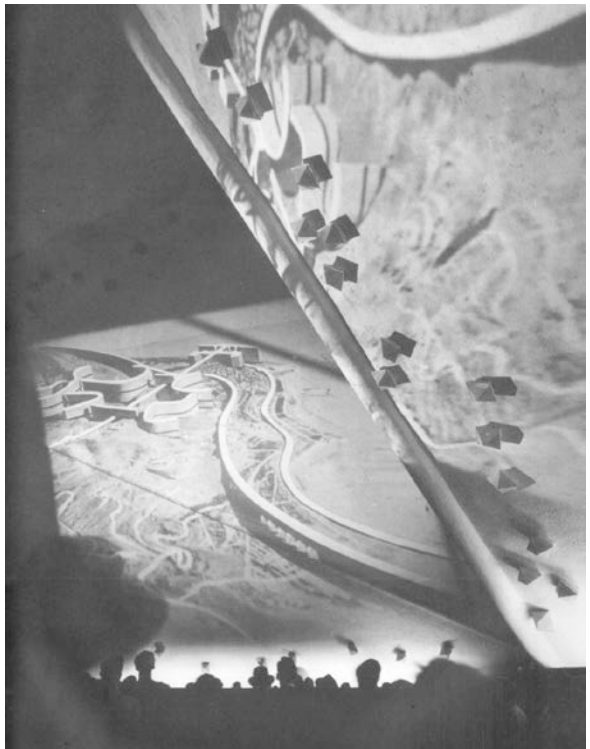

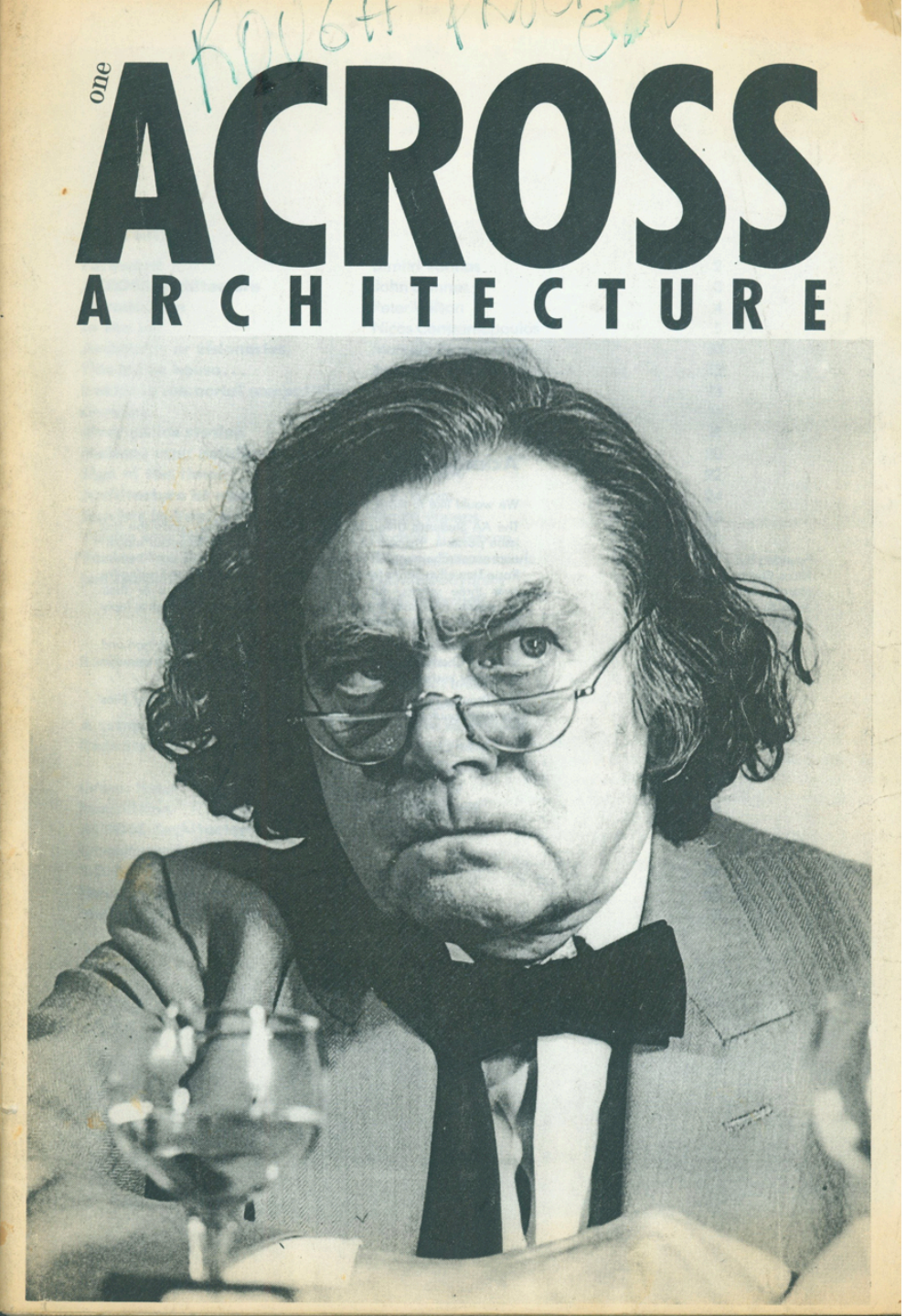

The revolution was cybernetics, a transdisciplinary field of research and theory that, in the 60s, 70s, and 80s, changed the way we think about both knowledge and information, and how they are communicated between individuals and social groups. It enabled the advent of 'the Information Age,' and paved the way for the use of the computer in every aspect of daily life, including the Internet.

While the direct impact of cybernetics on architecture has so far been limited to concepts of 'virtual reality,' 'intelligent buildings,' and 'simulacra,' its indirect impact has been enormous in the use of the computer as a tool of architectural design, representation, communication, and education.

During the period of cybernetics' development, the Architectural Association in London was at the center of the effort to apply its ideas and methods to architecture, primarily in the efforts of Peter Cook, the founder of Archigram. Gordon Pask was very much involved in discussions at the AA, along with Cook, Dennis Crompton, Michael Webb, and Cedric Price, (all under the direction of Alvin Boyarsky), about how architecture could become one of the 'trans'—'across'—disciplines embraced by cybernetics. The photo of Pask above is from the cover of one of many magazines published at the AA during this period of intense intellectual and artistic ferment.

I met Gordon Pask on several occasions, most memorably when I was giving a lecture at the AA on Einstein's ideas of space and time, when he abruptly came to the lectern and finished my lecture—with corrections, of course!

LW

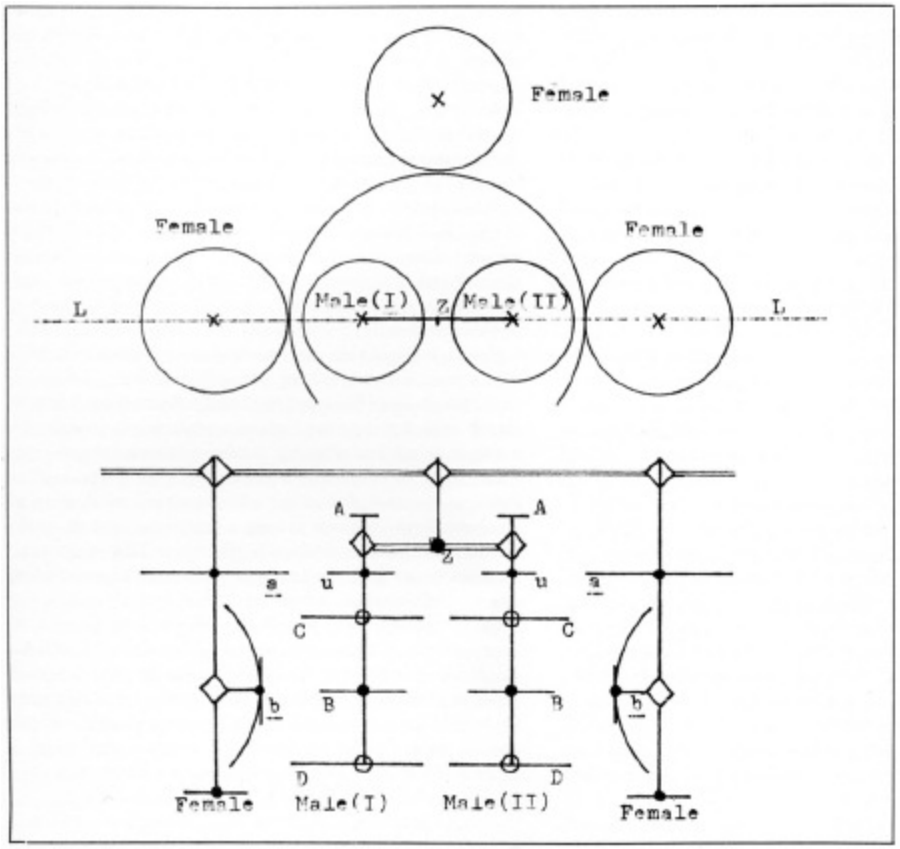

Fig. 34 A rough sketch of powered mobiles.
a Horizontal plan
b Vertical section taken through line *L* in horizontal plan.
A = drive state display for male
B = main body of male, bearing 'energetic' light projectors *O* and *P*
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D = lower 'energetic' receptors
U = non-'energetic', intermittent signal lamp
a = female receptor for intermittent positional signal
b = vertically movable reflector of female
Z = bar linkage bearing male I and male II

= Drive motor
= Free coupling
= Fixed coupling
= Bar linkage

The Colloquy of Mobiles»

The English cyberneticist Gordon Pask conceived the «Colloquy of Mobiles» for the 1968 exhibition «Cybernetic Serendipity» held at the ICA in London. It was a reactive, educable, computer-based system composed of five mobiles. By way of light and sound, the rotating elements suspended from the ceiling communicated with each other, independent of external influences. Using flashlights and mirrors, the people at the exhibition could nevertheless take part in the conversation between the machines. With this installation, Pask brought to a conclusion his idea for an «aesthetic potential environment».

To give significance to the communication between the machines, Park designed the «Colloquy of Mobiles» as a social system. At the same time, the form of communication that he conceived referred unmistakably to a sexual analogy: hung from the ceiling were two «males» and three «females». After a phase of inactivity, the females (made of fiberglass) began to glow more intensely and the three males emitted a ray of light. When the ray of light struck the mirror inside the female mobile's structure, by way of rotating the mirror, she tried deflecting the ray back at the free-hanging light sensors above and below the male's aluminum body. The goal of communicating was to achieve this moment of satisfaction, and the mobiles learned to optimize their behavior to the point where this state could be reached with the least possible use of energy. With the help of flashlights and mirrors, the exhibition visitors could assume the roles of the mobiles and influence the learning process

Cybernetic Serendipity

Serendipity

Serendipity

the faculty of making happy chance discoveries by means of control and communication machines both human and electronic

An exhibition

and other serendipitous manifestations

Institute of Contemporary Arts

August 2 – October 20

CYBERNETIC SERENDIPITY LECTURES

Thursday August 8

Tuesday August 13

Thursday August 15

Tuesday August 20

Tuesday August 27

Tuesday September 3

Thursday September 5

Tuesday September 10

Thursday September 12

Thursday September 19

Tuesday September 24

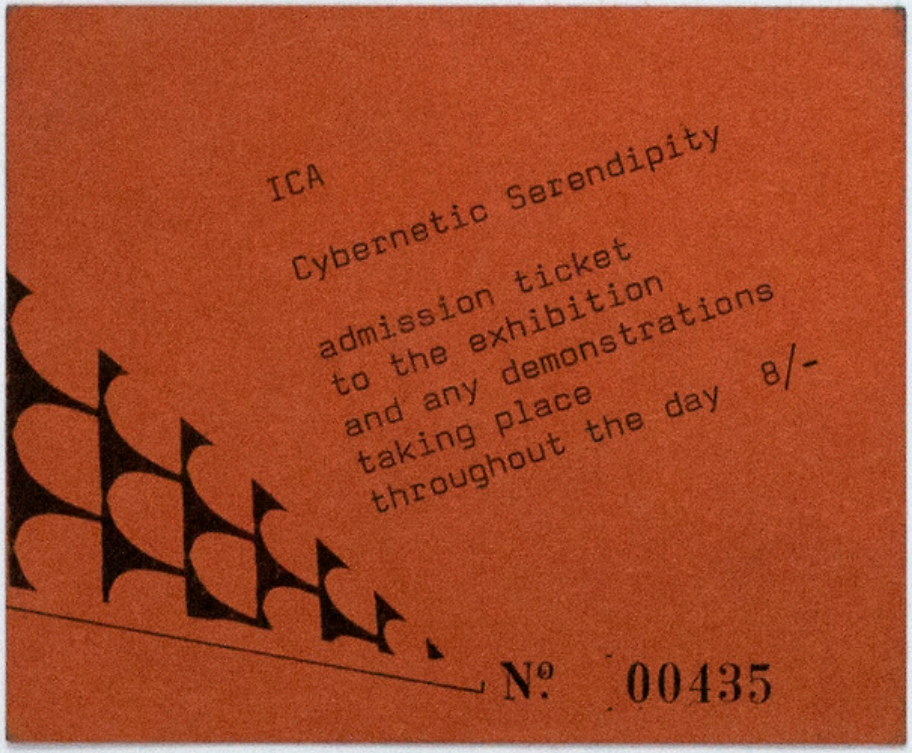
Thursday September 26

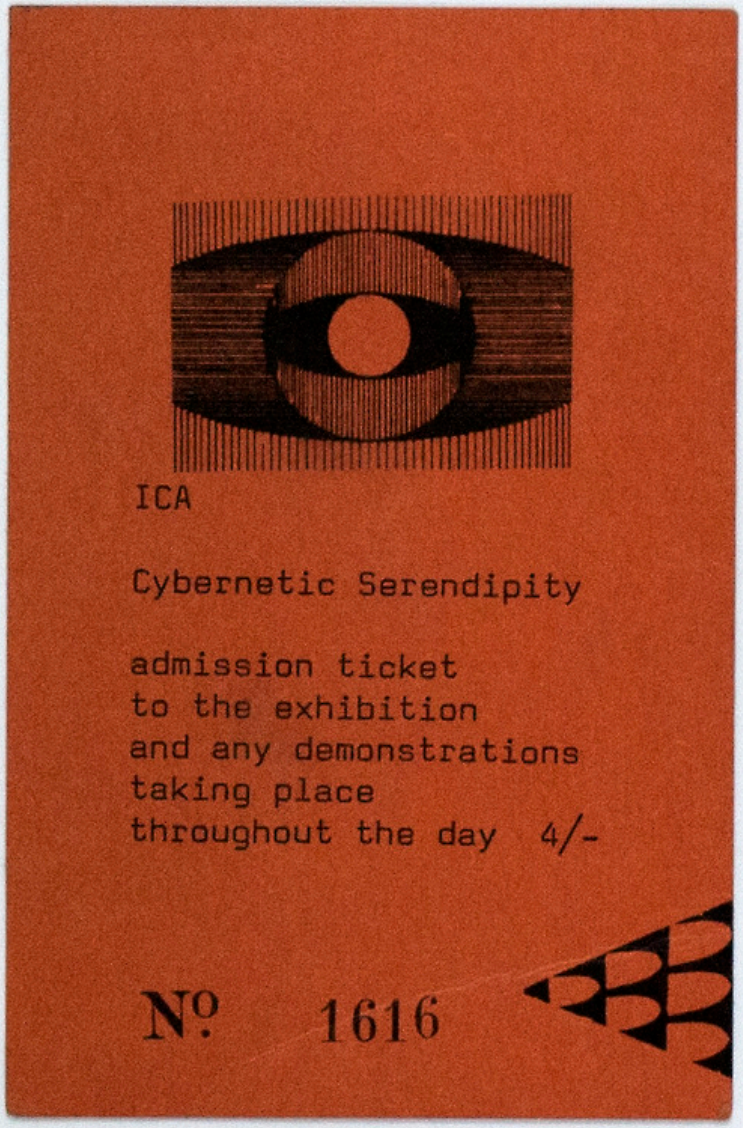
Tuesday October 1

Tuesday October 8

Thursday October 10

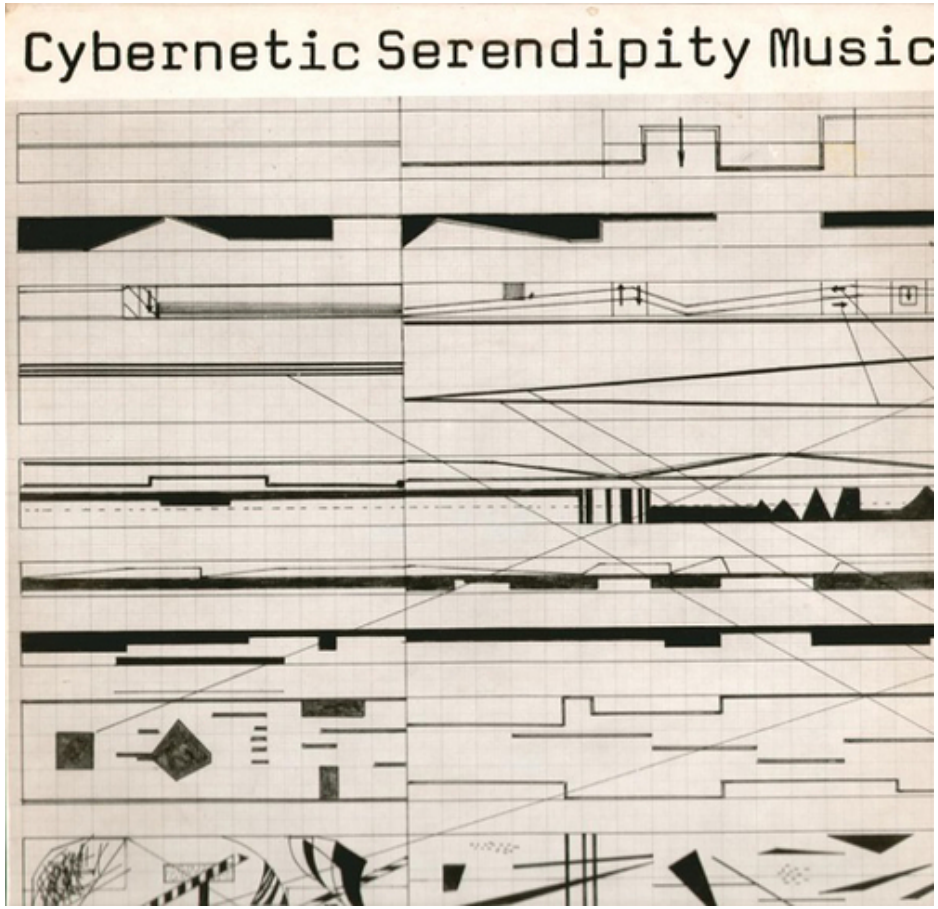
Thursday October 17





"Cybernetics - derives from the Greek «kybernetes» meaning «steersman»; our word «governor» comes from the Latin version of the same word. The term cybernetics was first used by Norbert Wiener around 1948. In 1948 his book «Cybernetics» was subtitled «communication and control in animal and machine.» The term today refers to systems of communication and control in complex electronic devices like computers, which have very definite similarities with the processes of communication and control in the human nervous system. A cybernetic device responds to stimulus from outside and in turn affects external environment, like a thermostat which responds to the coldness of a room by switching on the heating and thereby altering the temperature. This process is called feedback. Exhibits in the show are either produced with a cybernetic device (computer) or are cybernetic devices in themselves. They react to something in the environment, either human or machine, and in response produce either sound, light or movement. Serendipity – was coined by Horace Walpole in 1754. There was a legend about three princes of Serendipity (old name for Ceylon) who used to travel throughout the world and whatever was their aim or whatever they looked for, they always found something very much better. Walpole used the term serendipity to describe the faculty of making happy chance discoveries. Through the use of cybernetic devices to make graphics, film and poems, as well as other randomising machines which interact with the spectator, many happy discoveries were made. Hence the title of this show."
from the exhibition press release, ICA London, 1968.

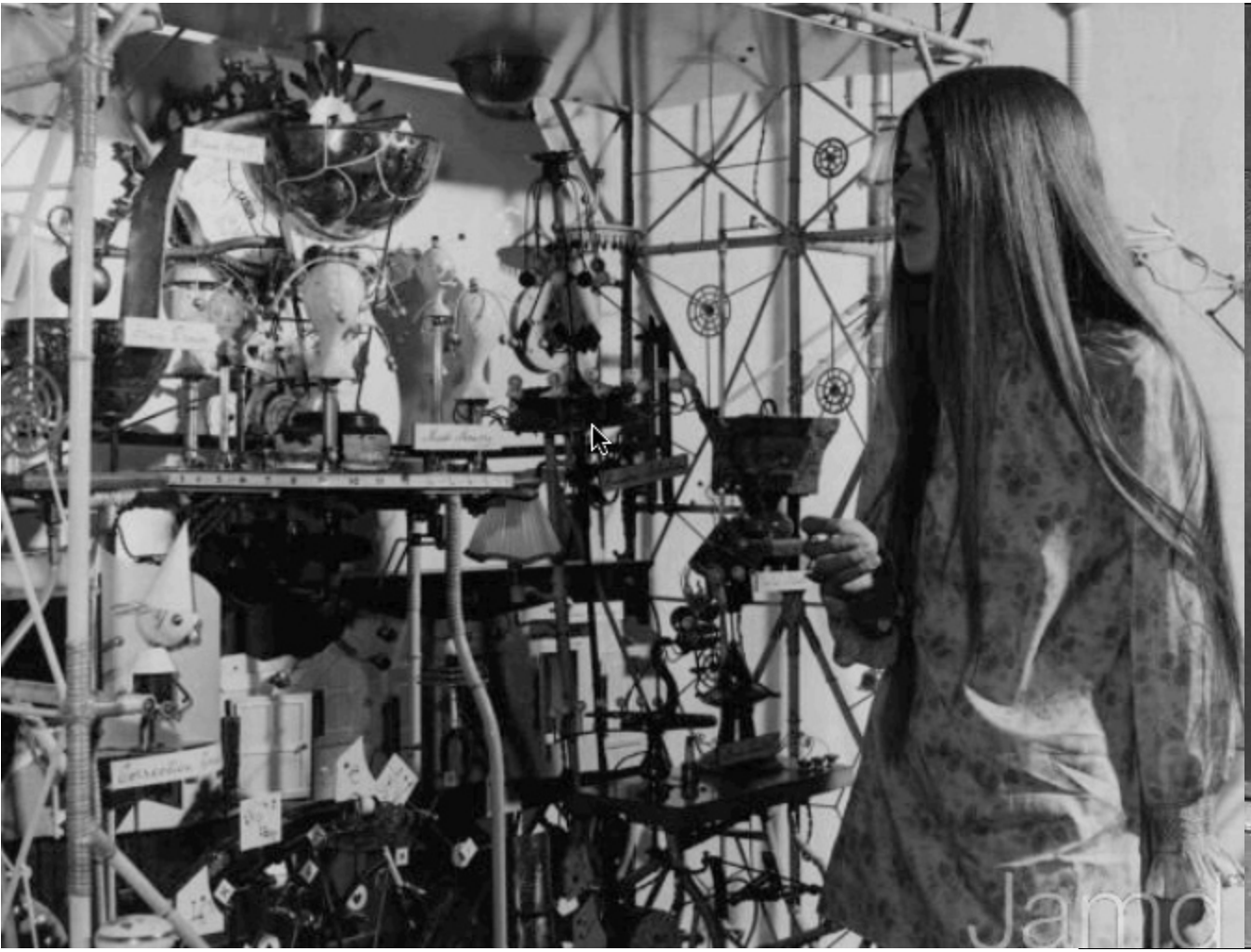
"I can't imagine *Artforum* ever doing a special issue on electronics or computers in art, but one never knows."
Philip Leider, editor of *Artforum*, 1967



ICA01
A1 Lajaren Hiller & Leonard Isaacson – Illiac Suite (Experiment 4). 1957, 4 minutes, Mono.
A2 John Cage – Cartridge Music (excerpt). 1960, 5 minutes, Stereo.
A3 Iannis Xenakis – Strategie (excerpt). 1962, 5 minutes, Stereo.
A4 Wilhelm Fucks – Experiment Quatro-Due. 1963, 5 minutes, Mono.
A5 J.K. Randall – Mudgett (excerpt). 1965, 7½ minutes, Stereo.
ICA02
B1 Gerald Strang – Compusition 3. 1966, 2½ minutes, Mono.
B2 Haruki Tsuchiya – Bit Music (excerpt). 1967-1968, 2⅜ minutes, Stereo.
B3 T.H. O'Beirne – Enneadic Selections. 1968, 4¼ minutes, Mono.
B4 Peter Zinovieff – January Tensions. 1968, 10½ minutes, Stereo.
B5 Herbert Brün – Infraudibles. 1967, 8 ½ minutes, Stereo.

This record was made to celebrate and commemorate the Cybernetic Serendipity exhibition held at the ICA, London, 1st August to 20th October 1968.
During the preparation of the Cybernetic Serendipity exhibition two things became apparent.
One, that in order to show what was going on in the field computer music, it was necessary to include a considerable amount of material that was not strictly composed with or played by computer. Two, that dealing with an exploratory field, all attempts at a historical perspective or firm evaluation were out of place. The exhibition and this record, therefore, are essentially a reportage of current trends and developments in programmed and stochastic music.
The first landmark in computer composition is Lejaren A. Hiller's 'Illiac Suite', 1957. Many experiments have been carried out before, but these were either exploratory without yielding a tangible music, or were mostly concerned with the technical possibilities of imitating familiar sounds.
Ideas which are relevant to composition with computers were frequently employed in the experimental musical composition of the past thirty years. The work of Joseph Schillinger, for instance, through its systematic analysis and programming, antedates the methods employed by computer composers today. The notion of randomness exemplified in the work of John Cage is also of crucial importance. Randomness (decision avoiding, or more concisely, leaving a decision to chance within an exactly specified range of possibilities) is one of the most important tools of the computer composer.
Computer music falls into two categories: computer composition and computer sound. Specific works may employ one or both of these. 'Illiac Suite' is computer composed but performed by a string quartet. Pieces by James Tenney, Gerald Strang and Peter Zinovieff utilise the computer both as a tool to compose with and a sound-making instrument. The experimental pieces produced at Bell Telephone Laboratories make use of existing tunes like 'A bicycle built for two' but played and sung by a computer.
As a souvenir of the Cybernetic Serendipity exhibition this record is a selection of work in progress.

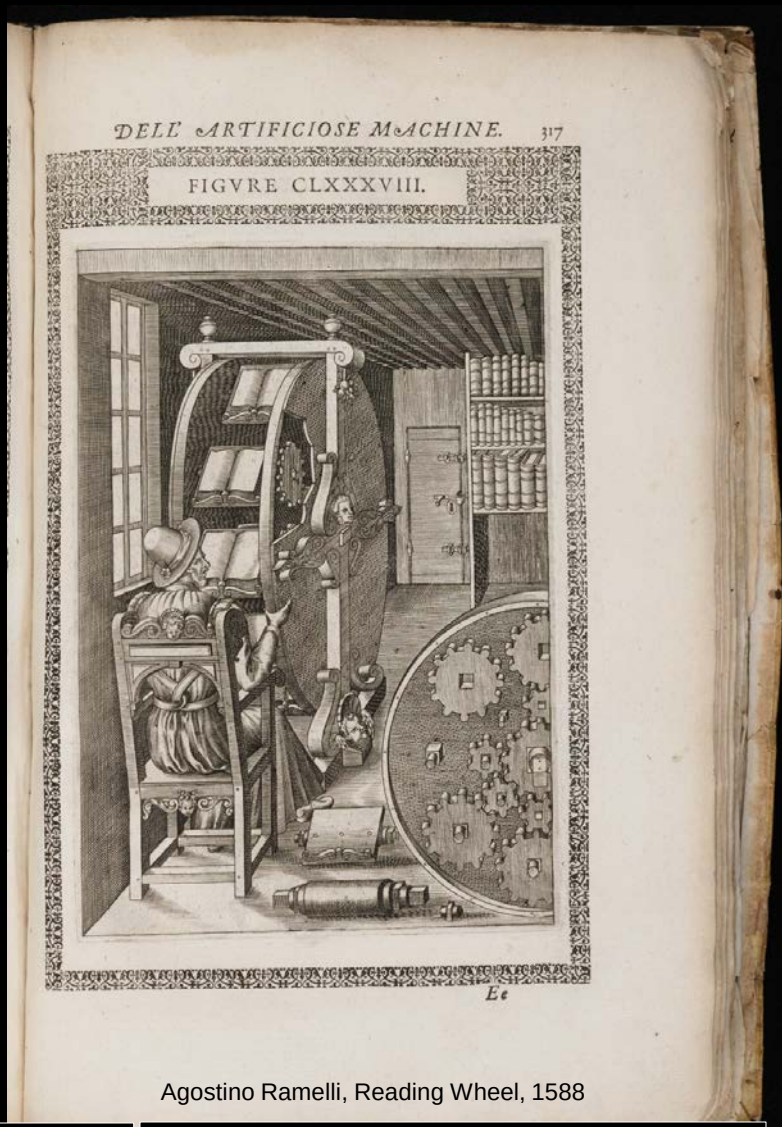
http://ubu.com/sound/cybernetic.html



exhibition view, ICA London 1968.
Rowland Emett's *The Honeywell-Emett Forget-me-not Computer*

Bruce Lacey and Princess Margaret at
Cybernetic Serendipity, ICA London, 1968

Daniel Libeskind, Reading Machine, 1985



Agostino Ramelli, Reading Wheel, 1588

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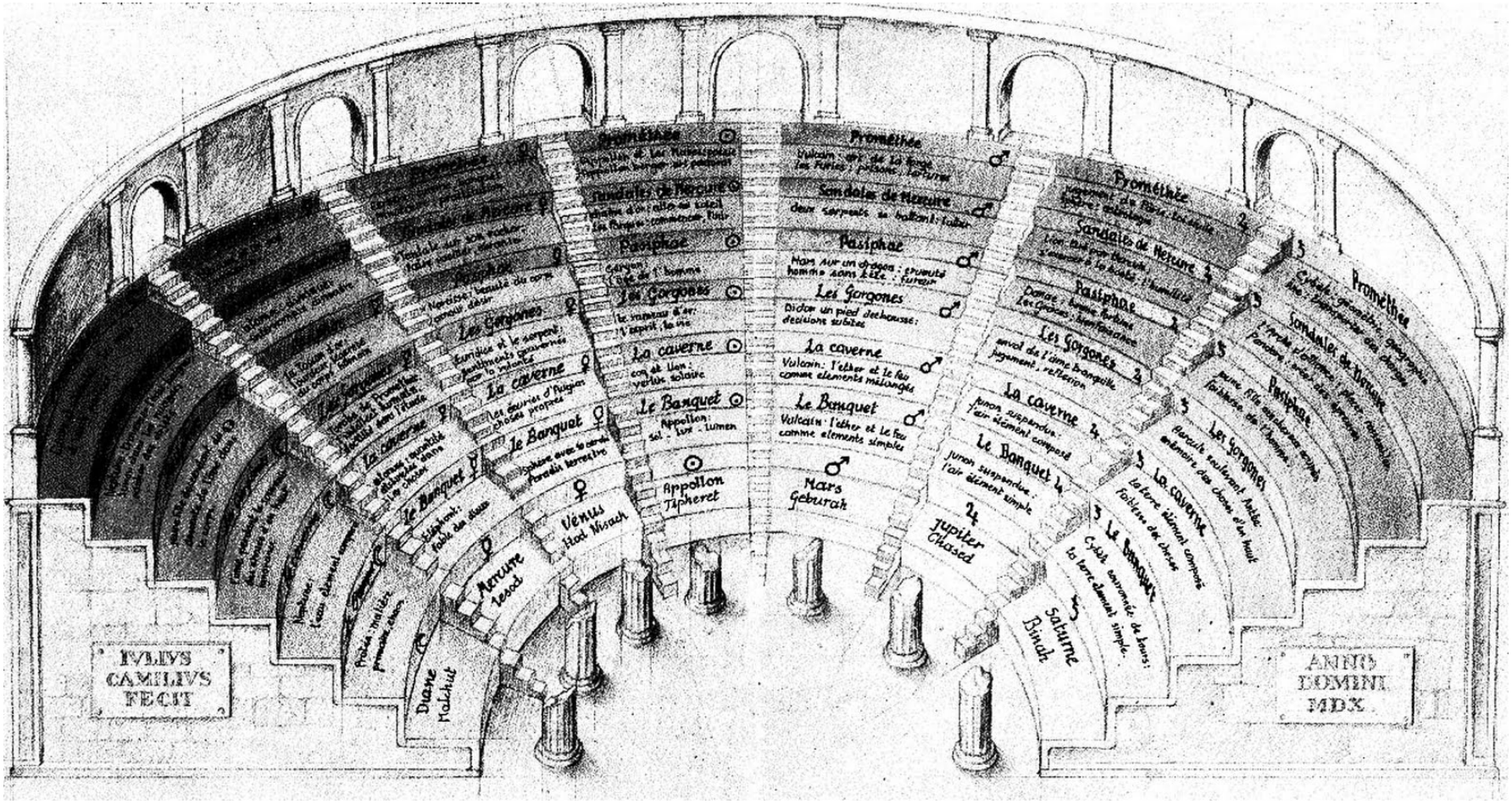

Giulio Camillo, Memory Theatre, 1550

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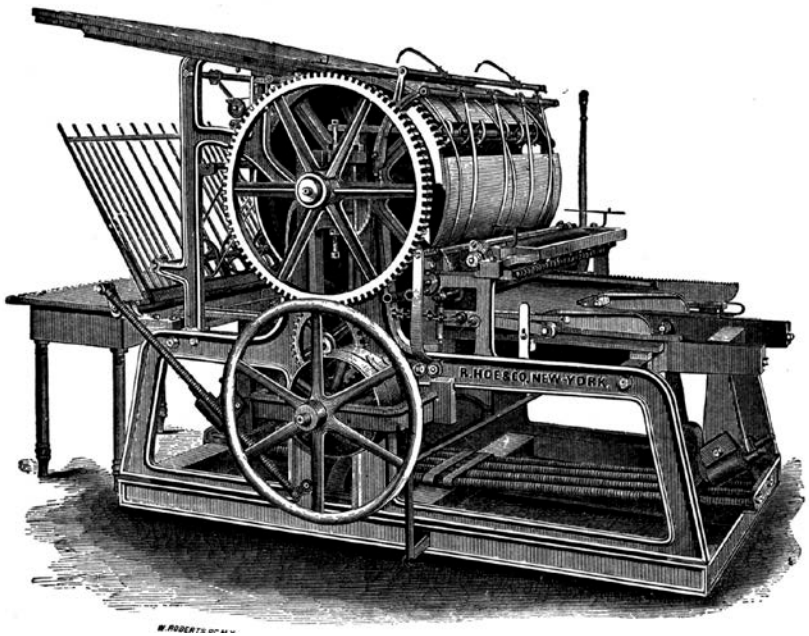
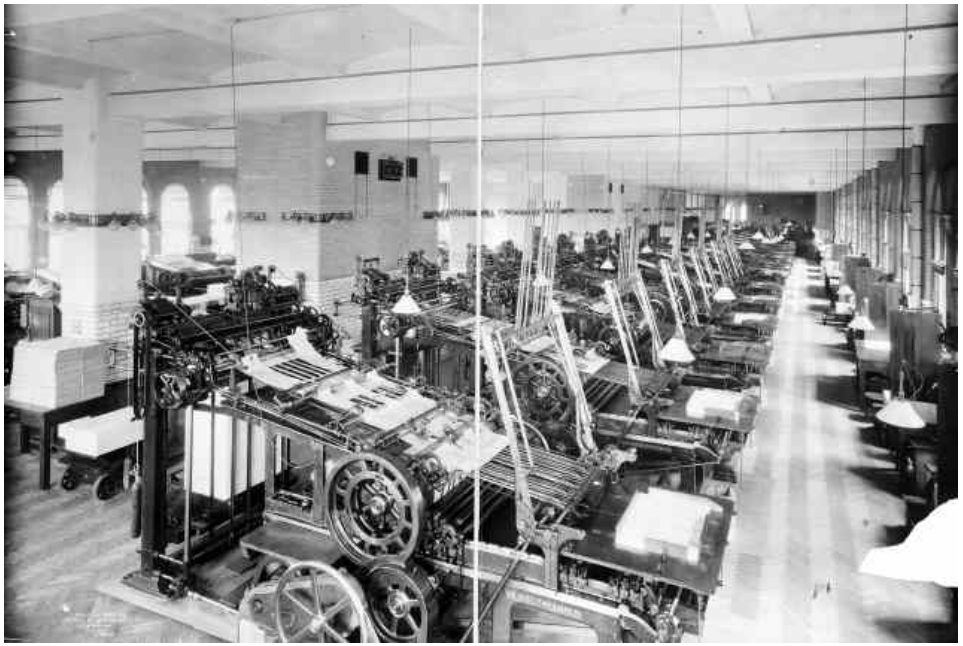
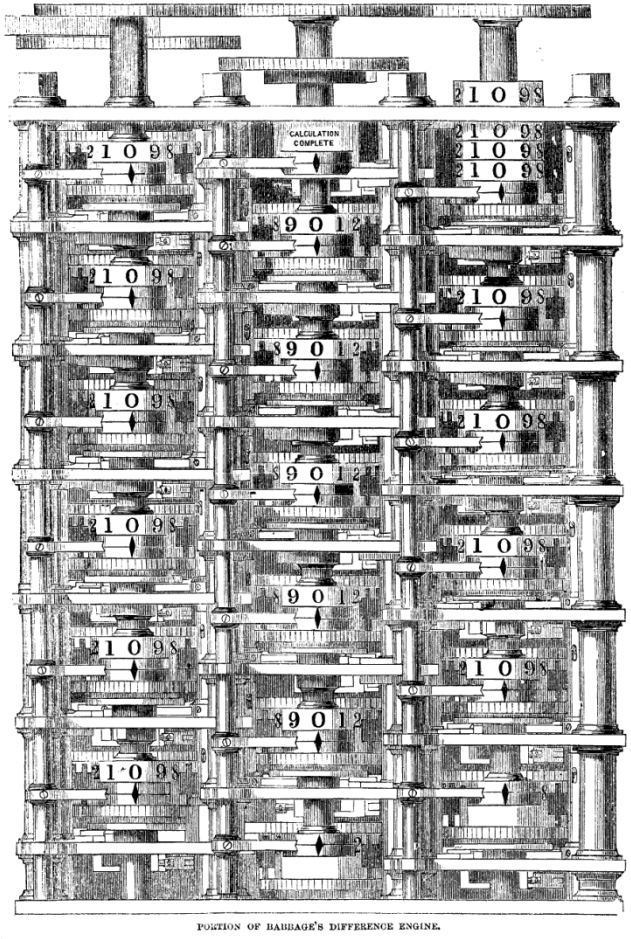


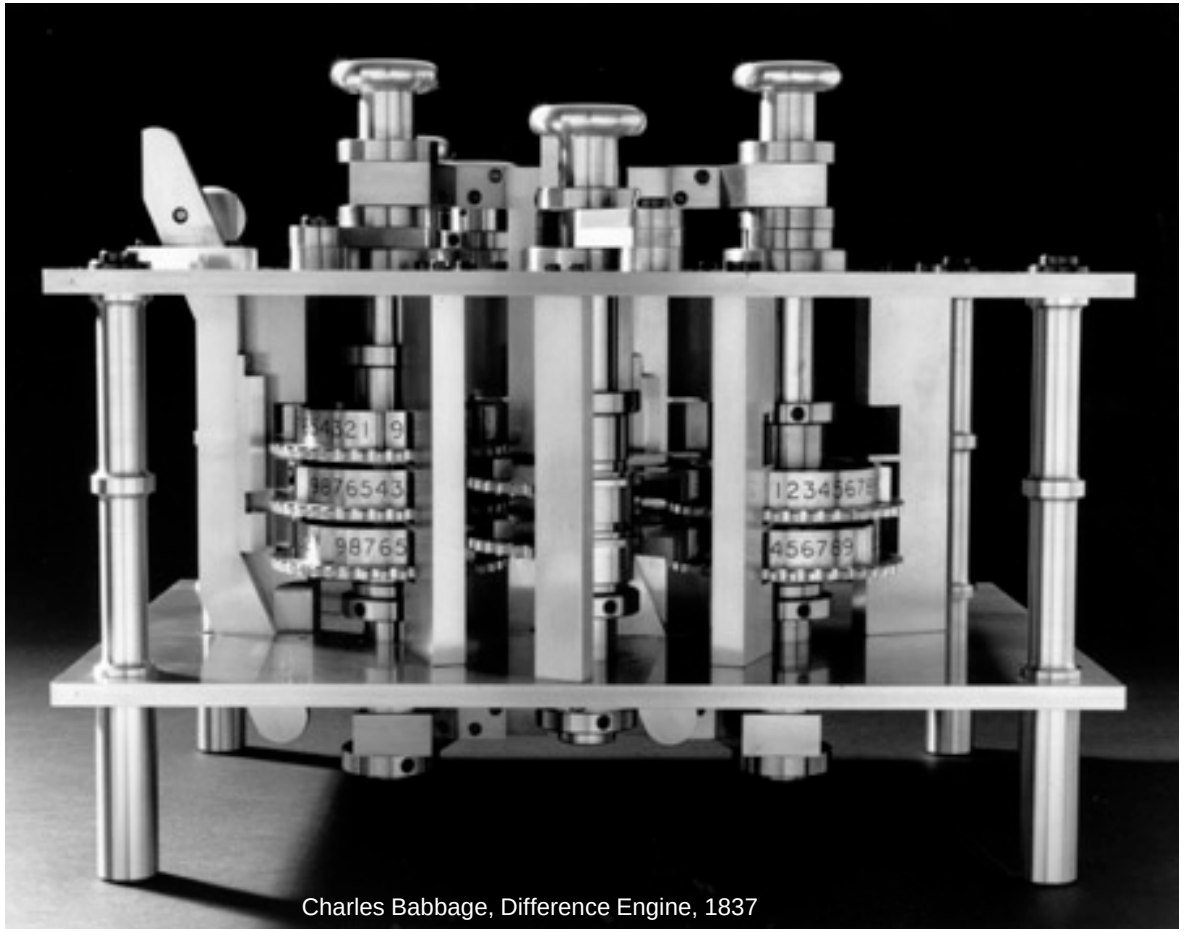


Industrial printing press

Daniel Libeskind, Writing Machine, 1985



PORTION OF BABBAGE'S DIFFERENCE ENGINE.



Charles Babbage, Difference Engine, 1837

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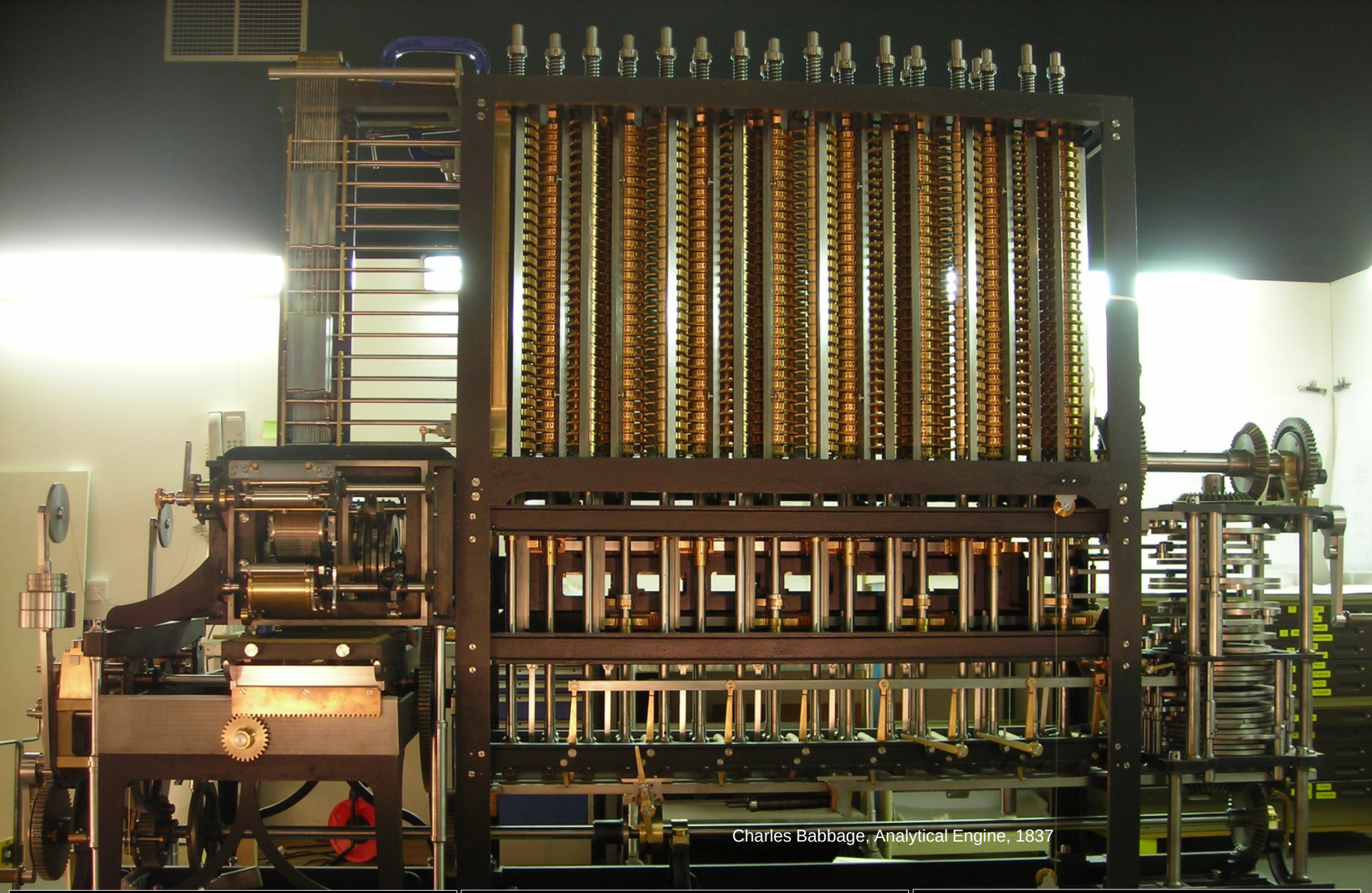

Charles Babbage, Analytical Engine, 1837

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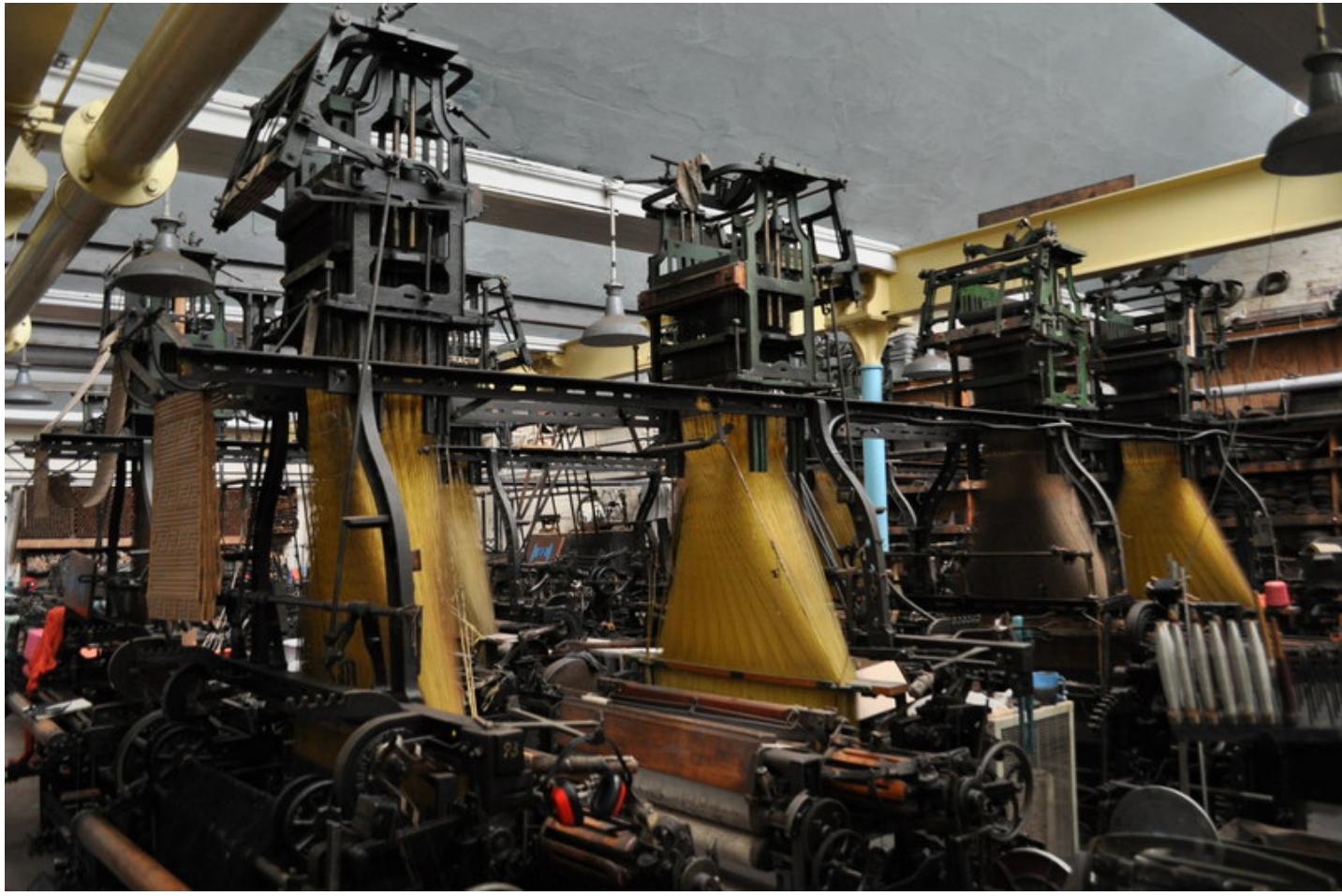

Industrial Loom (Jacquard Loom, 1801)

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From the middle of the eighteenth century, two distinct typologies have informed the production of architecture. The first, developed out of the rationalist philosophy of the Enlightenment, and initially formulated by the Abbe Laugier, proposed that a natural basis for design was to be found in the model of the primitive hut. The second, growing out of the need to confront the question of mass production at the end of the nineteenth century, and most clearly stated by Le Corbusier, proposed that the model of architectural design should be founded in the production process itself. Both typologies were firm in their belief that rational science, and later technological production, embodied the most progressive "forms" of the age, and that the mission of architecture was to conform to, and perhaps even master these forms as the agent of progress.

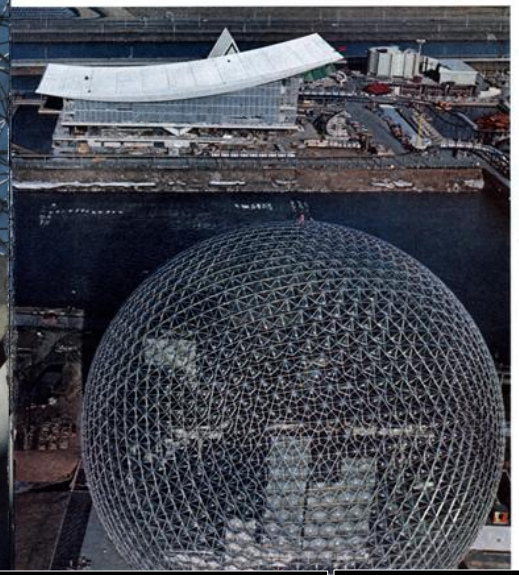
Anthony Vidler, The Third Typology, 1976

LIFE

Vol. 62, No. 17
April 28, 1967

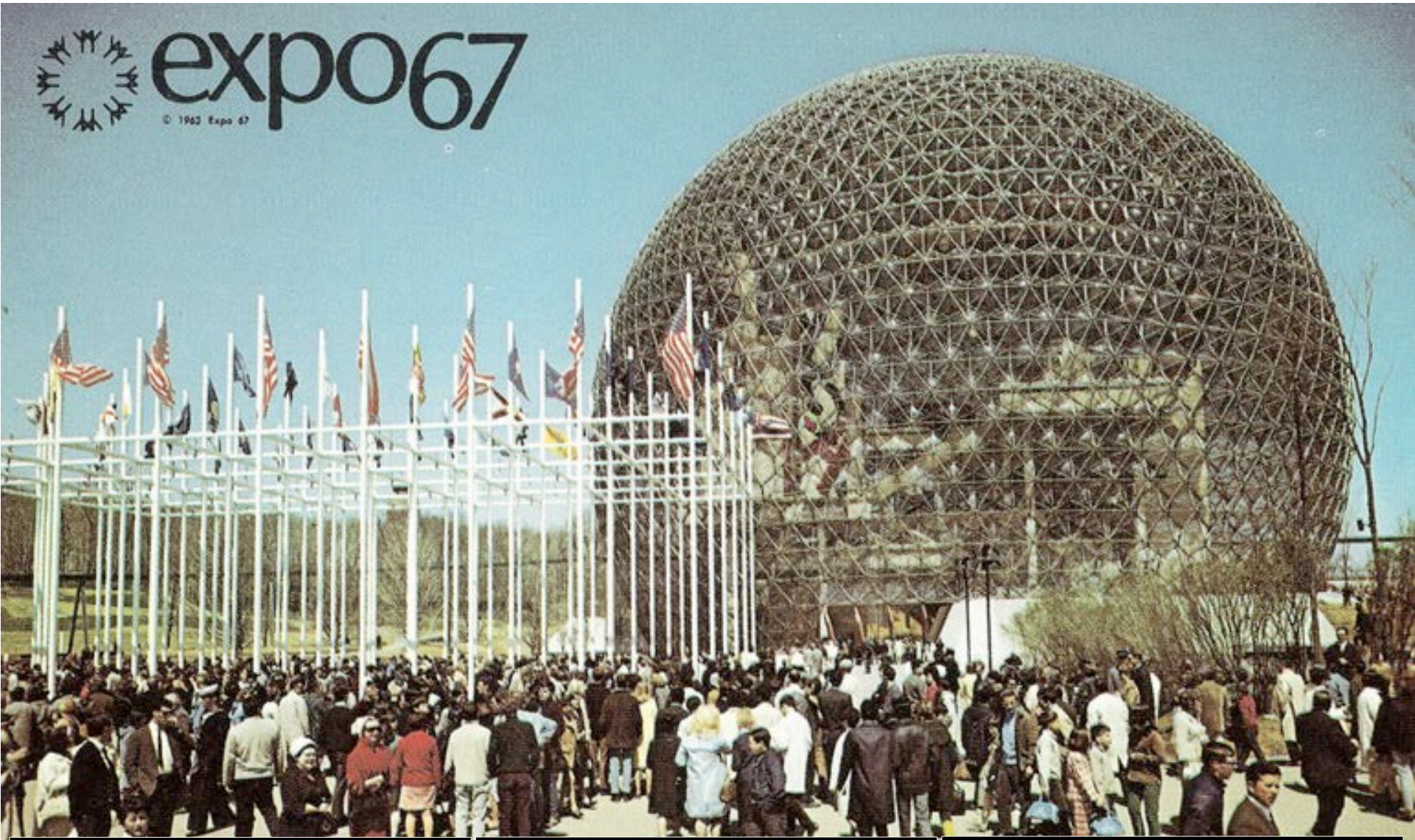
Architecture's Leap into the Future

The U.S. Pavilion (left and in foreground below) is a geodesic dome, draped inside with re-entry parachutes designed for the Apollo program. Below the Apollo capsule are molds of the seats occupied by Astronauts Shepard and Carpenter during their space flights. Russian Pavilion (in background below) contains a model of Yuri Gagarin's capsule. At right, beyond Expo's sign, is the Montreal skyline.



It could have been the imagery of a mad poet or a god. A transparent bubble flung up by the U.S. breaks the sky 20 stories high, and across the way the Russians have hung walls of glass on a ski jump of a roof. The architecture of Expo 67, Montreal's world's fair which opens this week, is a stunning leap into tomorrow. The West Germans came with a tent you could lose a small town in and draped it over giant poles. The British gaily cantilevered exhibitions far out over a yawning moat. In all ways, Expo, which cost $1 billion, turns out to be the biggest show ever. Queen Elizabeth is coming, and so too are the Bolshoi Opera and Olivier and La Scala and Dietrich. Wise visitors will not wait for the crowds to thin out. On the principle that a good show leaves them shouting for more, Montreal has decided there will be no Expo 68.

Photographed by



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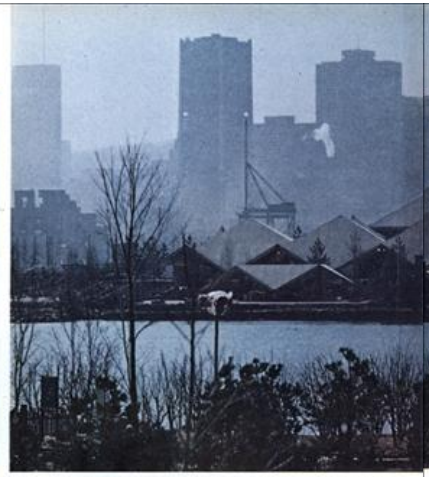
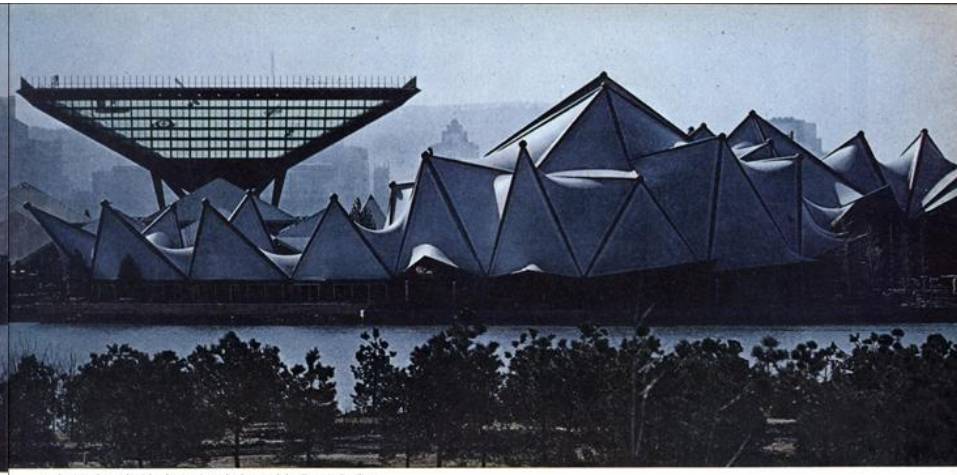
Replicas of ancient monuments at Ethiopian Pavilion



Canada's symbol is an inverted pyramid called "Katimavik"—Eskimo word for



gathering place—beside plastic triangular facets of the Ontario Pavilion

Red-domed "People Tree" near Katimavik has 500 picture leaves

Ornate tiles cover fluted facade of Iran's pavilion

Abstract sculpture at French Pavilion

Japan's pavilion of jutting beams

A skyline of amazing shapes

Pavilion of Quebec Province is light-reflecting glass box

Expo occupies two islands in the St. Lawrence, connected by bridges (right). There are 63 national pavilions, far more than any other fair has assembled. Some of the most striking are pictured on these pages.

mission is inexpensive and the average visitor will spend less than $5 daily inside the gates. Because a train will transport him around the grounds without charge, his feet will pain him less than at any other major fair in

puters will digest information about lines and flash the minute-by-minute situation onto big electronic tote boards. ("Skip the British Pavilion. Crowded," the boards might read.) However, Montreal (pop.: 2 million) has not

Massive cables stretch taut the skin of West Germany's big top

Webbed tubing covers the Netherlands building

In both design and materials, the West German Pavilion (above and right) is a major architectural innovation and is expected to exert a lasting influence on the planning of stadiums and exhibition halls of the future. Essentially it is a tent—made of plastic—open on all sides except where the supporting cables are anchored to the earth. (A supporting mast is seen in front of a window in the picture at near right.) In sunlight the skin is translucent, and both the patterns created by the exterior cables and the flowered pattern of the interior are visible.

A kaleidoscopic tower, a free-form tent

Below: two views of a building —all wood hexagons—erected to embody the theme "Man in the Community." Top picture looks up through the roof. Bottom one is an exterior view, looking down.

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RESEARCH AND DEVELOPMENT

The familiar programme of live/work will be reconsidered within a cross-product of Fun Palace/Theatre and the Research and Design environment of the 1967 Montreal Expo. R&D is the industry's heroic laboratory outside of academic institutions where invention need not immediately answer to market. Research and Development of The Immersive is similarly not bound only by programme and form but can be linked with other speculations - wearables, nonhuman perspective, new material, interaction, reconfiguration.

Central Issues

We will focus on comprehensive forms of responsiveness – augmentation, kinetics, adaptative programme, interaction, input/output, dynamics, memory, material behaviour

We will produce intelligent machines of inhabitation

Work within a Design Research methodology

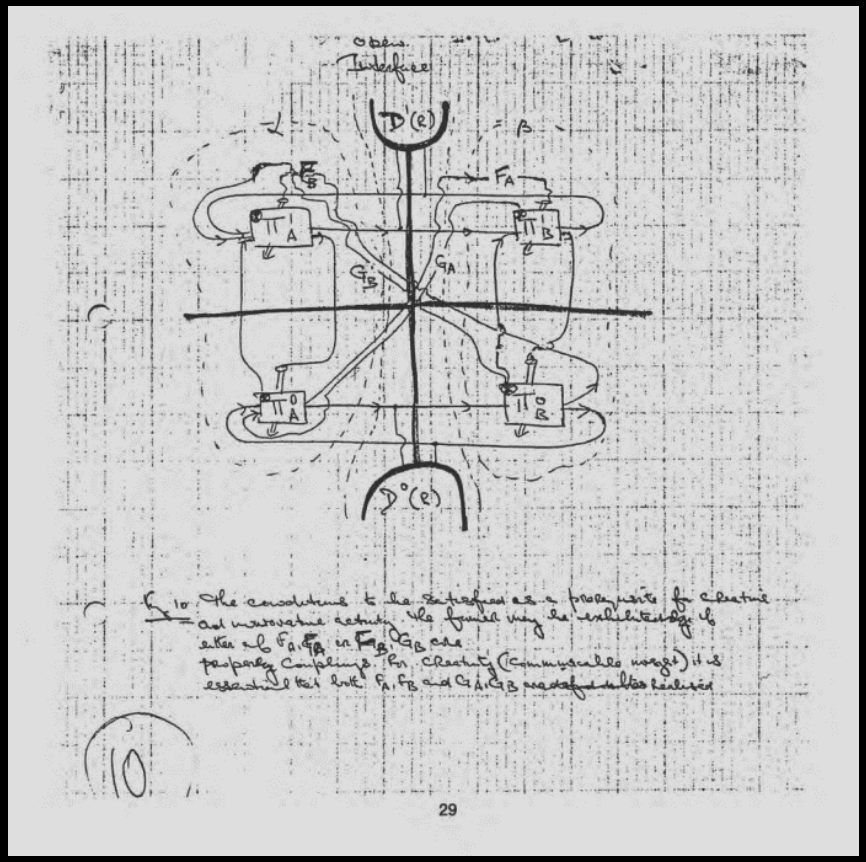
Focus on live and work, new types of occupation. New models of design.

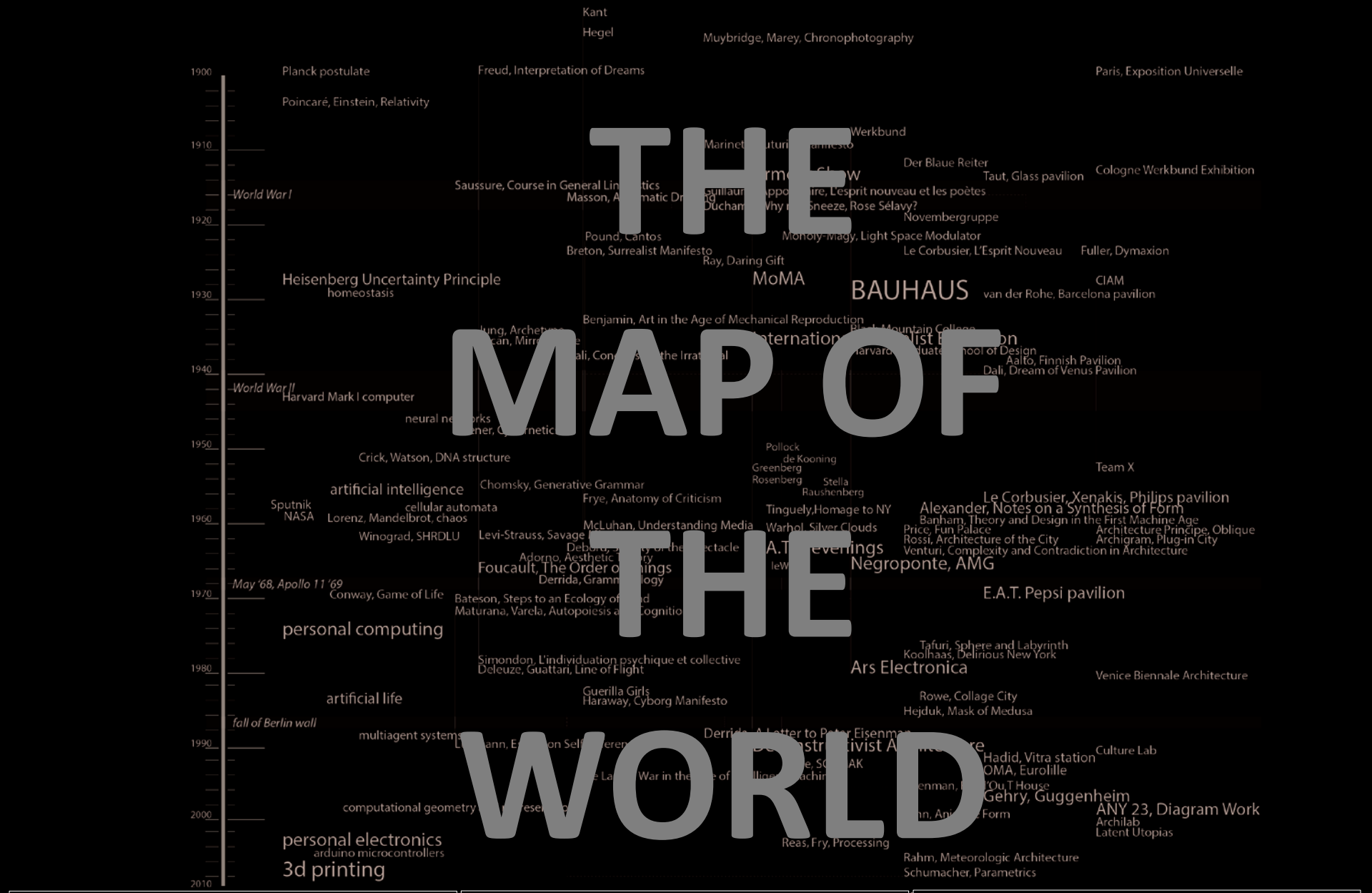
Methodology

On Transposition

1: to change in form or nature **:** TRANSFORM
2: to render into another language, style, or manner of expression **:** TRANSLATE
3: to transfer from one place or period to another **:** SHIFT
4: to change the relative place or normal order of **:** alter the sequence of <*transpose* letters to change the spelling>
5: to write or perform (a musical composition) in a different key

Transposition has a history in music theory and in mathematics, and is one of the sets of permutations that contains the principles of inversion, sequencing, pairing. In the simplest terms, to transpose is to shift or to move. This is normally through a procedure or function in which a node undergoes a transformation in position, relationship or value.





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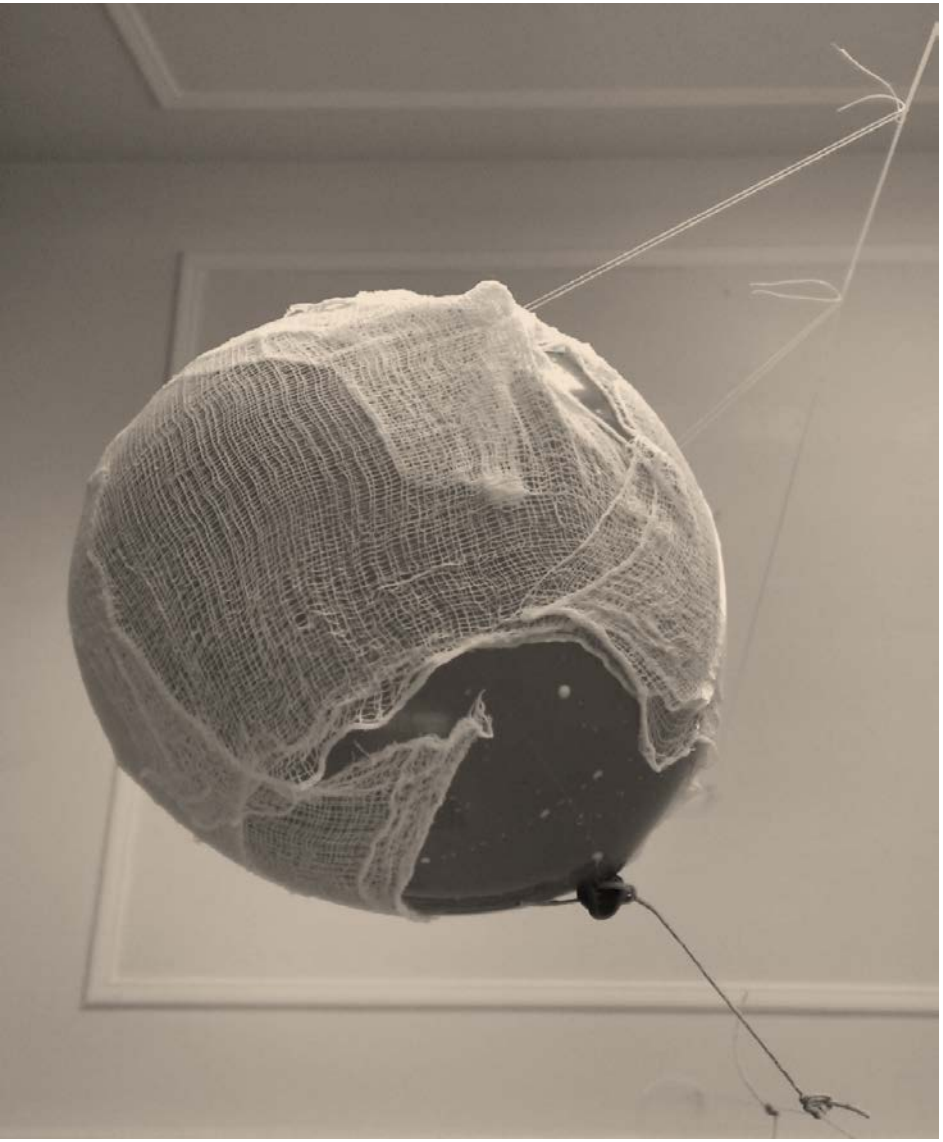
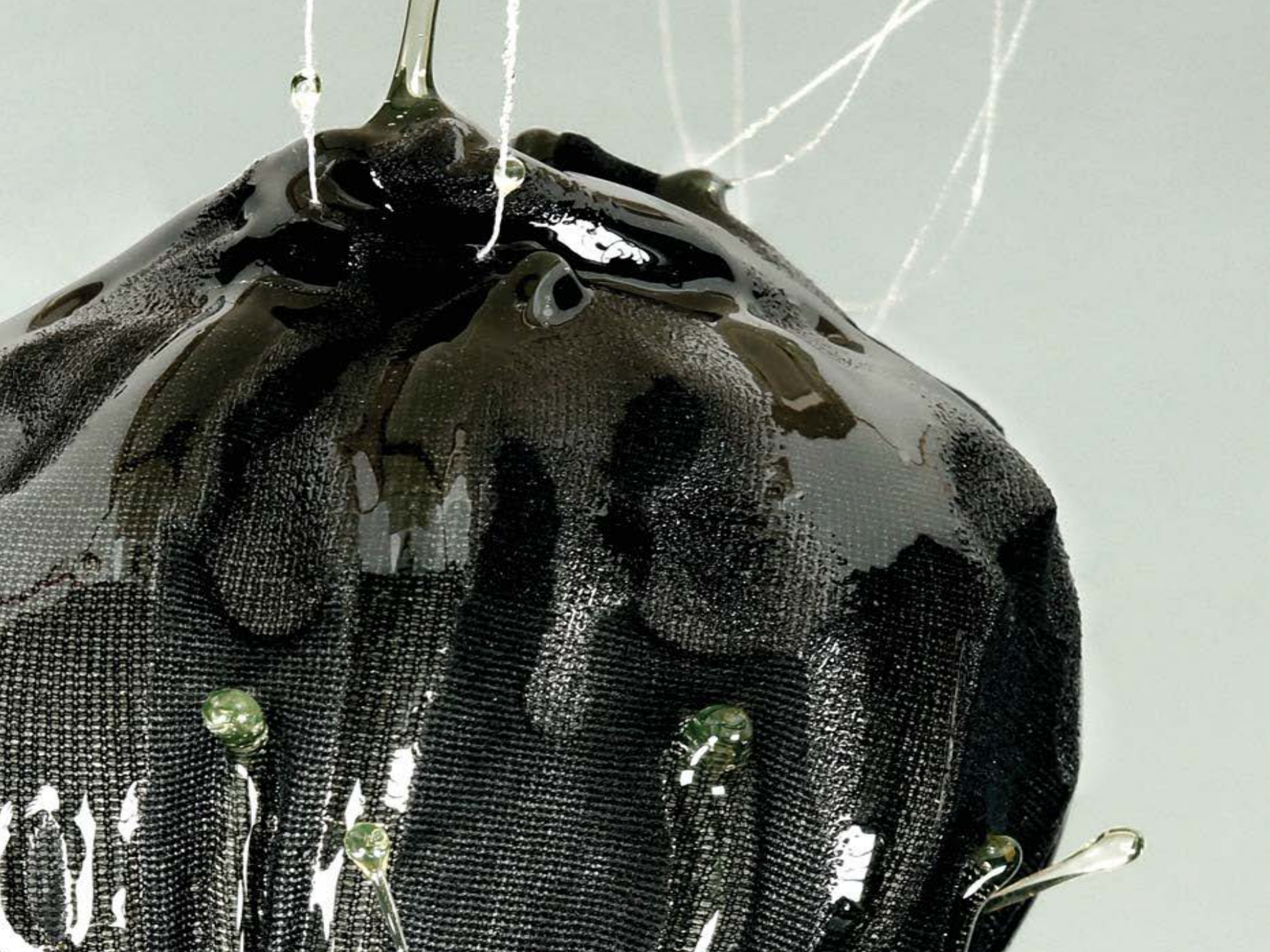
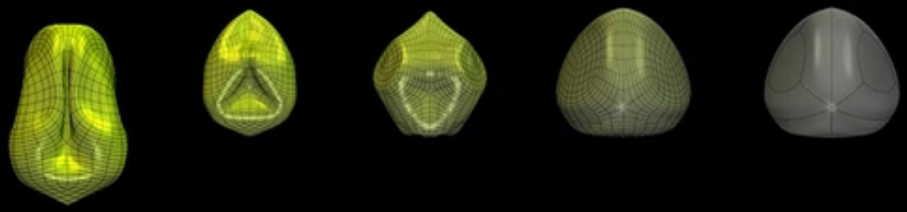
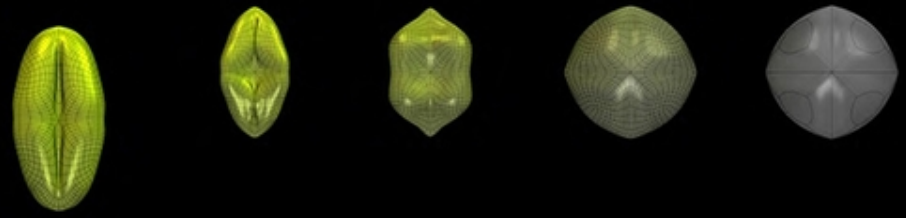






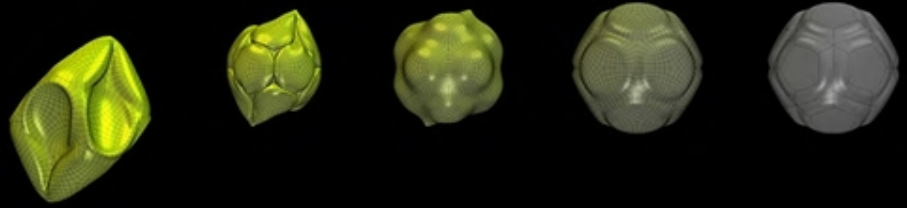
Icosahedron

+ Two Point Constraints ; Z-Axis
+ Faces Offset
+ Smooth Poly Mesh



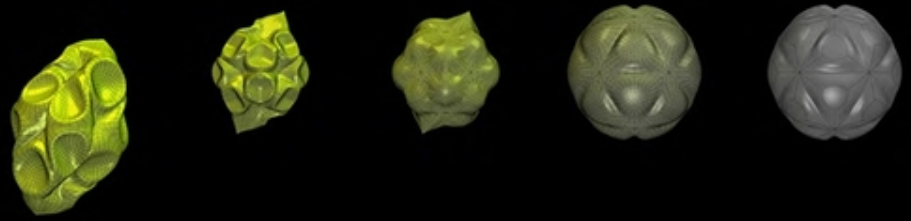
Tetrahedron

+ Two Point Constraints ; Z-Axis
+ Faces Offset
+ Smooth Poly Mesh



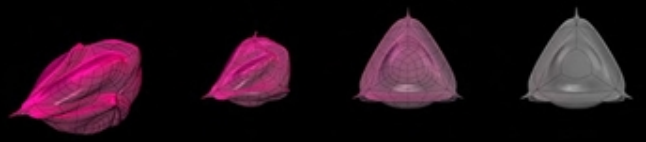
Octahedron

+ Two Point Constraints ; Z-Axis
+ Faces Offset
+ Smooth Poly Mesh



Dodecahedron

+ Two Point Constraints ; Z-Axis
+ Faces Offset
+ Smooth Poly Mesh

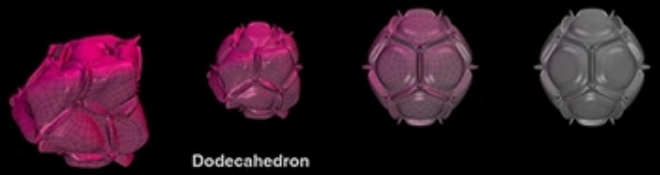


Tetrahedron

+ Two Point Constraints ; Y-Axis
+ Faces Offset
+ Beveled Edges
+ Smooth Poly Mesh

Octahedron

+ Two Point Constraints ; Y-Axis
+ Faces Offset
+ Beveled Edges
+ Smooth Poly Mesh



Dodecahedron

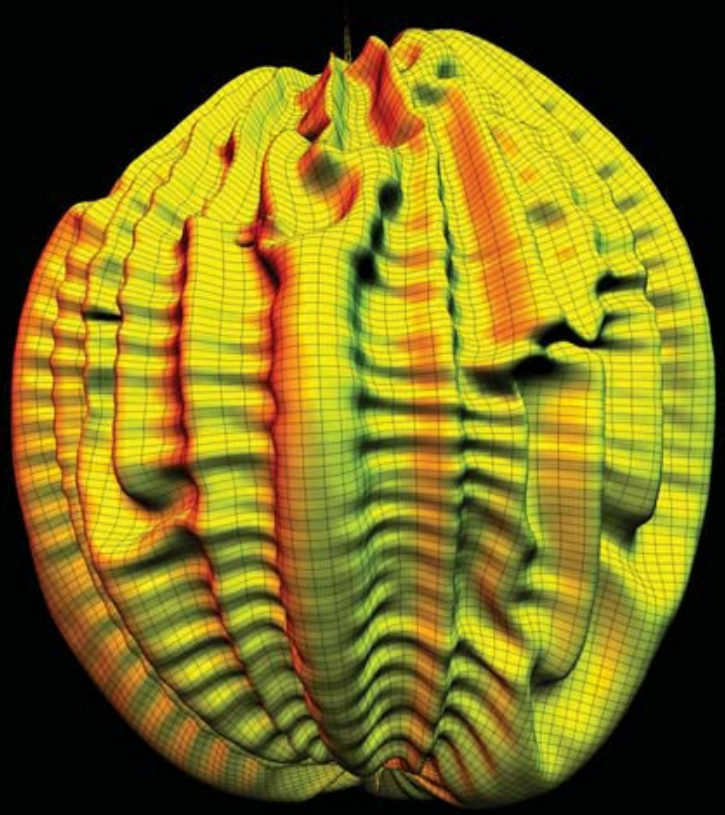
+ Two Point Constraints ; Y-Axis
+ Faces Offset
+ Beveled Edges
+ Smooth Poly Mesh

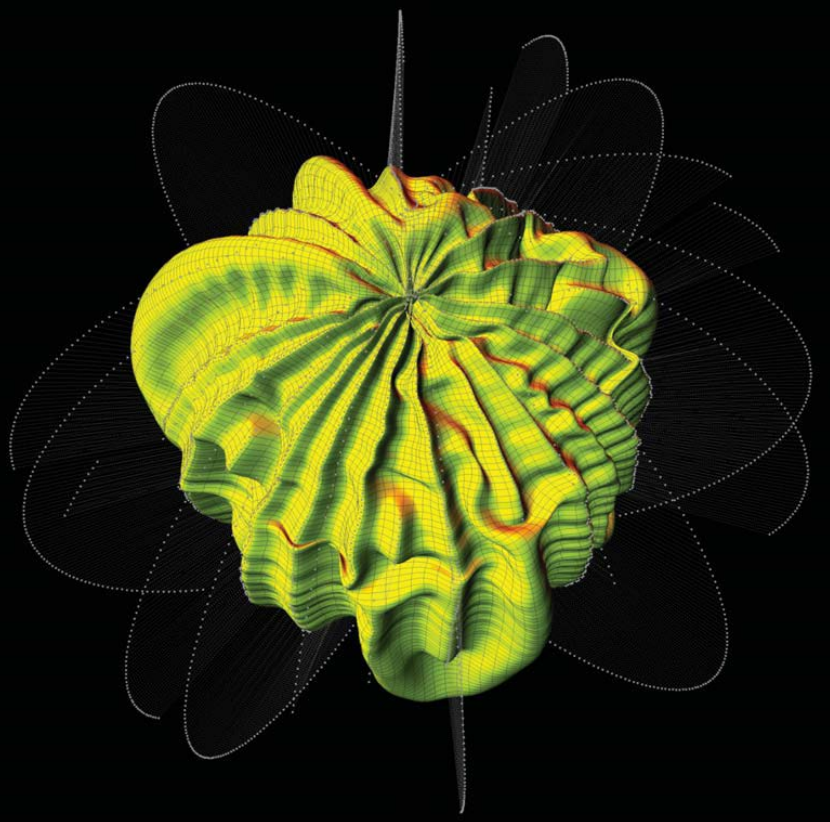
Icosahedron

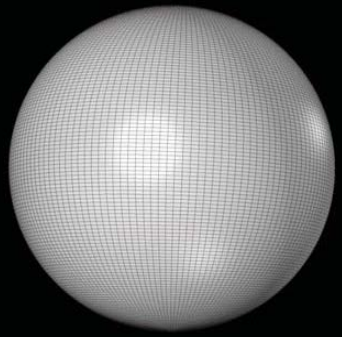
+ Two Point Constraints ; Y-Axis
+ Faces Offset
+ Beveled Edges
+ Smooth Poly Mesh

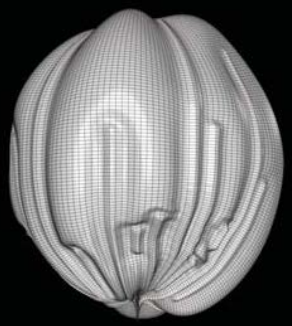
Icosahedron

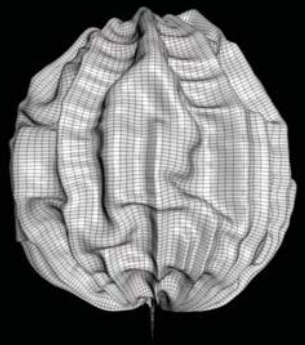
+ No Constraints
+ Deletion of Faces to Create Aperture
+ Smooth Poly Mesh

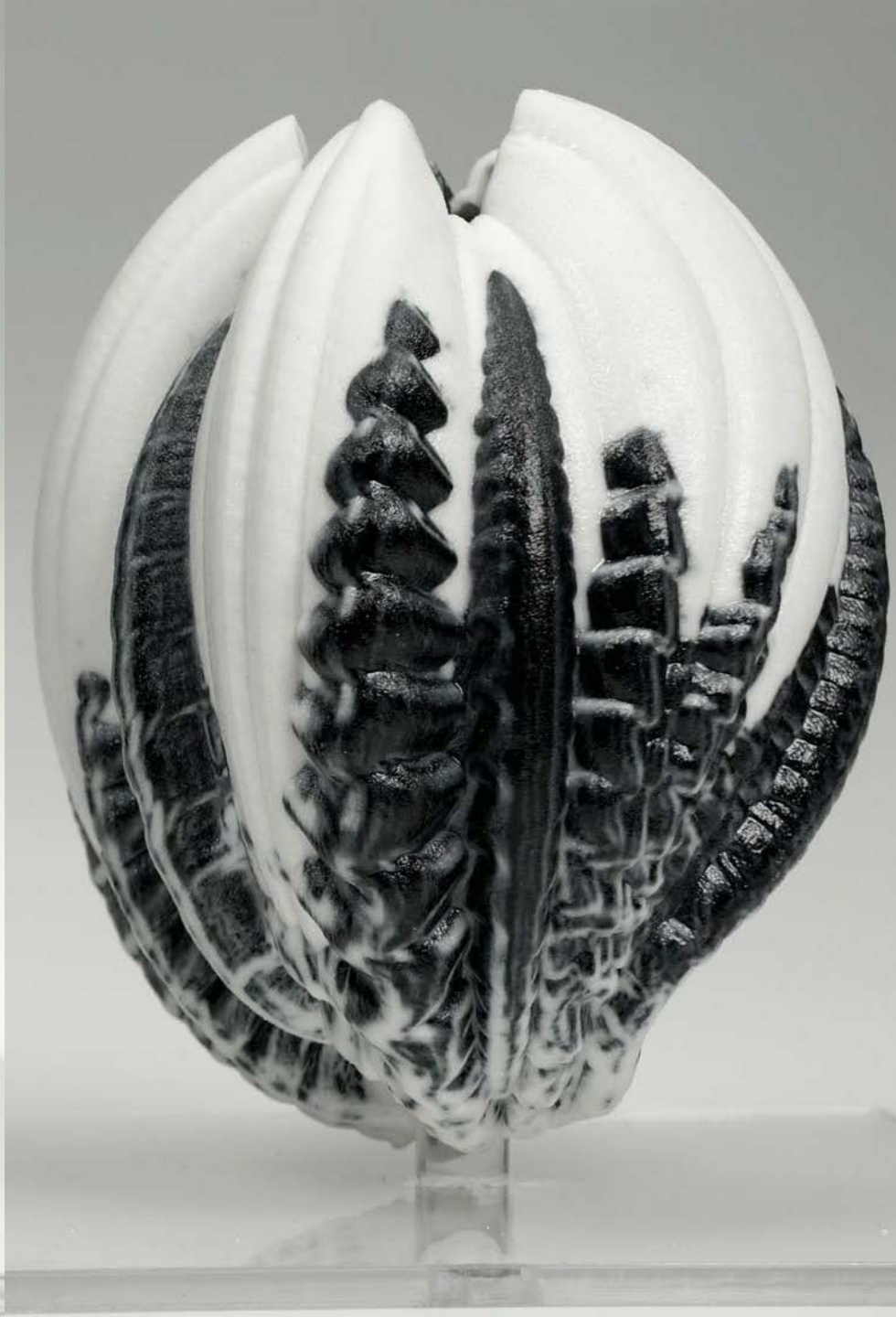


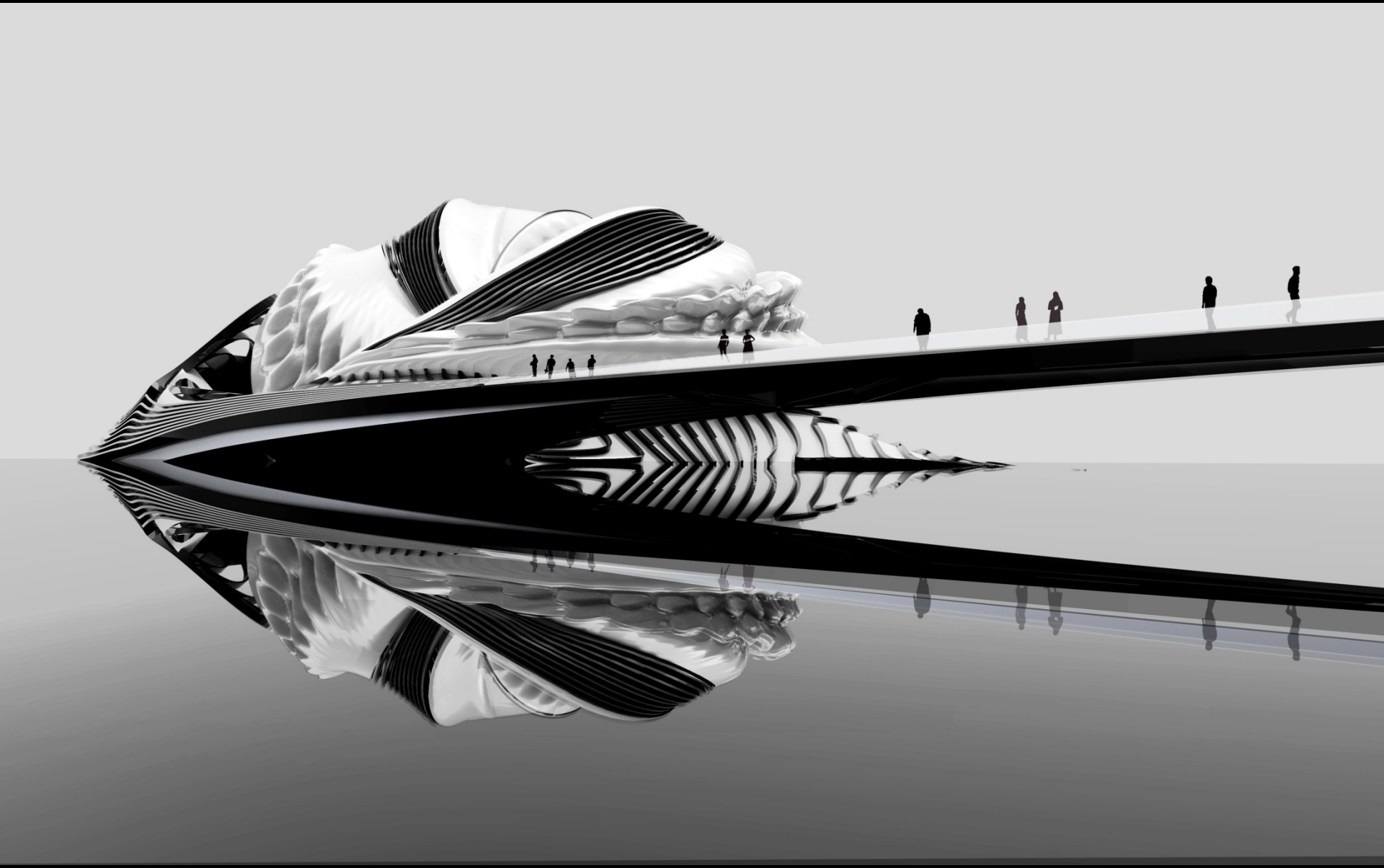


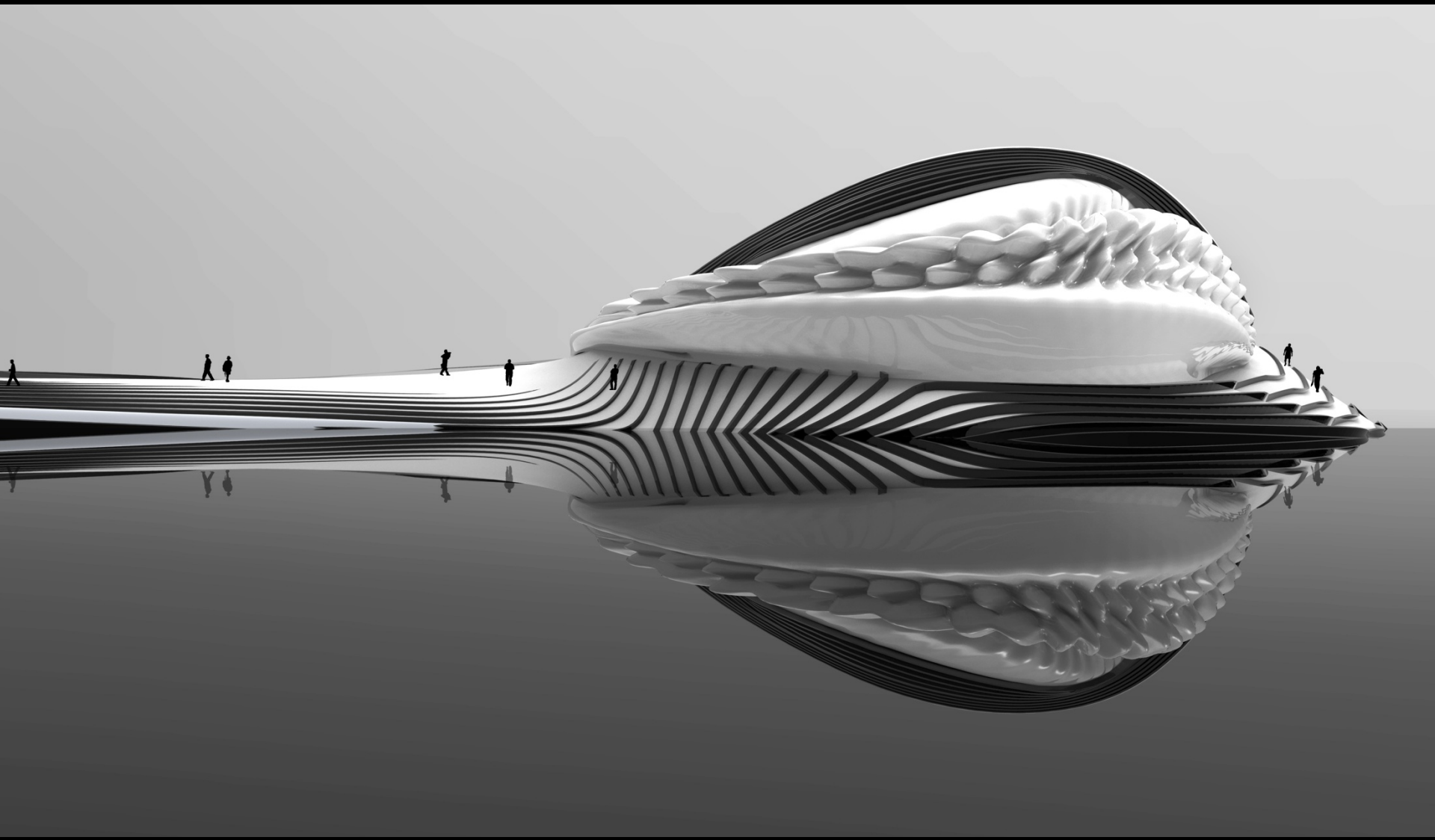












STUDIO FORMAT AND SCHEDULE

The semester will be divided into two components: group material research booklet followed by group projects, always conducted in parallel by physical prototyping and digital simulation.

The studio research trip will visit:

1. Cambridge: MIT Media Lab, Self-Assembly Lab, Harvard GSD and Responsive Environments Lab
2. Exeter Library, Kahn, and TAC and Gropius houses
3. Montreal: CCA to view Cedric Price Fun Palace Archive, McGill FARMM Lab

end