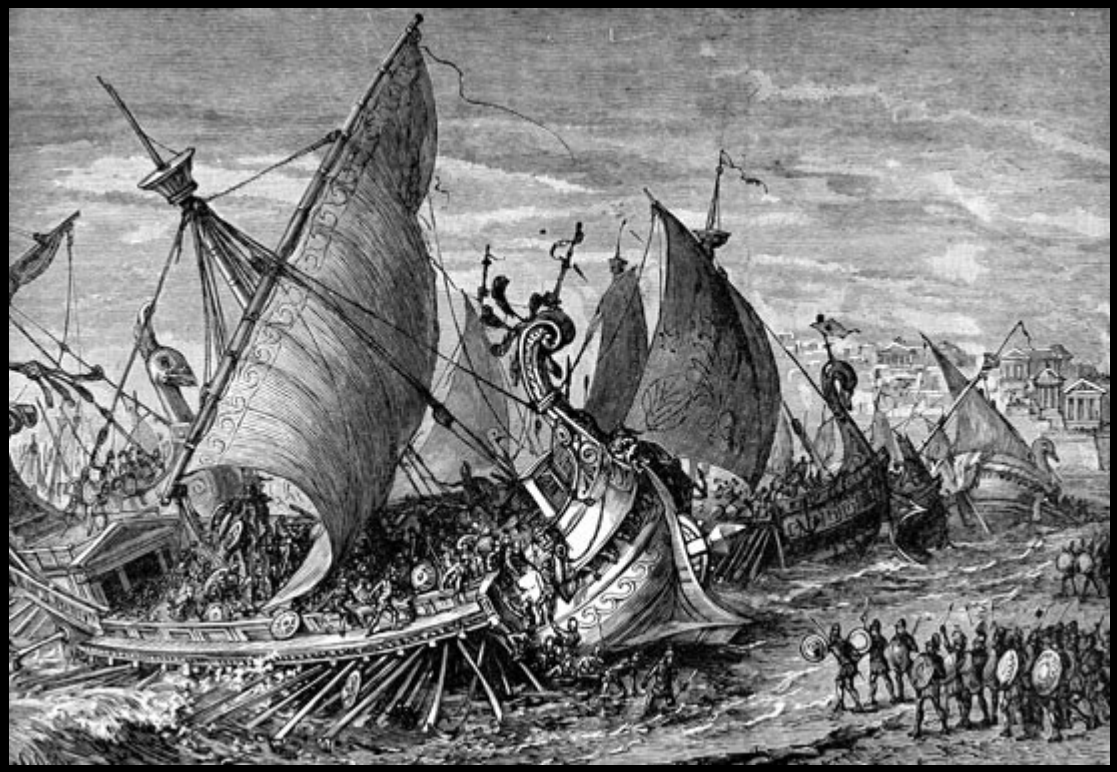
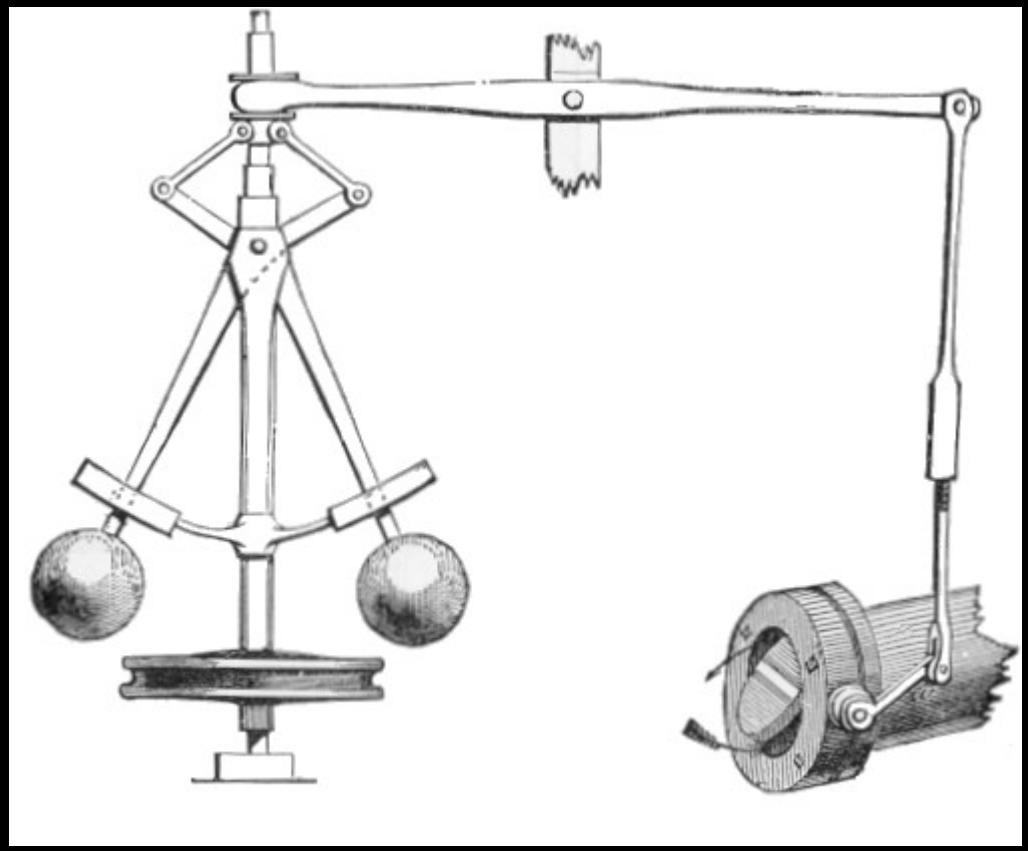
Cybernetics?



SOCRATES: Or again, in a ship, if a man having the power to do what he likes, has no intelligence or skill in navigation [αρετης κυβερνητικης, aretes kybernetikes], do you see what will happen to him and to his fellow-sailors?

Plato, Alcibiades I;


kybernetes
gubernetes
governor



Watts' "governor" (1788)


10
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Honeywell
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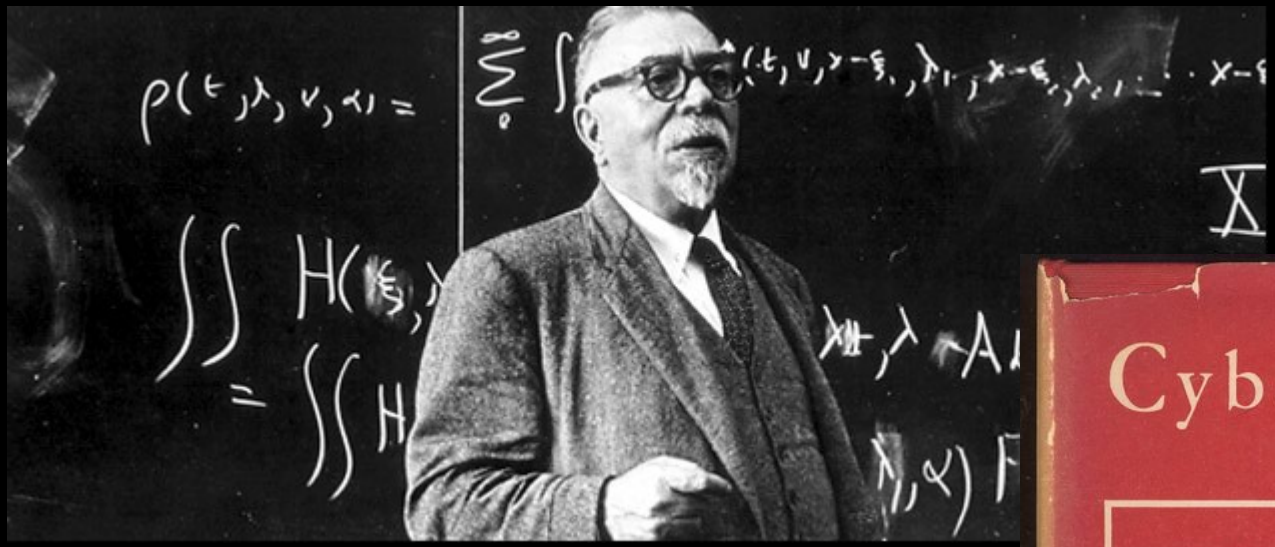
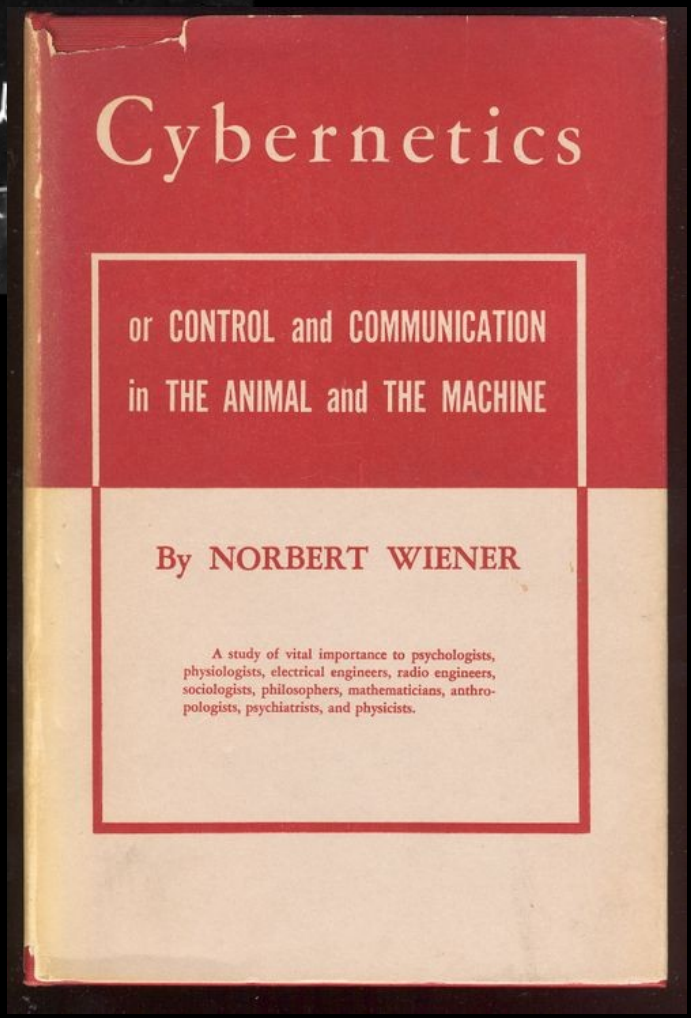
HONEYWELL

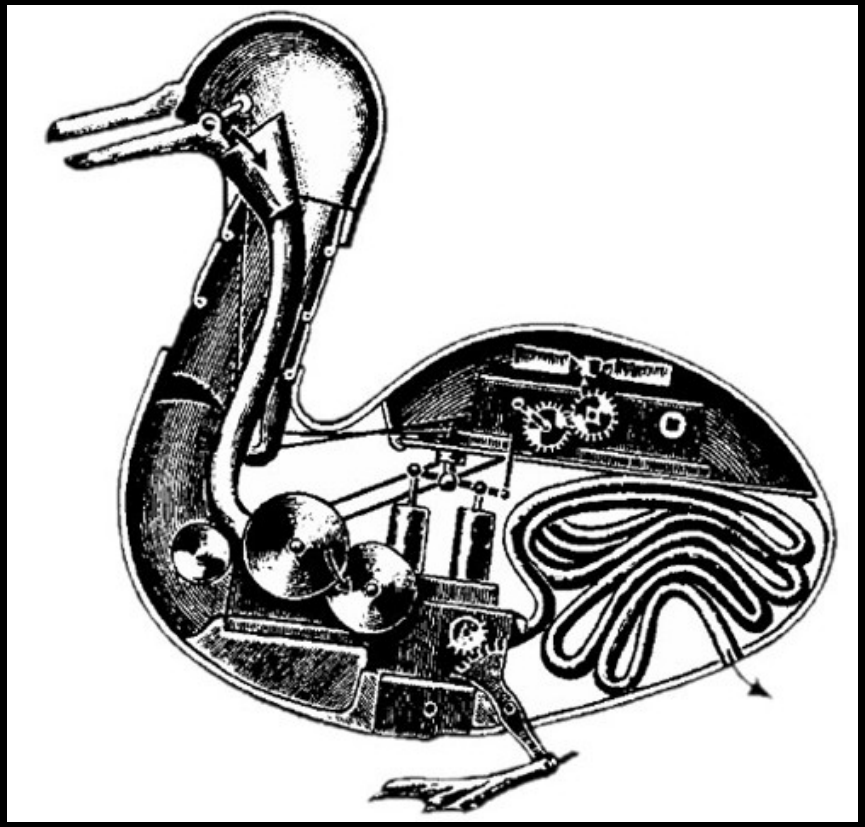



Cybernetics
or CONTROL and COMMUNICATION
in THE ANIMAL and THE MACHINE
By NORBERT WIENER
A study of vital importance to psychologists, physiologists, electrical engineers, radio engineers, sociologists, philosophers, mathematicians, anthropologists, psychiatrists, and physicists.

1948

Preprogrammed clockwork vs. self-regulating machines

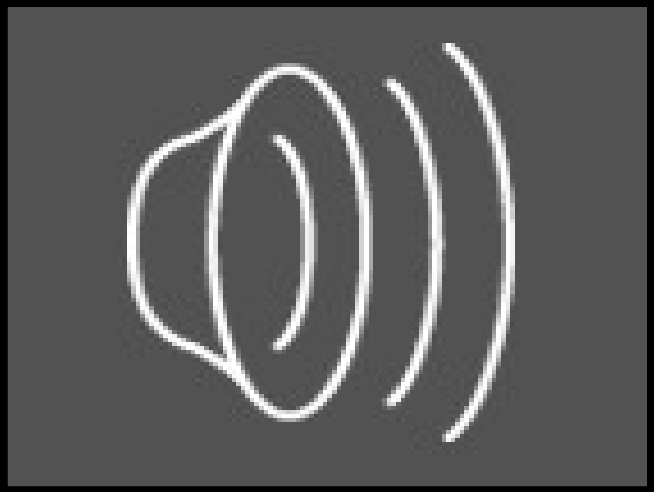
(a.k.a. authoritarianism vs. liberalism?)



Quite firmly established… is the fact of the simultaneous appearance in Britain of these two phenomena [self-regulating machinery and liberal political theories], which in itself is forceful evidence of the interdependence of the socio-intellectual with the technological activities of a culture … The grand conclusion of the interdependent, almost symbiotic evolution of the concepts of self-regulation and the liberal system of economics was reached in Adam Smith's classic Inquiry . . .The concept of self-regulation is the unacknowledged heart of this system

Otto Mayr, *Authority, Liberty & Automatic Machinery in Early Modern Europe*

Vaucanson's duck (1738)



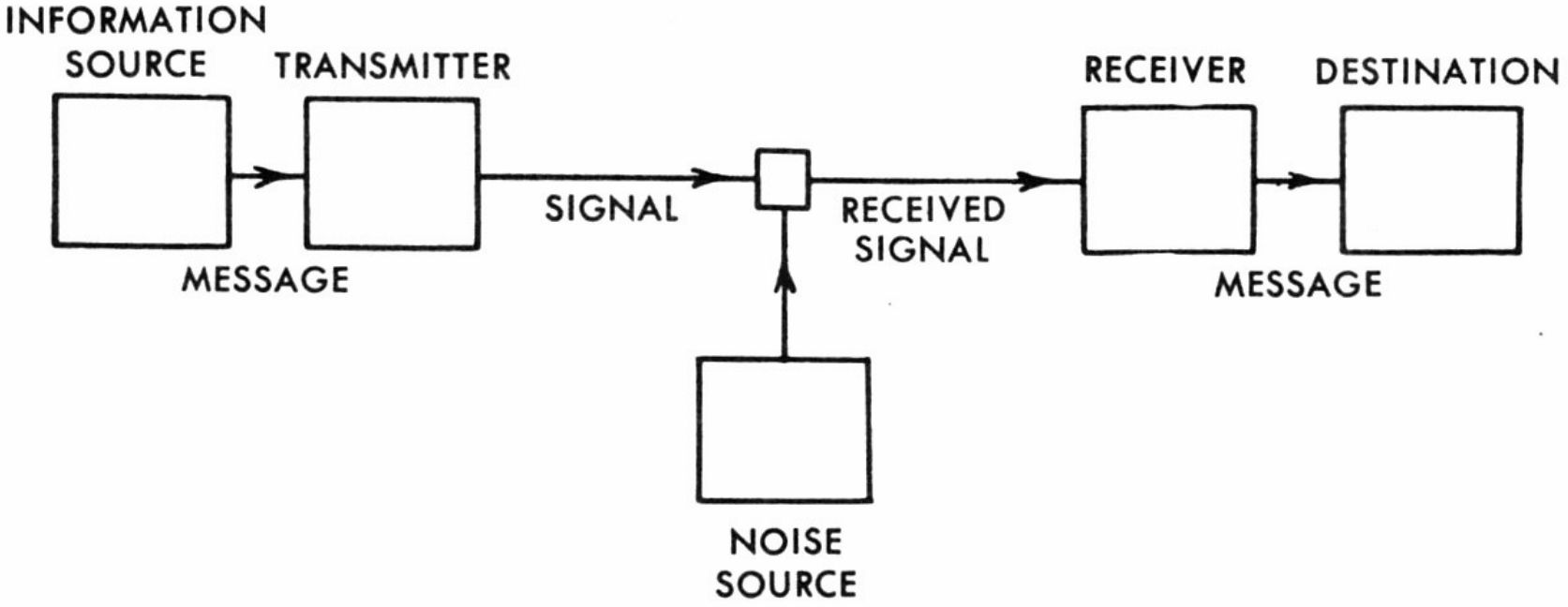
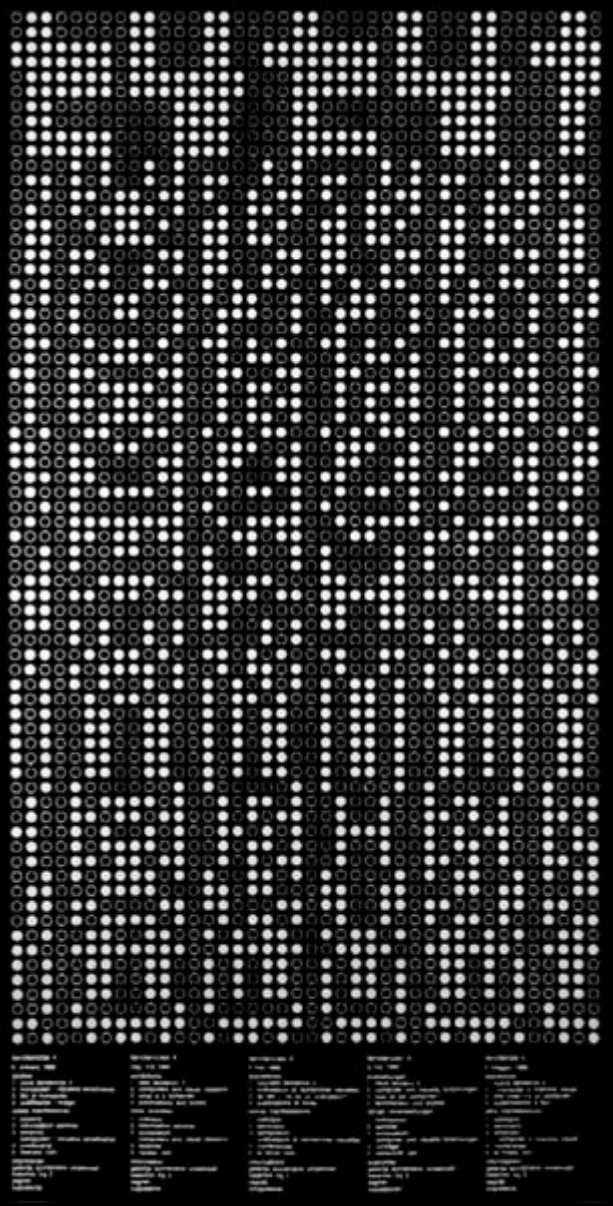
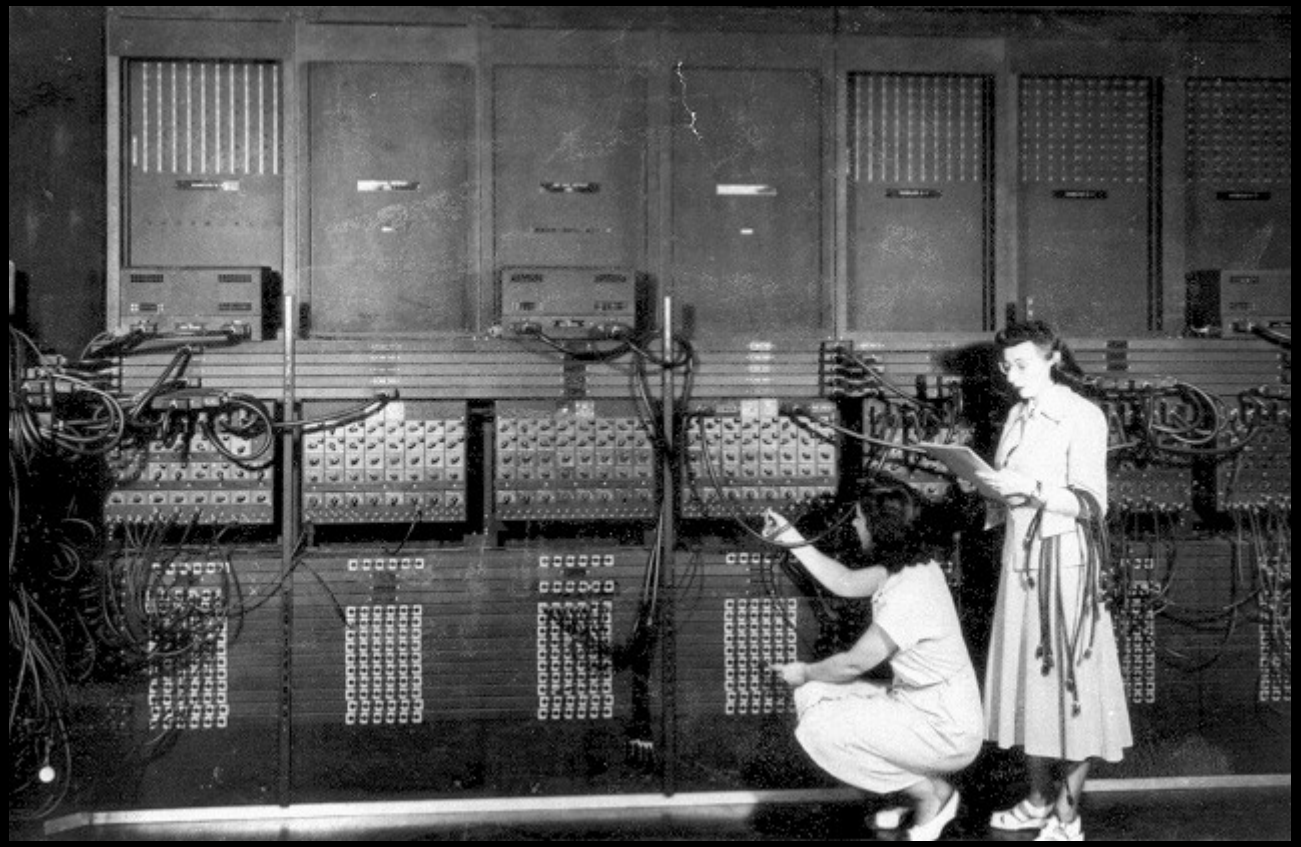


Fig. 1. — Schematic diagram of a general communication system.

Information Theory, Claude Shannon 1948





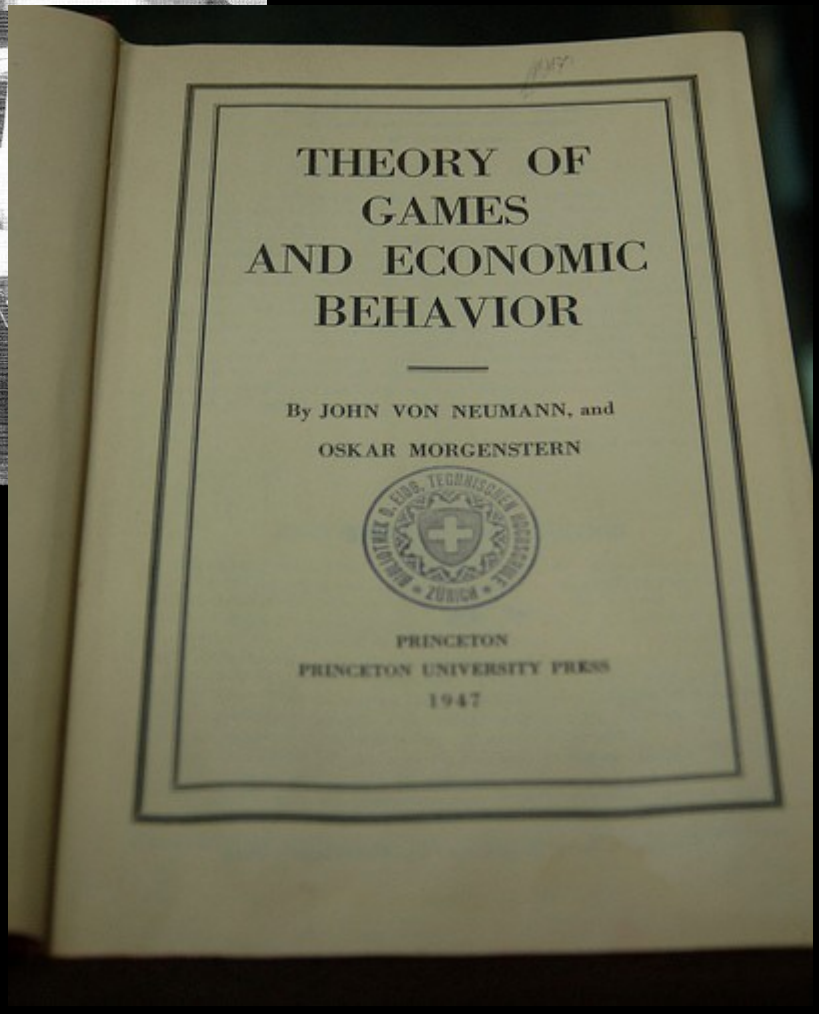
First general purpose computer (ENIAC 1943-1946)

"From the methodological standpoint, however, we see that 'mechanism' and 'vitalism' by no means form the mutually exclusive disjunction they have been supposed to do. If a 'non-mechanist' wishes to deny the assumption of methodological mechanism that biological explanations must also be physico-chemical ones, it is obviously by no means intended that the required explanation must be 'vitalistic', i.e. involving the assumption that in living organisms factors analogous to psychical ones are 'at work'. A 'non-mechanistic' theory which is not all 'vitalistic' thus appears to be logically possible, and if we make a critical study of mechanism and vitalism this possibility will be seen to be of special importance."

Ludwig von Bertalaffny,
Modern Theories of Development: An Introduction to Theoretical Biology (1933)

“The system problem is essentially the problem of the limitation of analytical procedures in science. This used to be expressed by half-metaphysical statements, such as emergent evolution or ‘the whole is more than the sum of its parts,’ but has a clear operational meaning.”

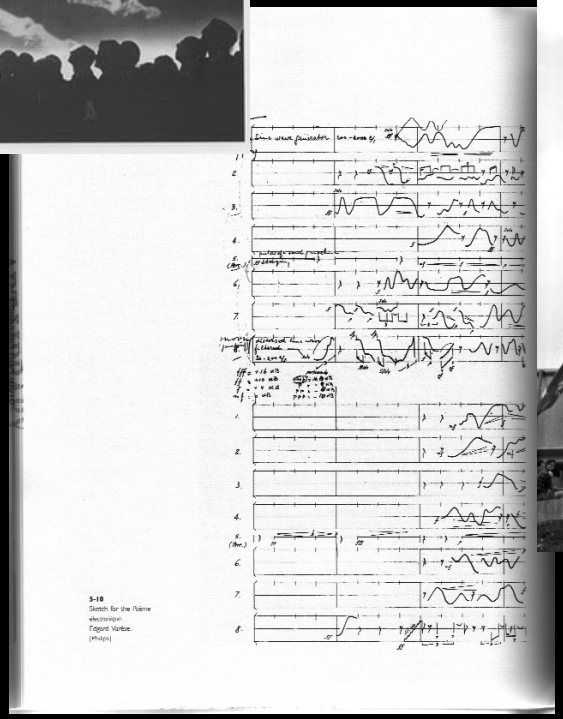
von Bertalanffy, *General System Theory* (1968)

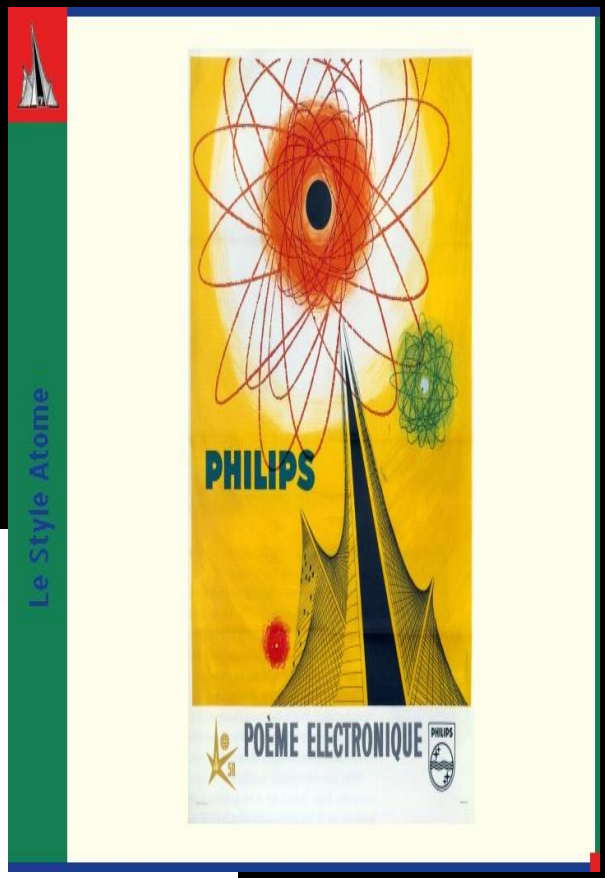


Operations Research

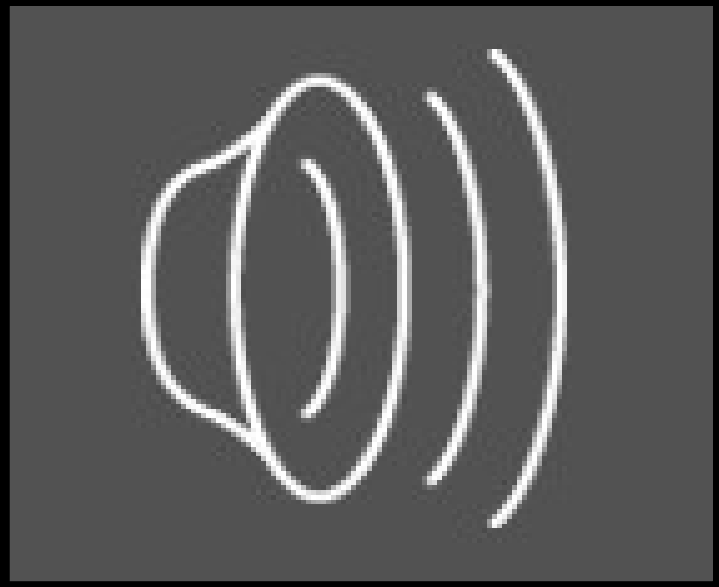
Corporate Futurism/Electronic Mass Culture: *Poème électronique* (Worlds Fair, Brussels, 1958)

"I will not make a pavilion for you but an Electronic Poem and a vessel containing the poem; light, color image, rhythm and sound joined together in an organic synthesis."
—Le Corbusier, who designed the pavilion along with Iannis Xenakis



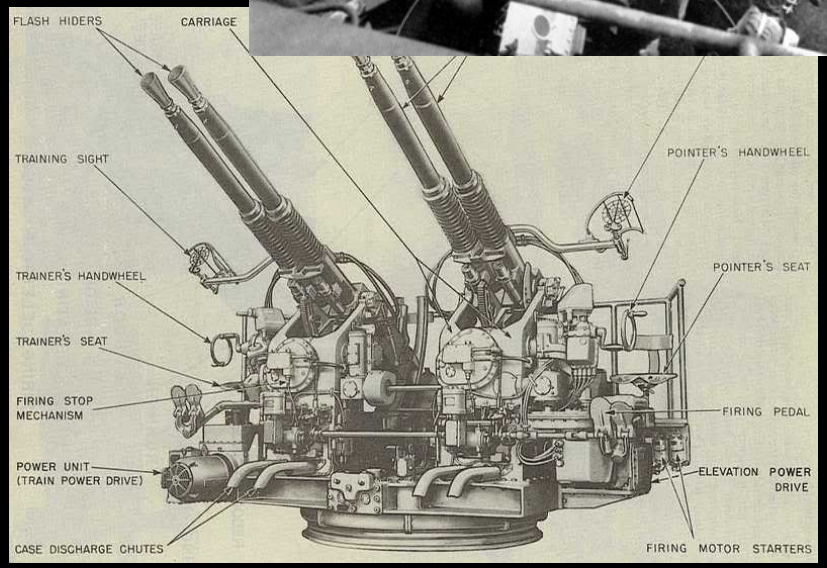


Score by Edgar Varèse



...the system of weaponry and people that Wiener had in mind was predicated on a picture of a particular kind of enemy. On the mechanized battlefield, the enemy was neither invisible nor irrational; this was an enemy at home in the world of strategy, tactics, and maneuver, all the while thoroughly inaccessible to us, separated by a gulf of distance, speed, and metal. It was a vision in which the enemy pilot was so merged with machinery that (his) human-nonhuman status was blurred. In fighting this cybernetic enemy, Wiener and his team began to conceive of the Allied antiaircraft operators as resembling the foe, and it was a short step from this elision of the human and the nonhuman in the ally to a blurring of the human-machine boundary in general. The servomechanical enemy became, in the cybernetic vision of the 1940s, the prototype for human physiology and, ultimately, for all of human nature.

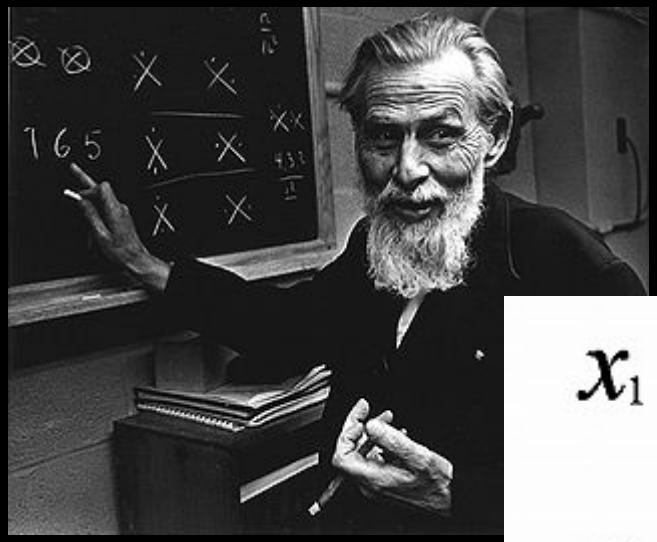
Peter Galison, "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision"

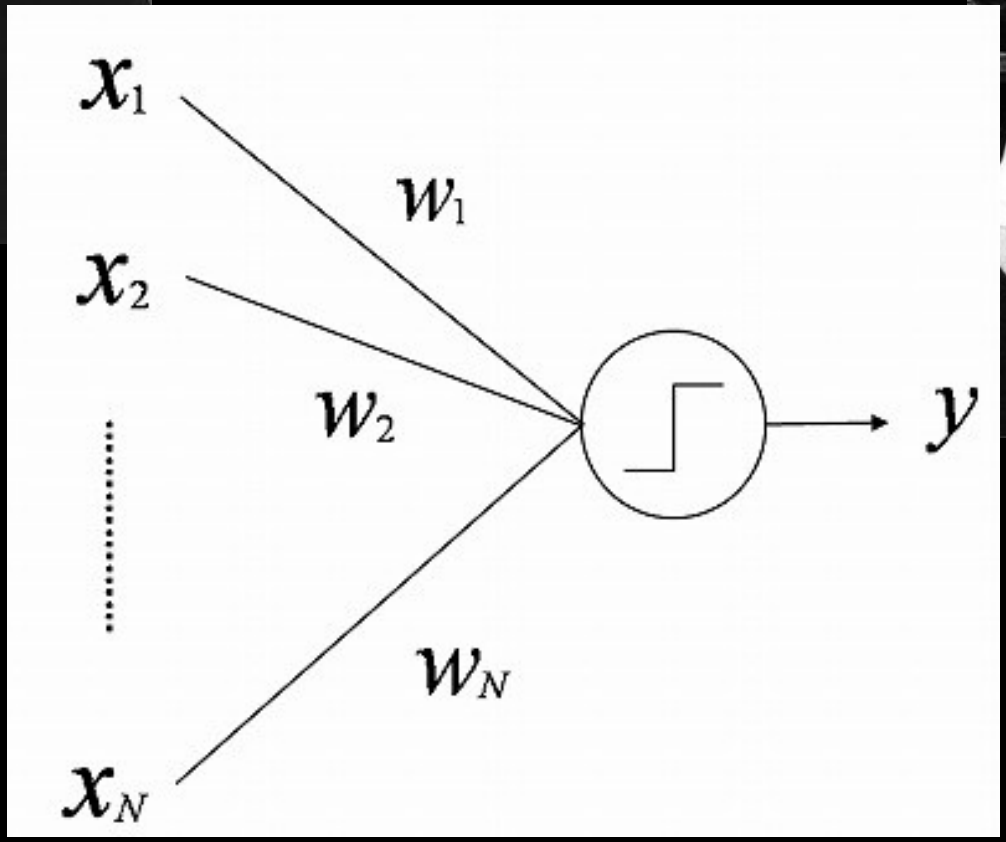


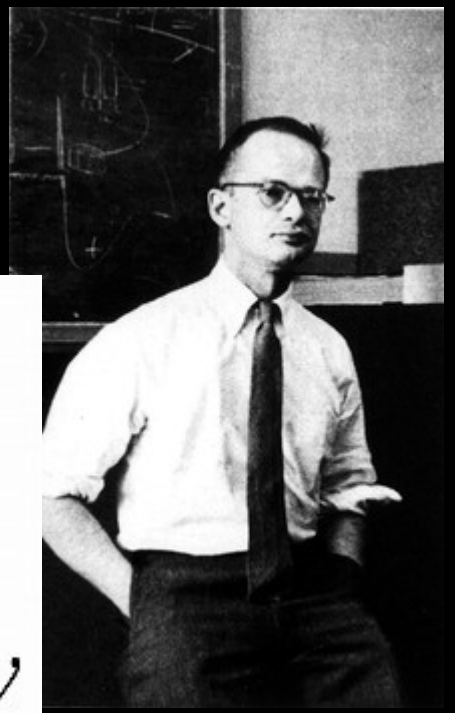
Teleology

The term purposeful is meant to denote that the act or behavior may be interpreted as directed to the attainment of a goal — i.e., to a final condition in which the behaving object reaches a definite correlation in time or in space with respect to another object or event. Purposeless behavior then is that which is not interpreted as directed to a goal. [...] Some machines [...] are intrinsically purposeful. A torpedo with a target-seeking mechanism is an example. The term servo-mechanisms has been coined precisely to designate machines with intrinsic purposeful behavior.

Arturo Rosenblueth, Norbert Wiener and Julian Bigelow, “Behavior, Purpose and Teleology” (1943)







Warren McCulloch and Walter Pitts, "A Logical Calculus of Ideas Immanent in Nervous Activity", 1943

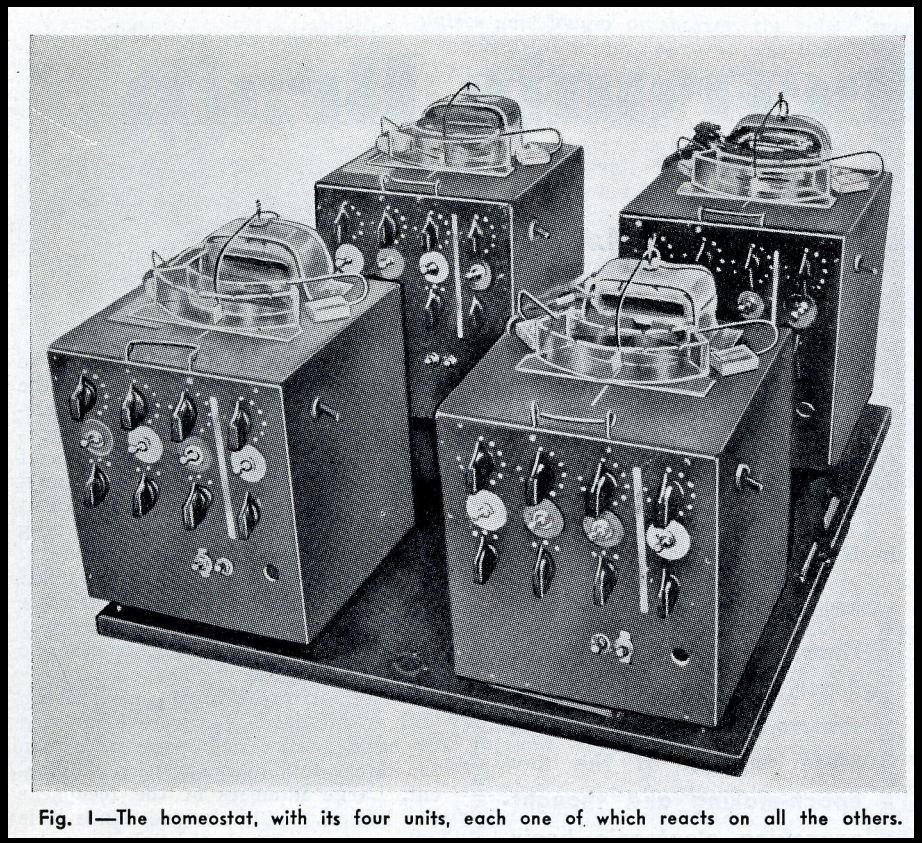
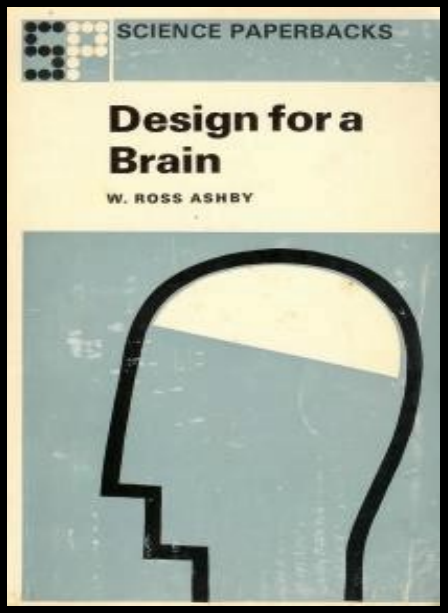
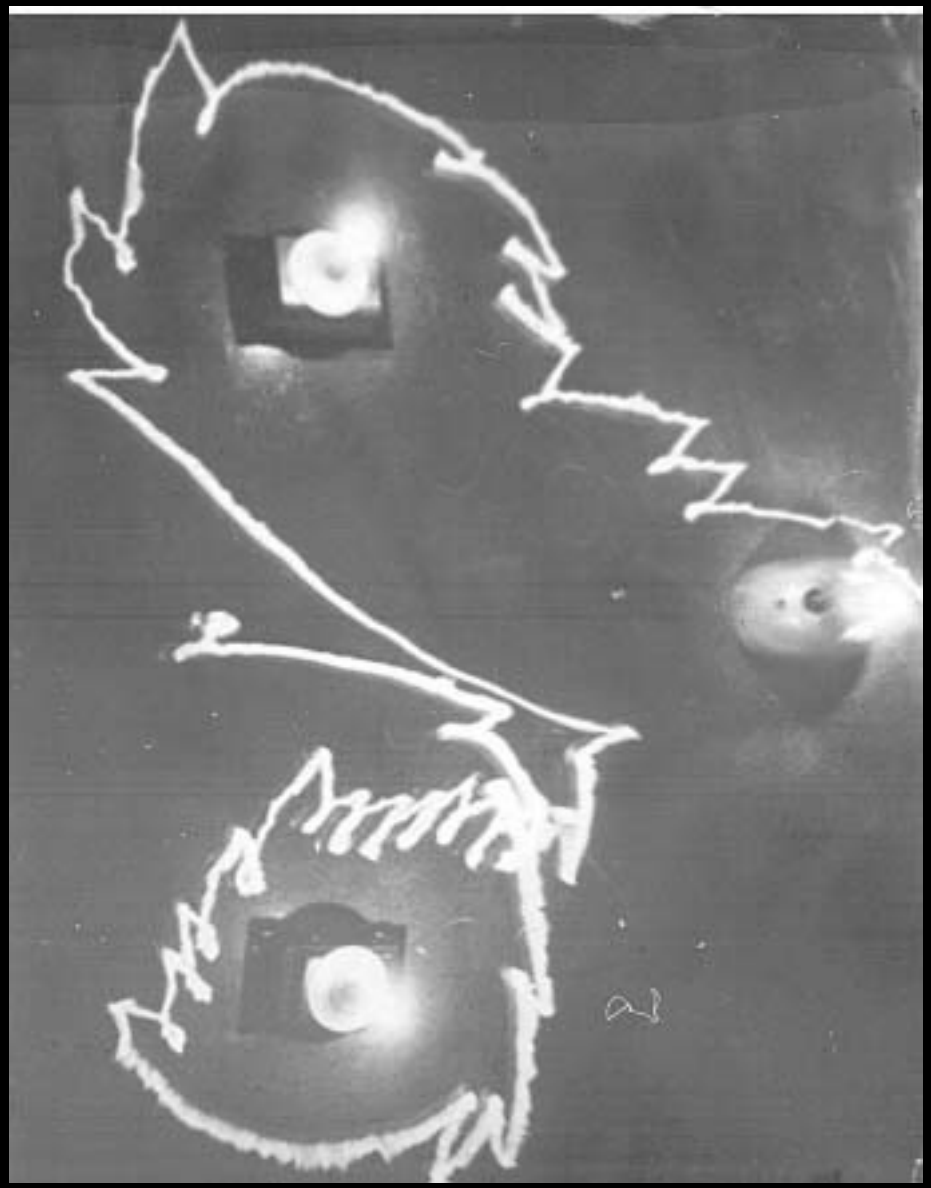


Fig. 1—The homeostat, with its four units, each one of which reacts on all the others.



“Only variety can destroy variety”

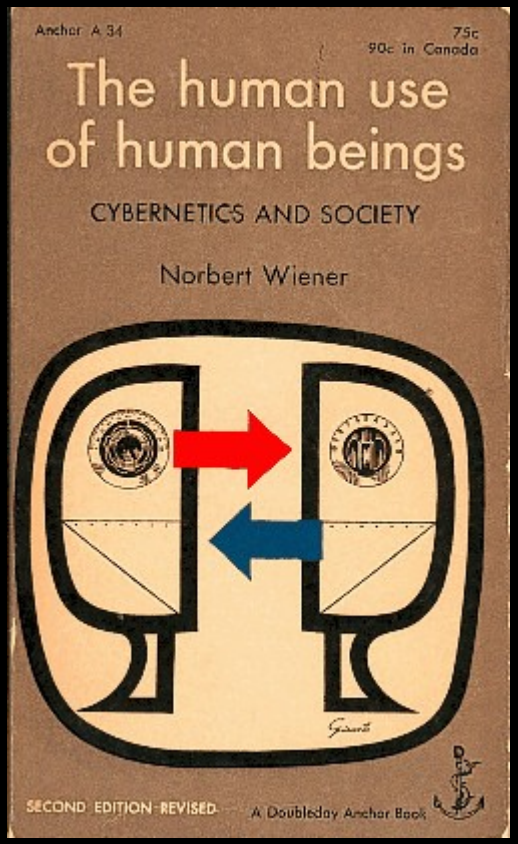
W. Ross Ashby, *Introduction to Cybernetics* (1956)



Time-lapse track of Grey Walter's robot Elsie

Macy Conferences 1946-1953

"Feedback Mechanisms and Circular Causal Systems in Biological and Social Systems."



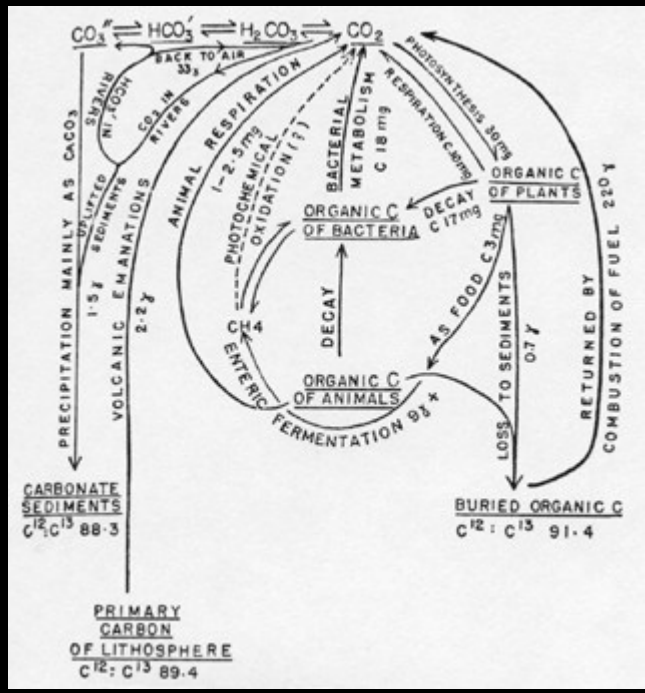
"It is the thesis of this book that society can only be understood through a study of the messages and the communication facilities which belong to it; and that in the future development of these messages and communication facilities, messages between man and machines, between machines and man, and between machine and machine, are destined to play an ever-increasing part."

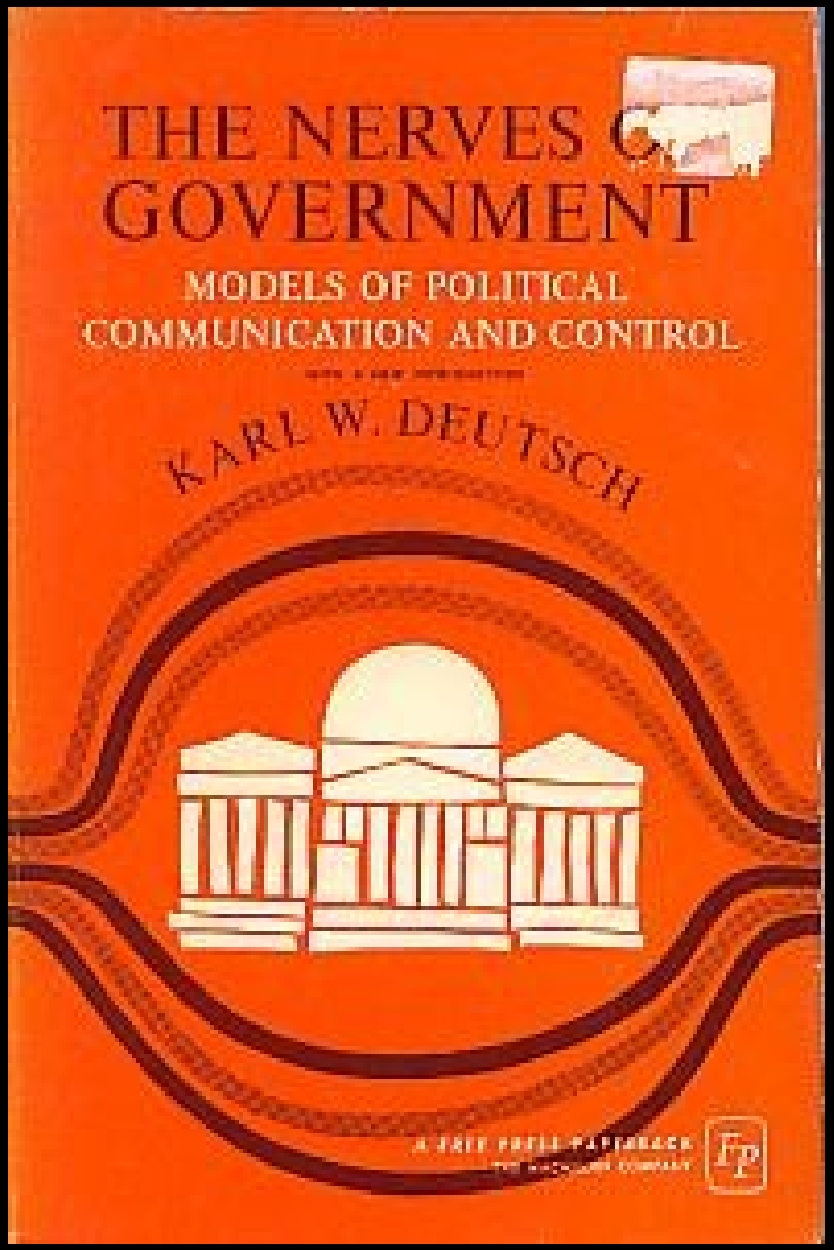
Norbert Wiener, *The Human Use of Human Beings* (1950)

The aspects of ecology to be considered regard primarily the study of the conditions under which groups of organisms exist. Such groups may be acted upon by their environment, and they may react upon it. If a set of properties in either system changes in such a way that the action of the first system on the second changes, this may cause changes in properties of the second system which alter the mode of action of the second system on the first. Circular causal paths can be established in this manner.

It is well known from mathematical theory [...] that circular paths often exist which tend to be self-correcting within certain limits, but which break down, producing violent oscillations, when some variable in the system transgresses limiting values. When a breakdown of the self-correcting system takes place in nature, it may be expected to end in disaster for some element in the system which consequently disappears. The original system is thus destroyed, to be replaced by another in which the lost element plays no part. It is, therefore, usual to find in natural circular systems various mechanisms acting to damp oscillations, and self-correcting mechanisms may be introduced at several points in the circular path. [...] The resulting stability, which appears to characterize most ecological systems, while it permits their persistence, makes investigation difficult.

George Evelyn Hutchinson “Circular Causal Systems in Ecology” (1948)

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MODELS OF POLITICAL COMMUNICATION AND CONTROL
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