

Norbert Wiener on cybernetics

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The best-known definition of cybernetics is Norbert Wiener's sub-title for his book *Cybernetics—Control and communication in the animal and machine*.

He described it further in 1950 as the study of messages as a means of controlling machinery and society.

His first book on this subject was a technical one, and Wiener in order to make his ideas acceptable to the lay public wrote another volume *The human use of human beings*, subtitled *Cybernetics and society*. In the second edition of this book, in 1954, Wiener elaborated further the new context in which cybernetics had become relevant:

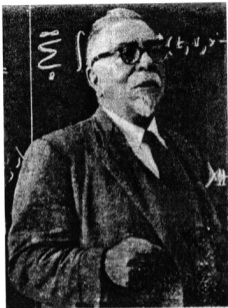
"In giving the definition of Cybernetics in the original book, I classed communication and control together. Why did I do this? When I communicate with another person, I impart a message to him, and when he communicates back with me he returns a related message which contains information primarily accessible to him and not to me. When I control the actions of another person, I communicate a message to him, and although this message is in the imperative mood, the technique of communication does not differ from that of a message of fact. Furthermore, if my control is to be effective I must take cognizance of any messages from him which may indicate that the order is understood and has been obeyed.

"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.

"When I give an order to a machine, the situation is not essentially different from that which arises when I give an order to a person. In other words, as far as my consciousness goes I am aware of the order that has gone out and of the signal of compliance that has come back. To me, personally, the fact that the signal in its intermediate stages has gone through a machine rather than through a person is irrelevant and does not in any case greatly change my relation to the signal. Thus the theory of control in engineering, whether human or animal or mechanical, is a chapter in the theory of messages.

"Naturally there are detailed differences in messages and in problems of control not only between a living organism and a machine, but within each narrower class of beings. It is the purpose of Cybernetics to develop a language and techniques that will enable us indeed to attack the problem of control and communication in general, but also to find the proper repertory of ideas and techniques to classify their particular manifestations under certain concepts."

From *The human use of human beings* by Norbert Wiener, Doubleday, 1964.



This digital Norbert Wiener is the work of H. Philip Peterson of the Control Data Corporation Digigraphics Laboratories, Burlington, Mass. The picture is composed entirely of numbers. Each two-digit number represents the density of colour in the area it occupies, based on a 'grey scale' of 100 increments. Philip Peterson designed the numerical character font so that the higher the number, the darker it appears to the eye. A Control Data Model 280 Digigraphic Scanner was used with a Model 160 computer to scan a 35 mm. black and white slide of Wiener, averaging the density in each of 100,000 'cells'. A Calcomp Model 564 plotter, driven on-line by a Control Data Model 3200 computer, was then used to plot the digits within the cells, which are .115 in. squares in the original plot. Scanning and processing time is about 4 minutes on the CDC 160, and plotting time on the Calcomp 564 is about 16 hours.