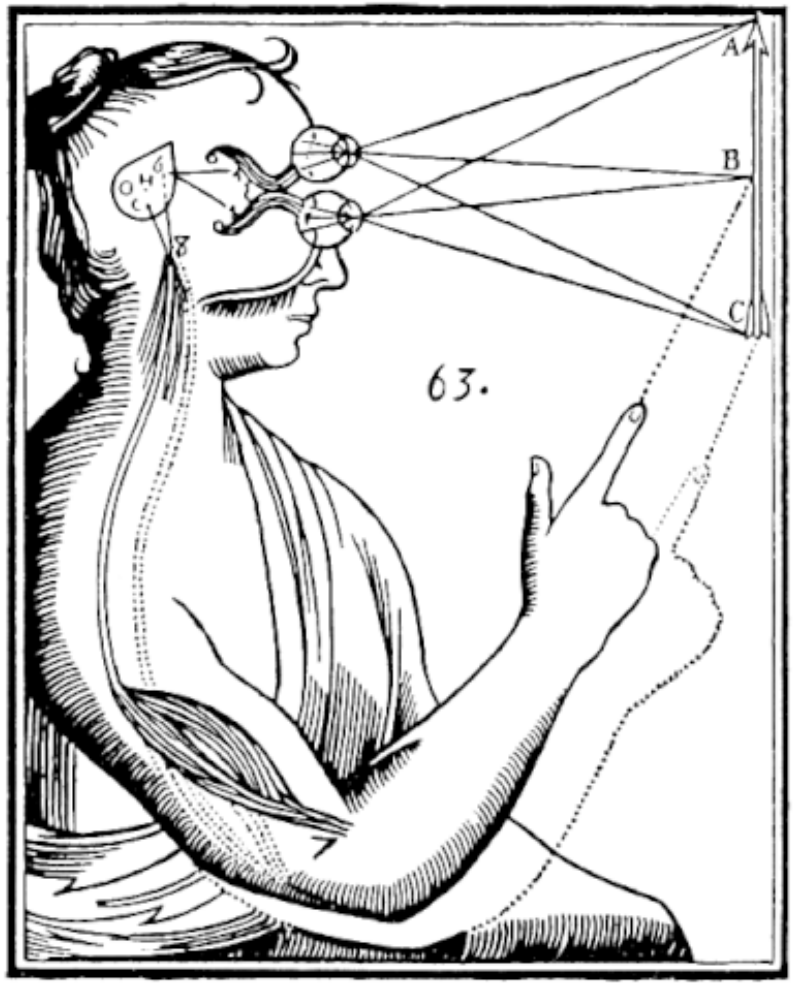
Vom elektrifizierten zum digitalen Geist:
Hirnströme zwischen Metaphern und Biomarkern

Hennric Jokeit

INDB Institut für Neuropsychologische Diagnostik und Bildgebung
Schweizerisches Epilepsie-Zentrum

René Descartes' mechanistisches Modell

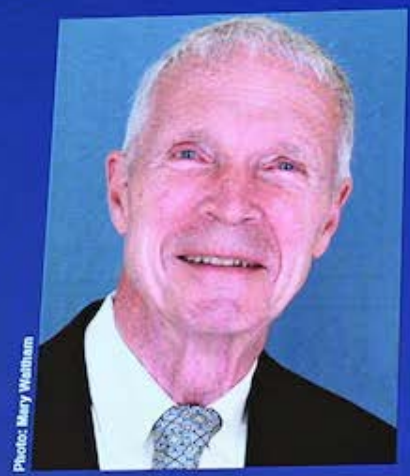


Descartes Vorstellung vom Sehen, bei dem visuelle Reize durch Nervenbahnen mechanisch vom Auge zum Gehirn und weiter zu den Händen geleitet werden.

René Descartes (1596-1650): L'homme de René Descartes, Paris: Compagnie des Libraires, 1729.

NOBELPRISET I FYSIK 2024
THE NOBEL PRIZE IN PHYSICS 2024

KUNGL. VETENSK AKADEM
THE ROYAL SWEDISH ACADEMY OF S



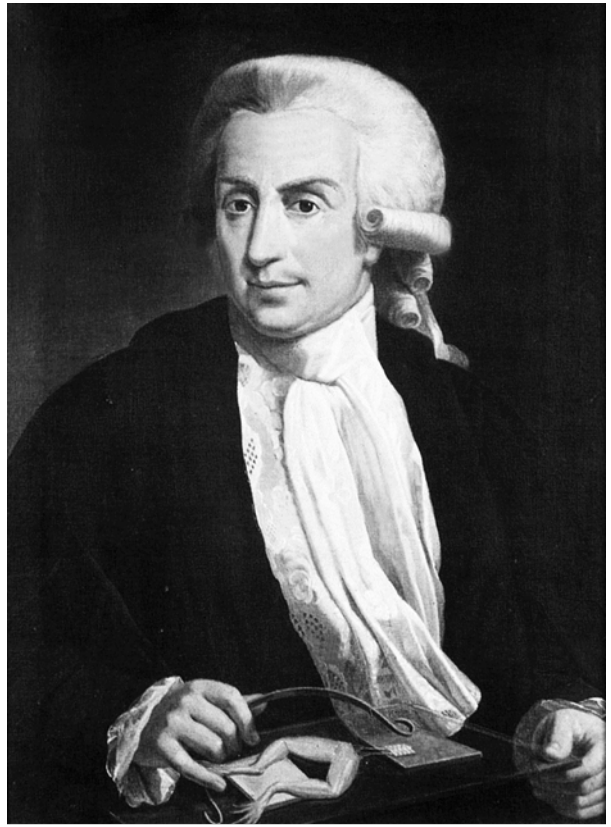
John J. Hopfield
Princeton University, NJ, USA

Geoffrey E. Hinton
University of Toronto, Canada

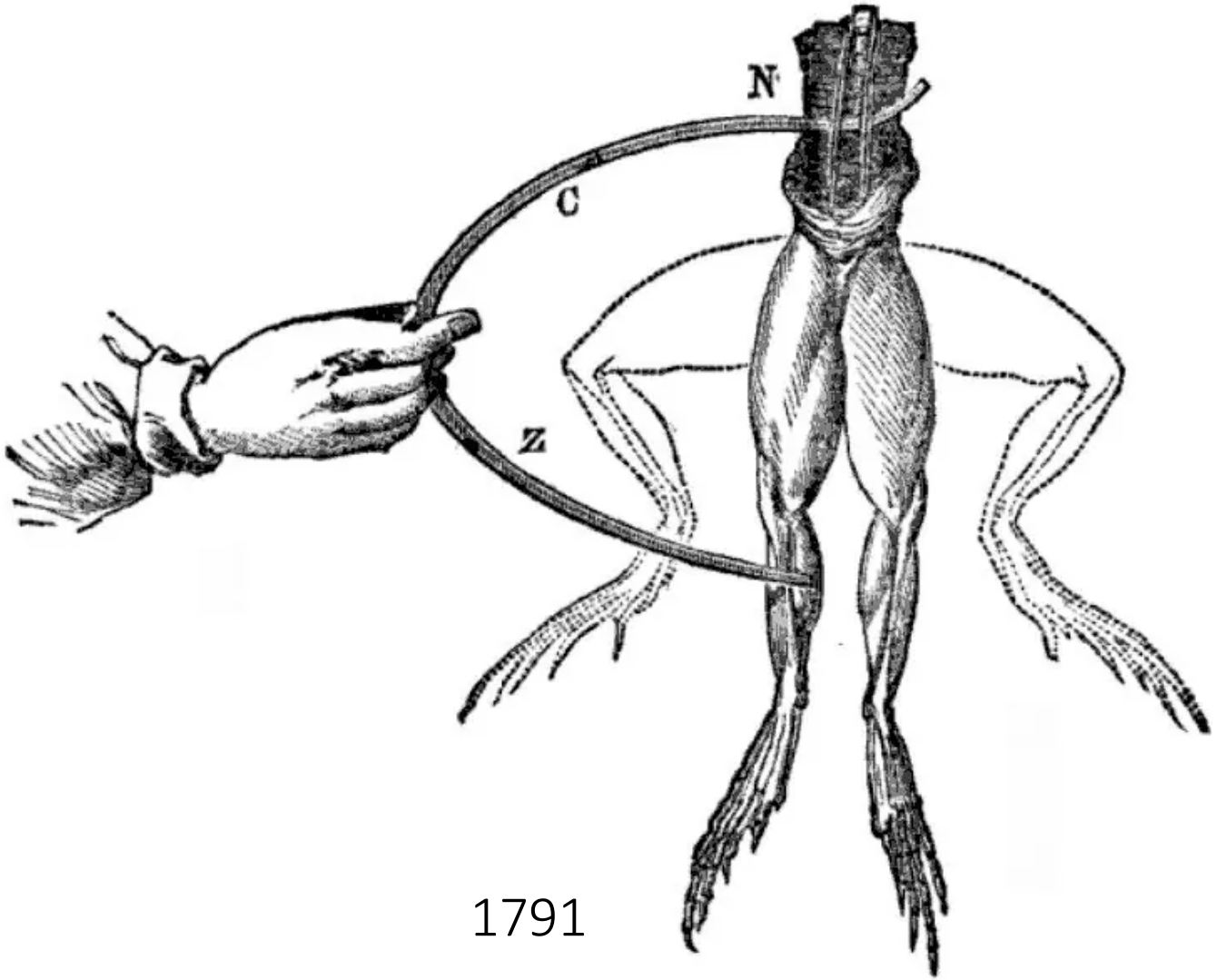
undläggande upptäckter och uppfinningar som möjliggör maskininlärning med artificiella neuron

foundational discoveries and inventions that enable machine learning with artificial neural netw

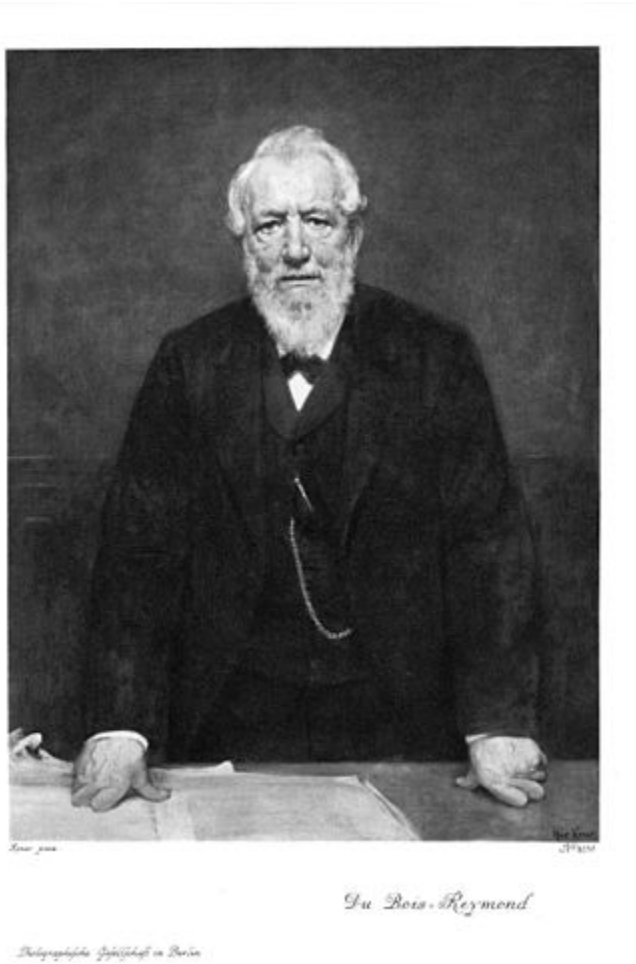
Galvanis „tierische Elektrizität“



Luigi Galvani 1750
(1737-1798)



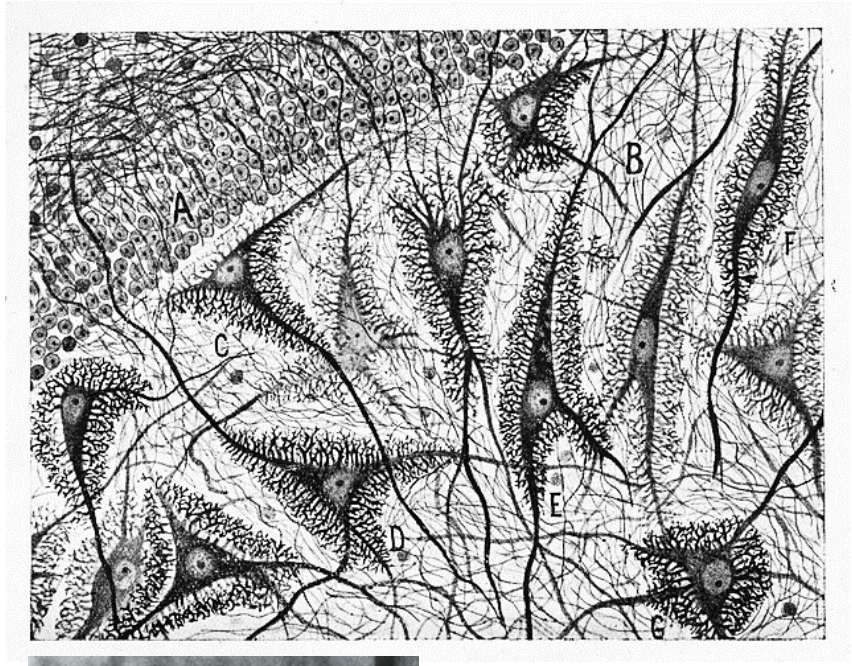
1791

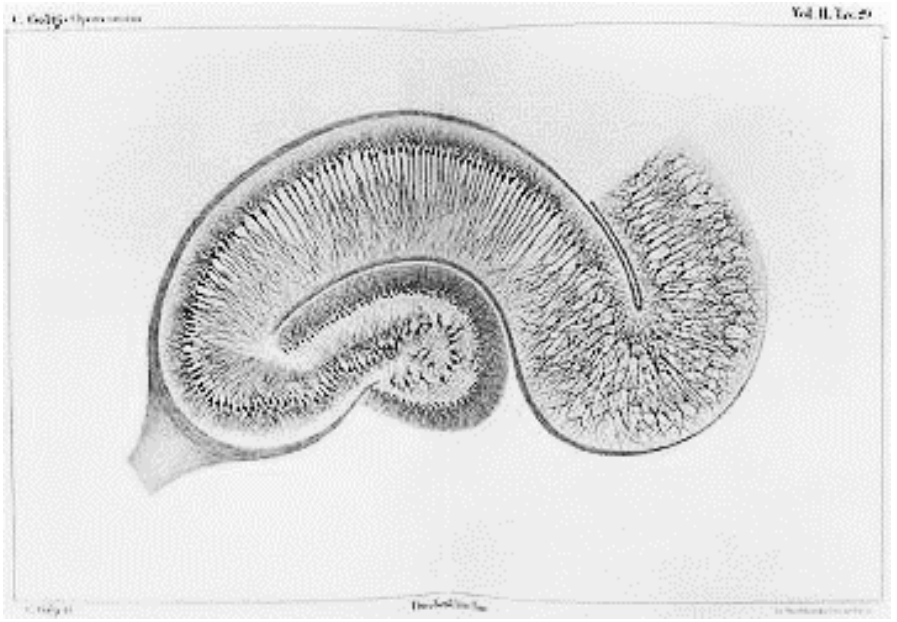


Emil Heinrich Du Bois-Reymond, 1896
(1818–1896)

Heinrich von Helmholz
(1821-1894)

Nobelpreise 1906 in Anerkennung ihrer Arbeiten über die Struktur des Nervensystems.

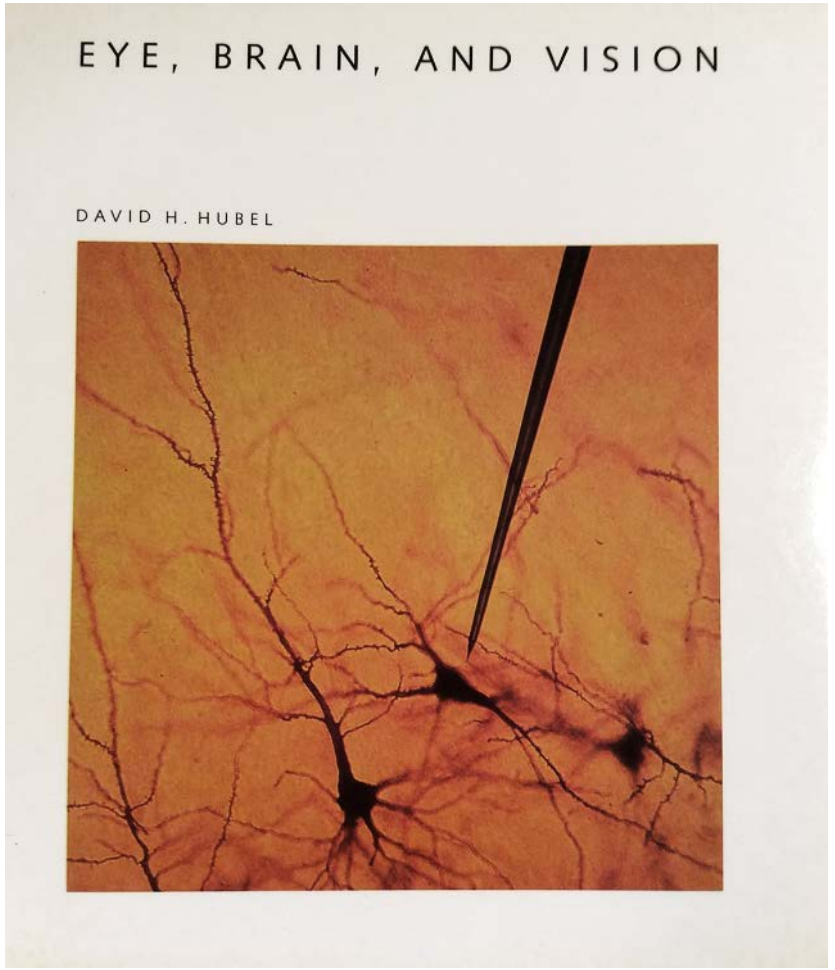


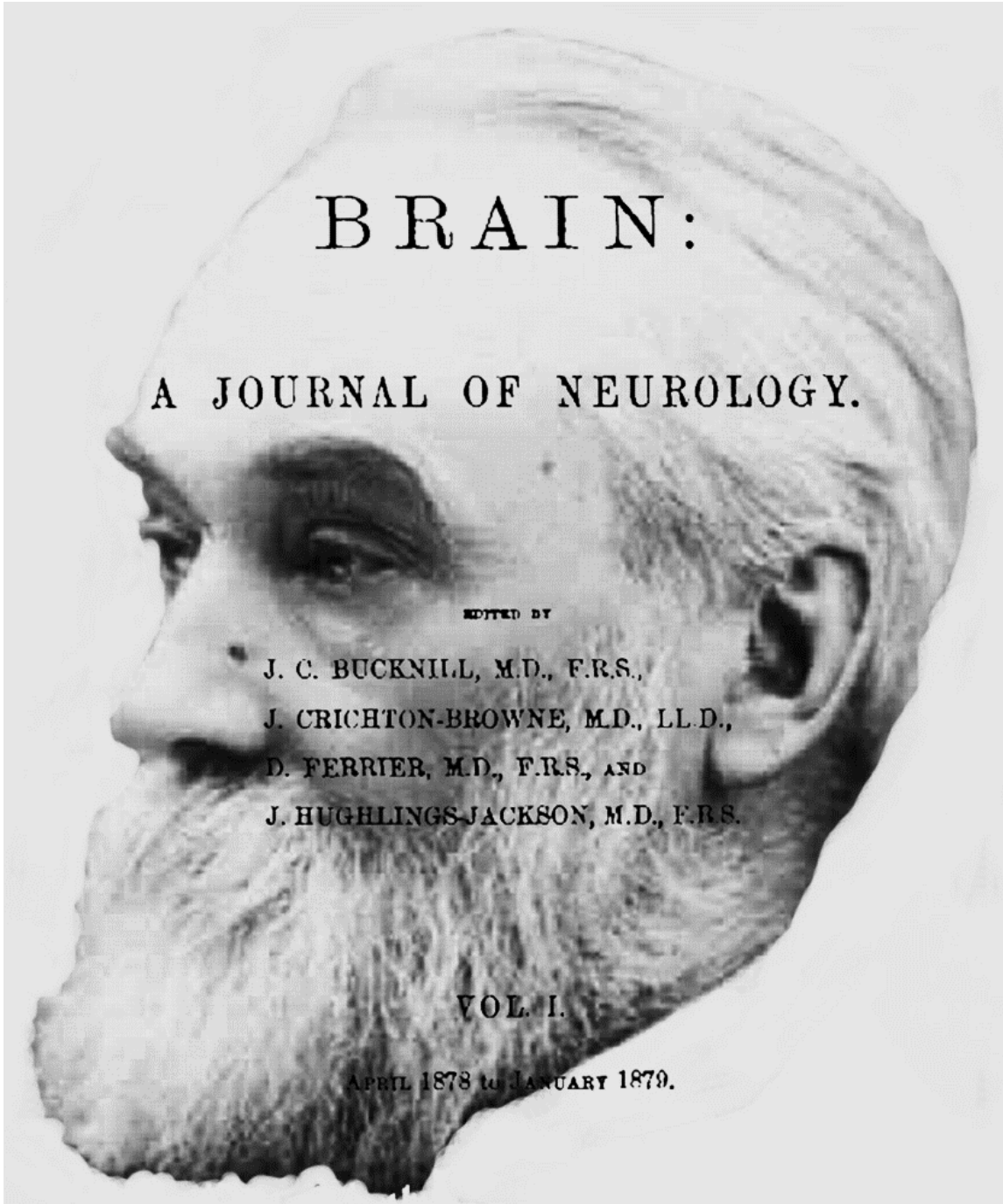


Santiago Ramón y Cajal, 1900, Zeichnung von Purkinje-Zellen

Camillo Colgi, 1873, Zeichnung des Hippocampus, gefärbt mit der Silbernitratmethode

Nobel Preis 1981 an David Hubel und Torsten Wiesel
für die Erforschung des visuellen Systems





LECTURES
ON
THE DIAGNOSIS OF EPILEPSY.

Delivered before the Harveian Society.

By J. HUGHLINGS JACKSON, M.D., F.R.C.P., F.R.S.,
Physician to the London Hospital, and to the National Hospital for the Epileptic and Paralysed.

LECTURE I.

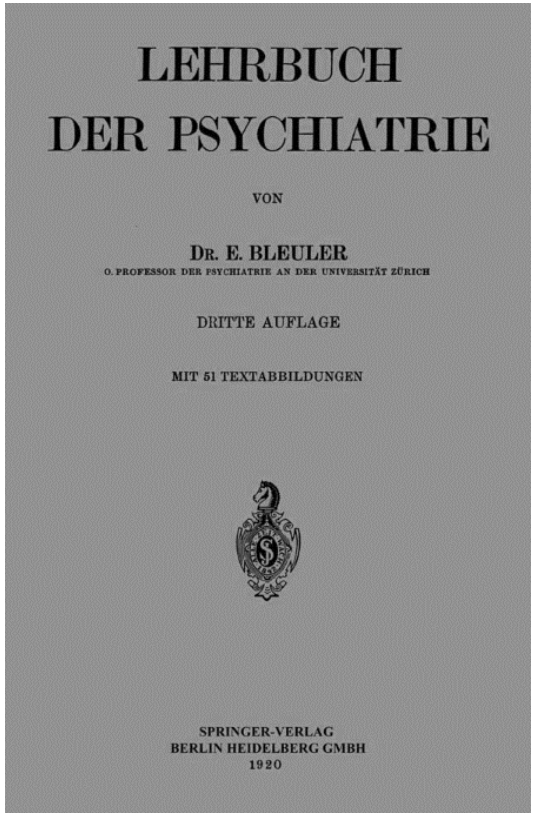
MR. PRESIDENT, GENTLEMEN,—The first thing I have to do is to thank you most heartily for the great honour you have conferred on me in asking me to give these lectures, and the next is to assure you that the task is in all ways a most pleasant one.

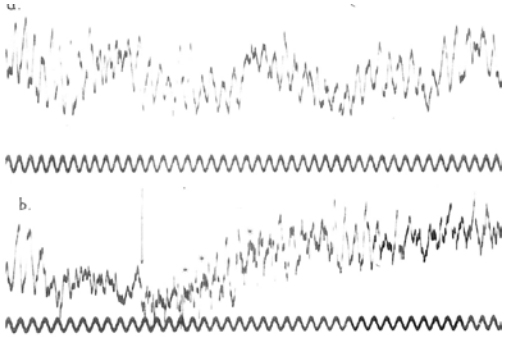
The subject I have chosen is the Clinical Investigation of Epilepsy. Epilepsy will be considered chiefly with regard to diagnosis. Such a subject is, however, far too wide. I must, therefore, omit large parts of it. To show more definitely how I shall handle my subject, some preliminary remarks on classification generally may be made.

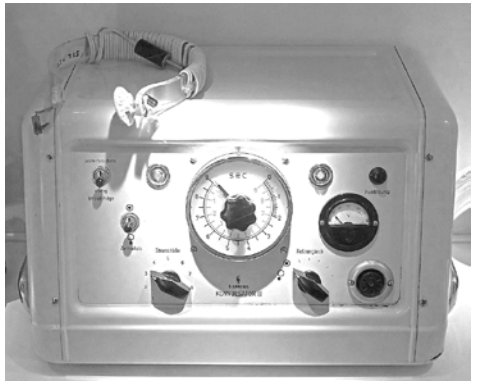
There are two kinds of classification of diseases: one scientific, generally called theoretical, for the advancement of knowledge; one empirical or clinical, for practice. In the scientific or theoretical, so far as is possible, we classify diseases as they are *departures from healthy states*—as they show abnormalities of structure, function, and nutrition. Empirically or practically, we classify them as *they approach certain types*. We will first consider the scientific classification of epilepsy, or rather of epilepsies.

Scientifically, I should consider epilepsies on the hypothesis that the paroxysm of each is dependent on a sudden temporary excessive discharge of some highly unstable region of the cerebral cortex. There is, in other words, in each epilepsy, a "discharging lesion" of some region of the cortex cerebri. The discharging lesion is nothing more than a group of cells whose instability is raised far above normal. This is considering an epileptic fit as being a development of the impressions and movements represented in some unstable region and in other regions secondarily discharged; but yet, since the discharges are excessive, an excessive and, so to speak, brutal development of them. Thus epilepsies are, scientifically regarded, departures from normal states by excess. As implied, the "discharging lesion" is supposed to be local. The discharge of the highly unstable cells constituting it (the primary discharge) leads to secondary discharge of healthy cells in other centres (collateral or lower) with which there is anatomical connexion by fibres; the degree and width of the secondary discharges varying according both as the force of the currents developed by the primary discharge and the resistance opposed by fibres and by cells of the healthy centres vary. We must not forget the resistance offered to local discharges in our consideration of their effects. The "discharging lesion" may be likened to a fulminate which overcomes the resistance of less unstable compounds.*

Elektrifizierte Psychiatrie

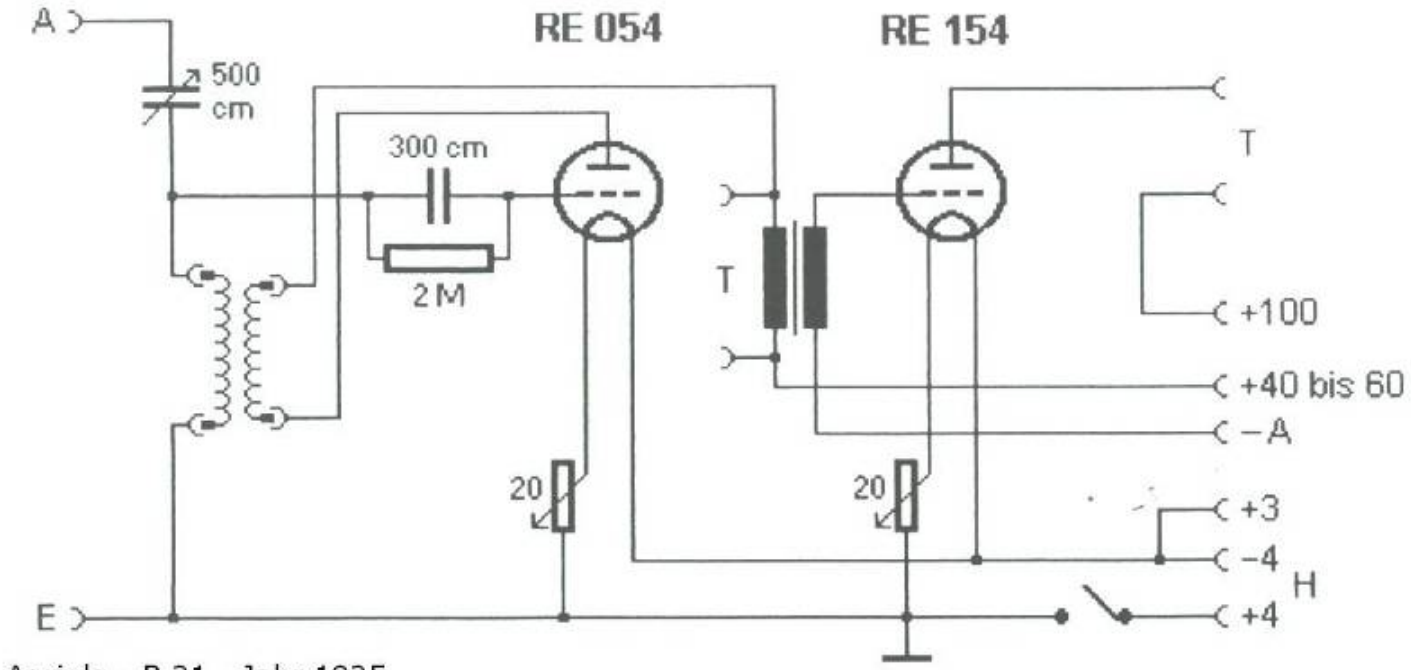




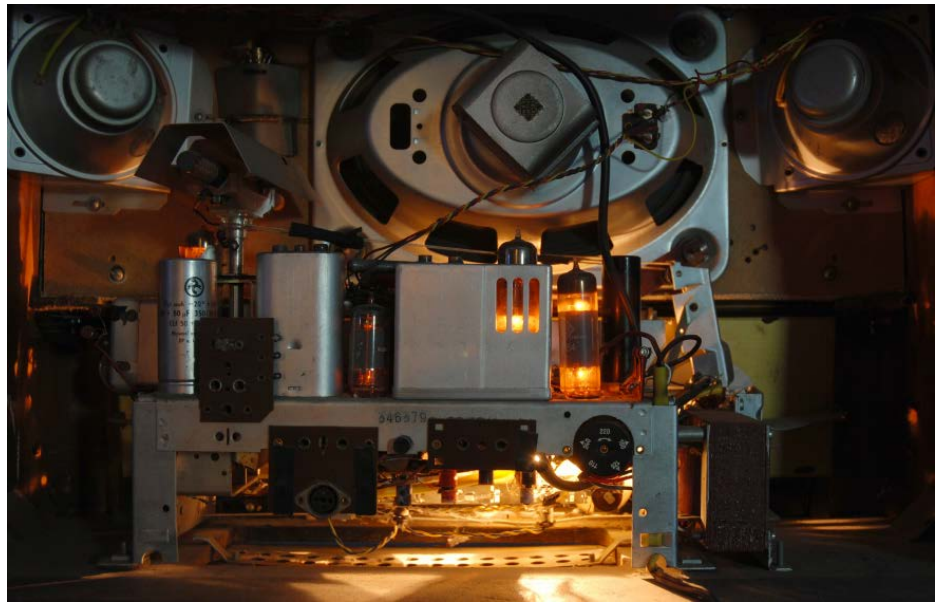


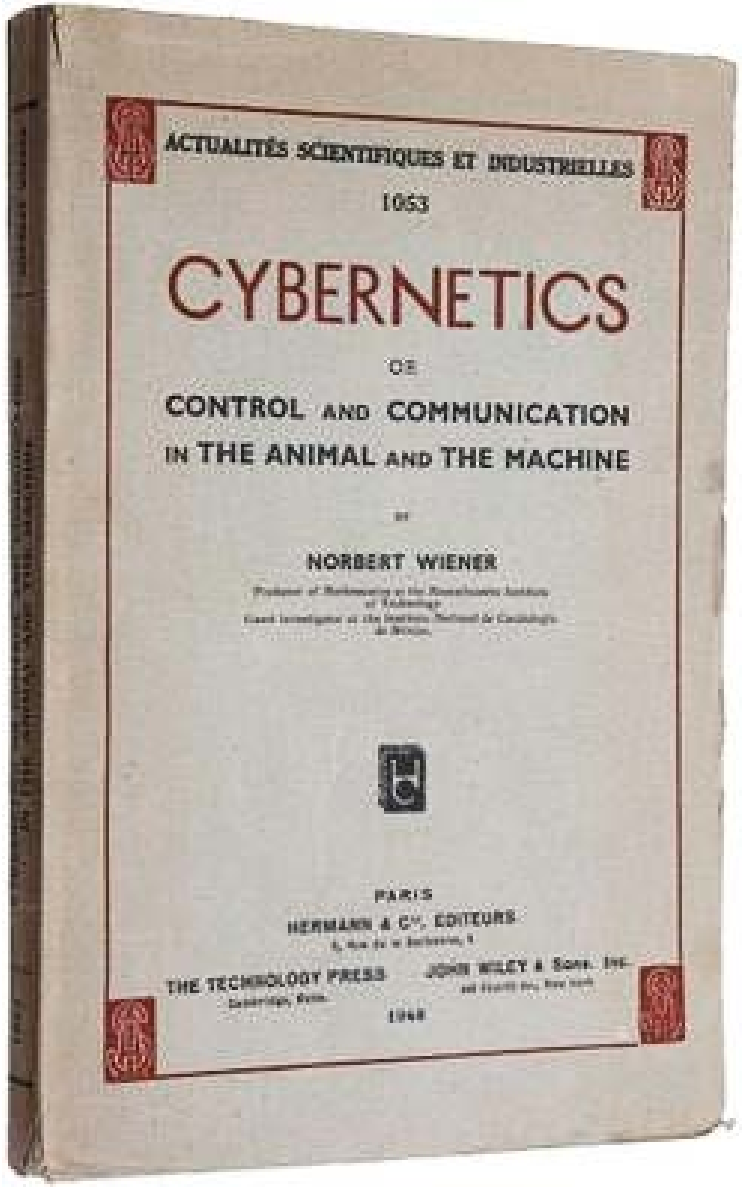
Eugen Bleuler (1857 – 1939), 1898 bis 1927 Direktor des Burghölzli und Ordinarius für Psychiatrie an der Universität Zürich

Rundfunkempfänger ca. 1925

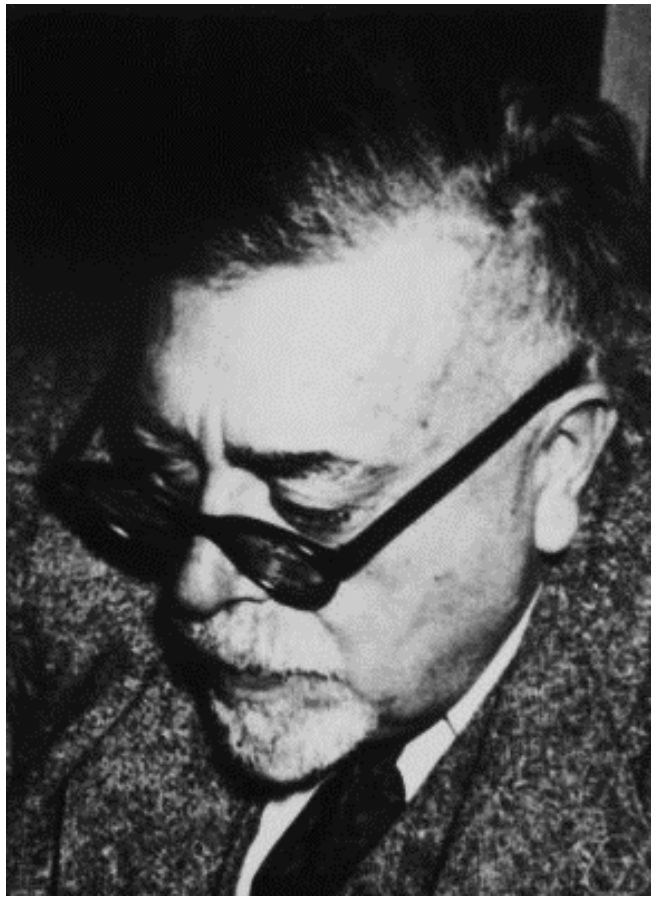


Aeriola - B 21 - Jahr 1925

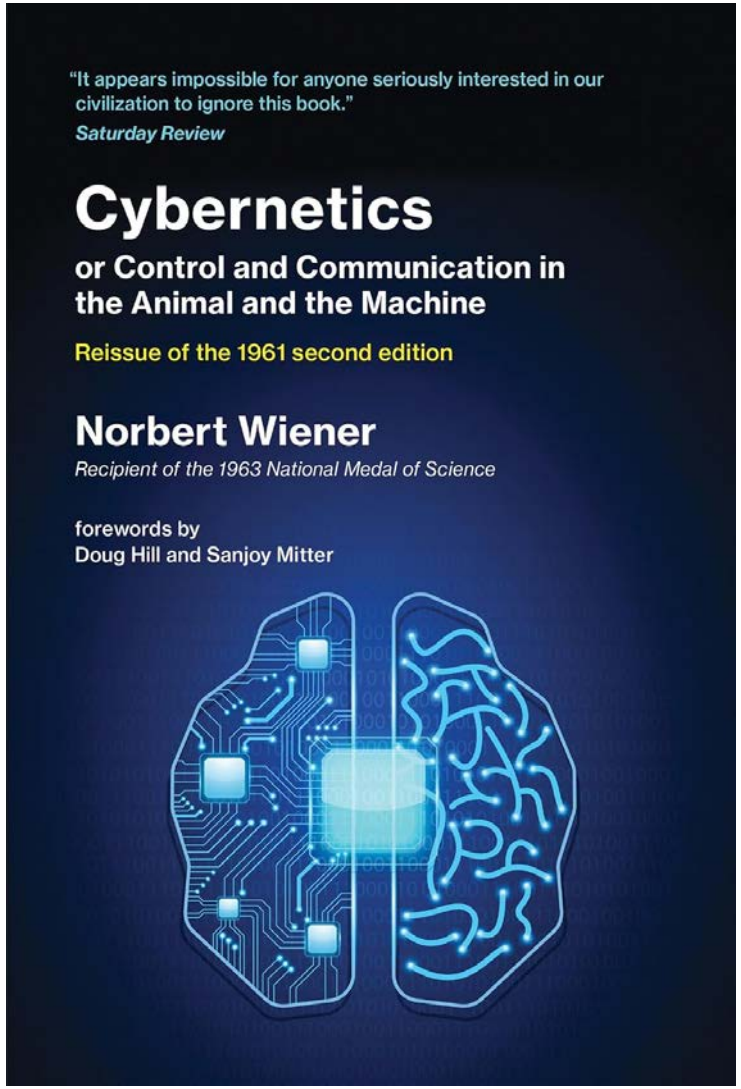




1948



1896-1964



2019

1903-1972

DESIGN FOR A BRAIN

The origin of adaptive behaviour

W. ROSS ASHBY

M.A., M.D., D.P.M.

Director, Burden Neurological Institute;
Late Director of Research, Barnwood House, Gloucester

SECOND EDITION
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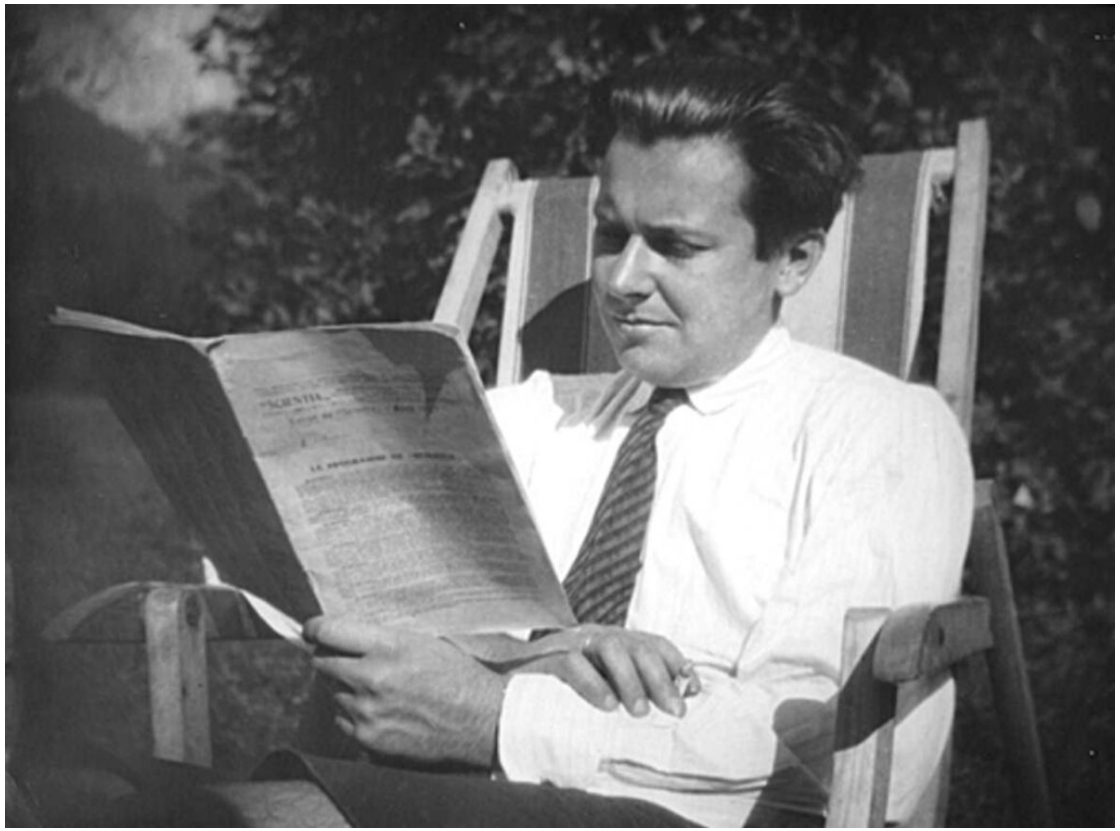
NEW YORK
JOHN WILEY & SONS, INC.
LONDON: CHAPMAN & HALL, LIMITED
1960



1901-1972

General System Theory

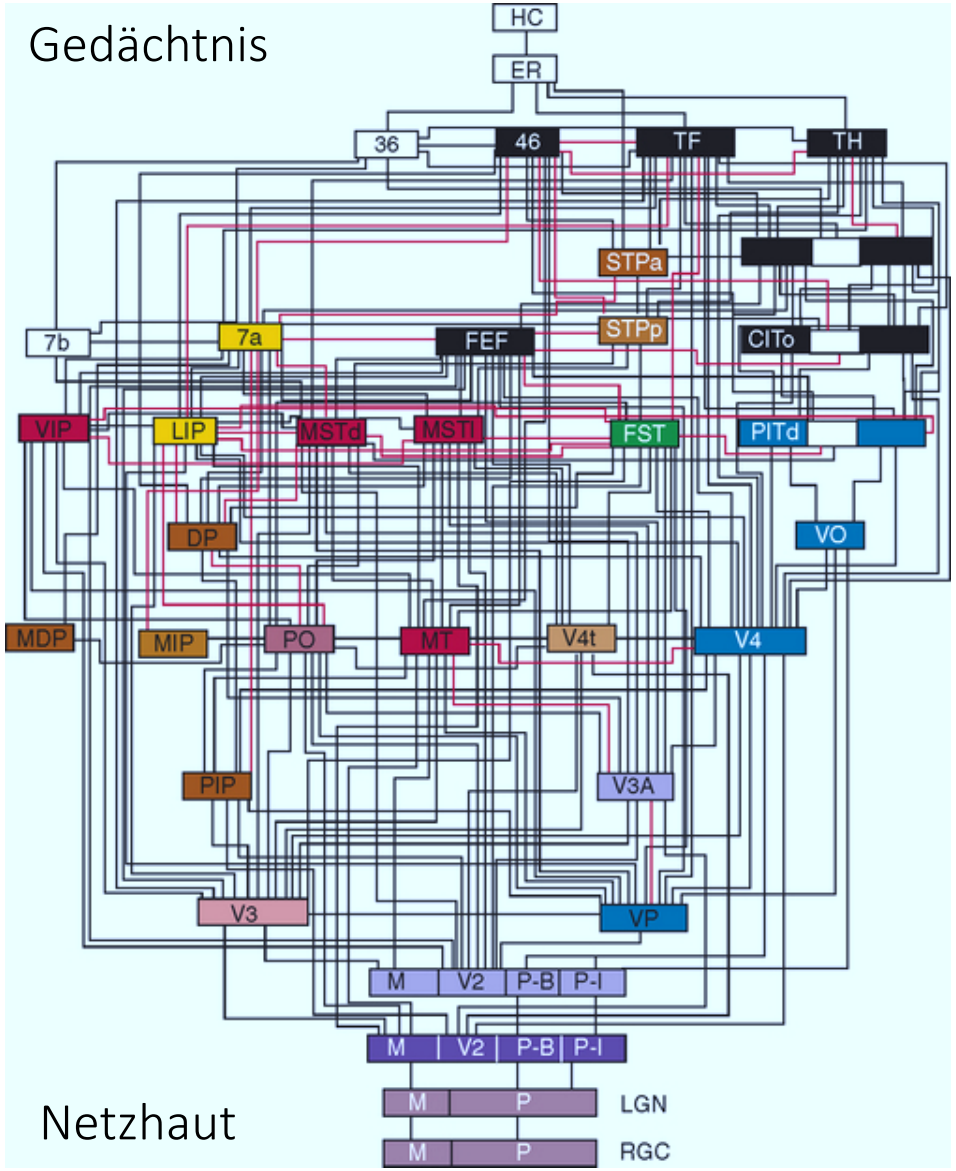
Foundations, Development, Applications

by Ludwig von Bertalanffy

University of Alberta
Edmonton, Canada

GEORGE BRAZILLER
New York

Das visuelle Netzwerk um 1990



Felleman & van Essen 1991

The Mind Revealed?

Science 24 August 1990: Vol. 249. no. 4971, pp. 856 - 858

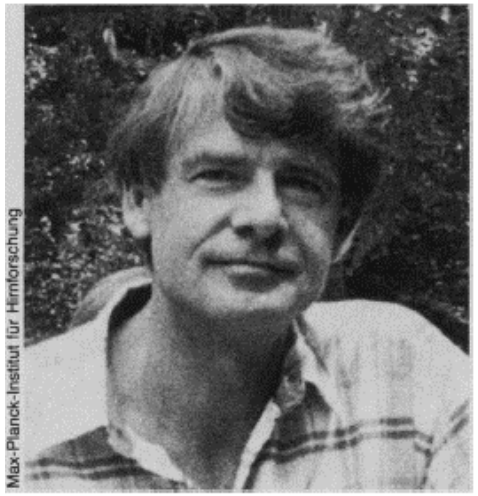
Some neuroscientists think that recently discovered oscillations of electrical potential at 40 hertz hold the key to how the brain assembles sense impressions into a single object

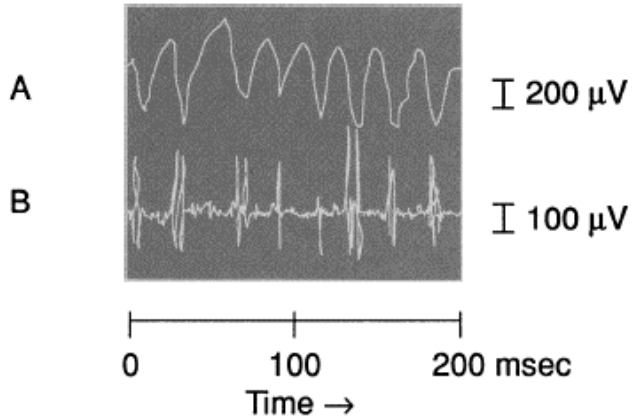
HAS WOLF SINGER UNCOVERED the cellular basis of consciousness? Some neuroscientists think he may have, although Singer himself stops short of such a bold claim.

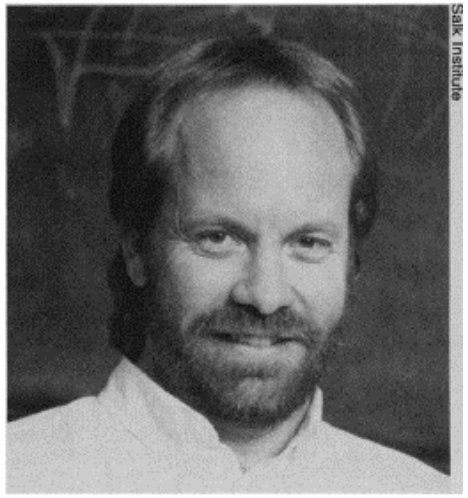
Last year Singer's research team at the Max Planck Institute for Brain Research in Frankfurt, West Germany, published a dramatic finding.* While recording electrical signals from widely spaced neurons in the brains of cats, they found that the neurons tend to fire synchronous electrical impulses when responding to stimuli that appear to come from the same object. Presented with stimuli that clearly are unrelated, the neurons may do it, Singer suggests, simply by firing in unison. A few bold theorists have pushed the notion further, claiming that, since visual awareness can be considered a model for consciousness in general, the 40-hertz oscillations may play a role in other forms of awareness as well.

Such grandiose theoretical leaps leave many experimental neuroscientists cold. Indeed, some suspect the oscillations are little more than an inconsequential side effect of neuronal activity. Yet the debate over Singer's findings has been sufficient to make 40-hertz oscillations one of the most talked-

the University of Southern California offered an intriguing solution to the problem of visual binding. He said that the neurons involved might bind by briefly synchronizing their patterns of activity. But how could a researcher know where to look for that synchronous activity among all the other neural commotion in the brain? "For a while I was rather depressed about the possibility of finding it," von der Malsburg told *Science*. "I thought sets of cells that would be correlated would be scattered all over the brain—there would be no way to pick them out. The mind would be invisible."

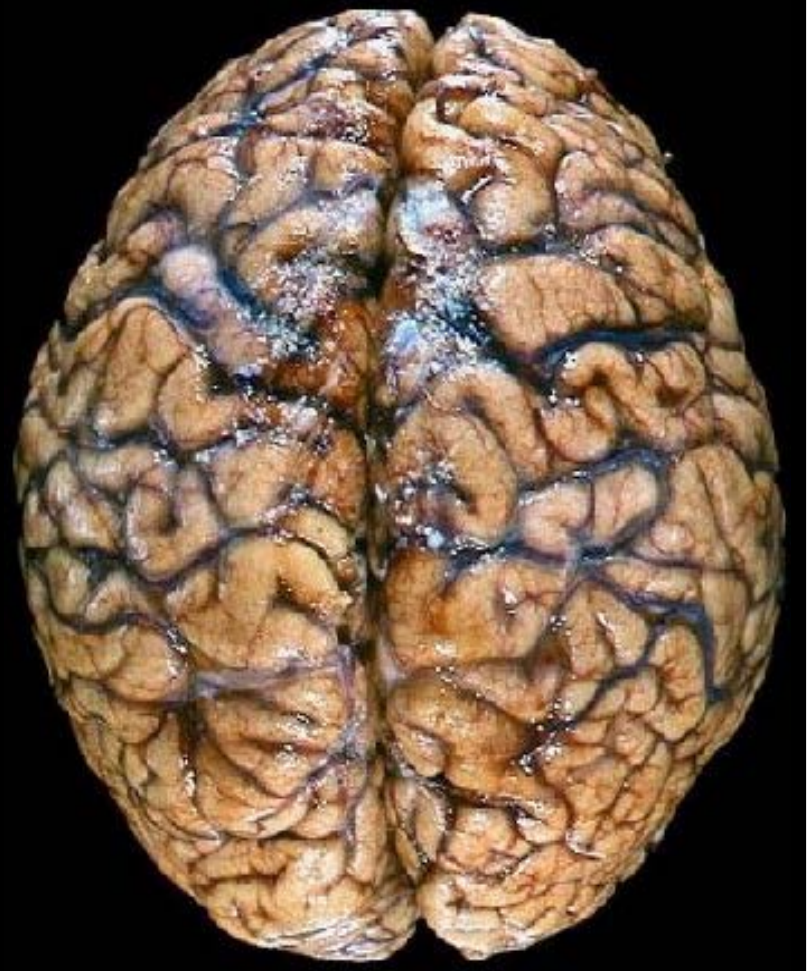






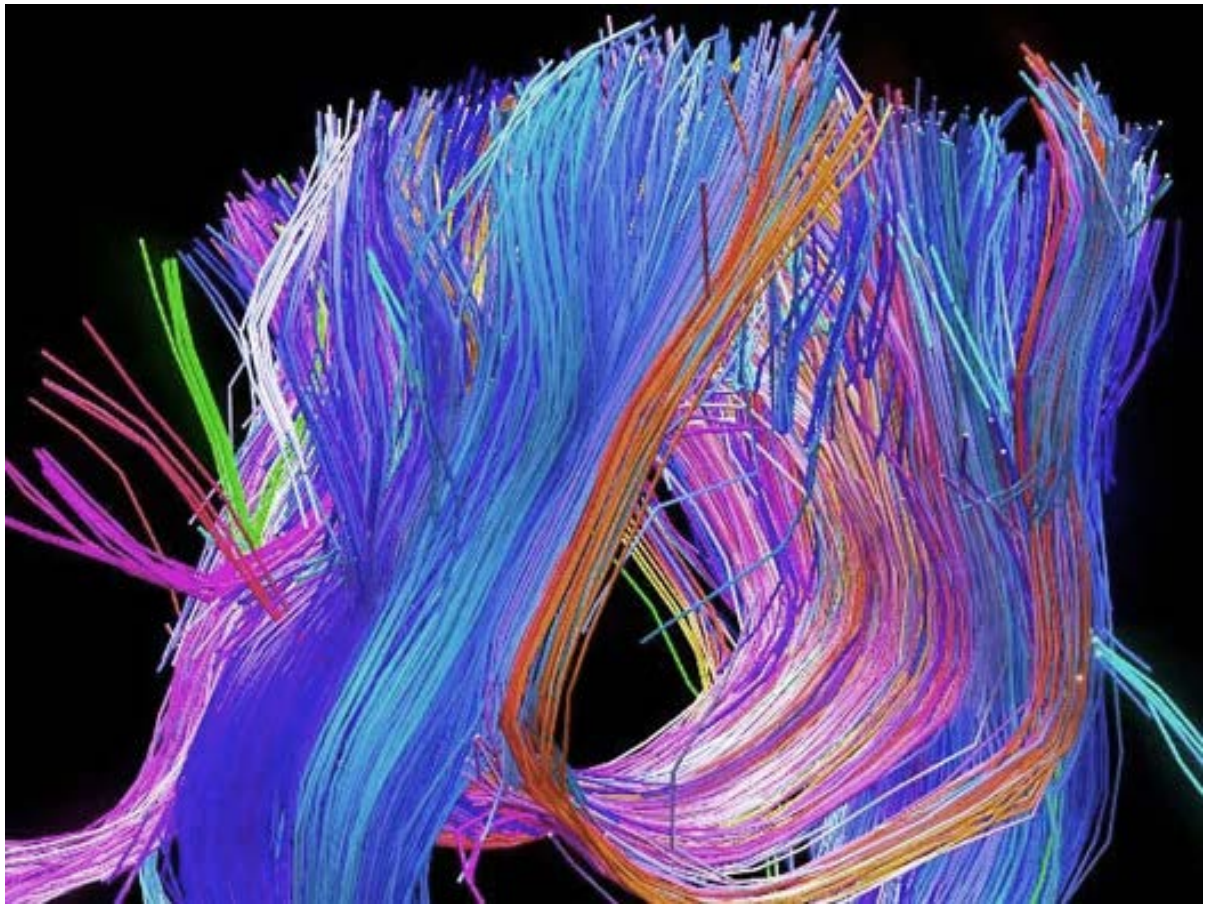
Oscillation revealed. *Wolf Singer (left) and Charles Gray characterized 40-hertz oscillations in the brain. Trace A shows the oscillations in electrical potential of all neurons near a recording electrode. Trace B shows the firing pattern of a pair of neurons near the electrode; the neurons tend to fire when the potential is at a low.*

Semir Zeki: Alles menschliche Verhalten
ist bestimmt durch die Gesetzmässigkeiten
der Aktivitäten von Nervenzellen und der Art,
wie sie im Gehirn organisiert sind.



Neuro-Philosophie, Neuro-Theologie, Neuro-Anthropologie, Neuro-Philosophie,
Neuro-Ökonomie, Neuro-Ästhetik, Neuro-Pädagokik, Neuro-Leadership

The Human Connectome Project Is a First-of-its-Kind Map of the Brain’s Circuitry



«Save the Date»

Ethik-Tagung der Schweizerischen Epilepsie-Stiftung zum Thema
„Herausforderungen und Chancen von digitalen Biomarkern und KI für Menschen mit Behinderungen"
Donnerstag, 24. Oktober 2024 von 13.30 bis 17.00 Uhr
www.swissepi.ch/ethik-tagung