

In This Issue



Memories

On the cover — a human brain against some detail of a portion of a computer chip. Superficial similarities have made comparison of computer and brain tempting. Even though they operate on entirely different principles to process information and store and retrieve memories, an understanding of the way each functions in these tasks may aid comprehension of the other as well.

To try to determine how the brain functions as a physical system, John Hopfield, the Roscoe



G. Dickinson Professor of Chemistry and Biology, constructs mathematical models of collections of neurons. Hopfield came to chemistry and biology via physics, the field in which he earned his PhD from Cornell in 1958. Before coming to Caltech in 1980, he was professor of physics at Princeton for 16 years.

During that time, however, his research veered from solid state physics to the physical basis of molecular biology. The long-term goal of his research is understanding the relation between structure and function in biological systems, but he considers that he is still doing solid state physics — only on rather more complicated material.

In his recent Seminar Day talk, which generated much enthusiasm and many questions, Hopfield described how a simple physical system can underlie the complex mem-

ory retrieval function of neurons. "Brain, Computer, and Memory," adapted from that talk, begins on page 2.

Commencement 1982

This year's commencement speaker, Hans W. Liepmann, is a man who knows and cares about students — a fact that is recognized and appreciated by them. In 1976, for example, ASCIT gave him an award for excellence in teaching; in 1978 the campus chapter of Tau Beta Pi honored him with the title Eminent Engineer; and in 1981 he was elected an Honorary Alumnus by the Alumni Association. His talk, "To Know, To Understand, To Do," was addressed very directly to those who were graduating and appears on page 8 almost word for word as he delivered it.

Liepmann is actually an alumnus of the University of Zurich, where he received his PhD in 1938. He came to Caltech in 1939 as a research fellow and has been at the Institute ever since, becoming a full professor in 1949, director of the Graduate Aeronautical Laboratories in 1972, and Powell Professor of Fluid Mechanics and Thermodynamics in 1976. Over the years his research has included work on laminar instability, transition and turbulence, shock wave boundary layer interaction, transonic flow, aerodynamic noise, and the fluid mechanics of helium II.

This has been distinguished research, and Liepmann has been honored for it by his peers. He is a member of the National Academy of Engineering, the National Academy of Sciences, and the American Academy of Arts and Sciences. He is an honorary fellow of the American Institute of Aeronautics and Astronautics, for which he was First Dryden Research Lecturer. The German Society for

Aeronautics has awarded him the Ludwig Prandtl Ring, and he holds the Worcester Reed Warner Medal of the American Society of Mechanical Engineers, the Monie A. Ferst Award of Sigma Xi, the Michelson-Morley Award from Case Institute of Technology, and the Fluid Dynamics Prize of the American Physical Society, of which he is a fellow.

Clearing the Air

Roger Noll, Institute Professor of Social Sciences, is a Caltech alumnus who received his BS in 1962



and then went off to Harvard to do his graduate work. He came back to Caltech as a member of the faculty in 1965, and has been here ever since except for stints as a senior economist at the President's Council of Economic Advisers in 1967-68 and a senior fellow at the Brookings Institution in 1970-73.

Noll is the author of three books and of more than a hundred articles on such subjects as safety and environmental policies, public utility regulation, the broadcasting industry, the economics of professional sports, the application of economics in political science, medical care policy, and bureaucratic decision-making. One of his current research interests is the development of a practical method for implementing tradable emissions rights as a means of dealing with air pollution.

On Seminar Day last May, Noll talked about some aspects of this research. "Leasing the Air: An Alternative to Regulation?" on page 12 is adapted from that talk.

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