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AN ELECTRONIC BRAIN

SOLVING ABSTRUSE PROBLEMS

VALVES WITH A MEMORY

Admiral Lord Mountbatten of Burma, as president of the British Institution of Radio Engineers, paid warm tribute to the recent developments in radio and associated techniques at the twenty-first anniversary dinner of the institution, held at the Savoy Hotel last night. He announced that the King had intimated his readiness to become a patron of the institution.

During the war, the PRESIDENT said, a wonderful opportunity for closing the gap between scientific theory and practical application came to scientists in every field, and it would be impossible to over-estimate the part they played in bringing about victory. Great stimulus had also been given to all forms of electronic research, and much of this was now being directed to inventions for purely peace-time purposes.

In the field of communications it was hoped that a standard system would be evolved, in which morse operators would be replaced by automatic apparatus such as the teleprinter and probably in certain circumstances by facsimile transmitters, and that a single unified world-wide network of stations would be set up over which messages would be passed automatically or semi-automatically from origin to destination without appreciable delay at any necessary intermediate stations.

SERVICE TECHNIQUE

The value of integrating the technique of service communications to the greatest possible degree had been demonstrated during the war, and it was encouraging that the three fighting services as well as civil and commercial interests in the British Commonwealth were now considering the possibilities of a network of this kind. He hoped they would reach agreement, and take what might well be the first step towards an international system over a world-wide network.

The war not only taught us a great deal about techniques, but it proved the occasion for new departures in application, particularly in electronics, which had enormously augmented our present human senses. Apart from radar, which aided to a remarkable degree the sense of sight, we might in future be able, by pooling and transforming the potentialities of other forms of radiation, such as light, heat, sound, X-rays, gamma rays, and cosmic rays, to receive the counterpart of radar screen pictures from inside our bodies, or even from individual body cells. Or perhaps we might receive them from the interior of the earth, or from the stars and galaxies.

Still looking into the future, Lord Mountbatten said that the sense-machine might present us with information not only visually but also in the form of sound or even of feeling; for there was reason to believe that facilities for impressing information and knowledge on the human brain, at present largely limited to sight and sound, may be extended by the direct application of electrical currents to the human body or brain. This extension of the sense of feeling was still in its infancy, but it had already been demonstrated as a practical possibility; and the information from the sense-machine might very well come to us in forms which would be unintelligible until we had trained ourselves to interpret new ranges of sight, sound, and feeling.

BRAIN WITH 18,000 VALVES

The stage was now set for "the most Wellsian development of all." It was considered possible to evolve an electronic brain, which would perform functions analogous to those at present undertaken by the semi-automatic portions of the human brain. It would be done by radio valves, activating each other in the way brain cells do; one such machine was the electronic numeral integrator and computer (Eniac), employing 18,000 valves.

A machine of this kind received information from various systems and, acting in accordance with overall directions given to it by human beings, even at a distance, could solve complicated mathematical problems in a fraction of the time taken by a mathematician. Abstruse calculations on which mathematicians might spend years could now be solved in a few hours. Machines were now in use which could exercise a degree of memory, while some were being designed to employ those hitherto human prerogatives of choice and judgment. One of them could even be made to play a rather mediocre game of chess! In the field of memory alone, it seemed likely that man was to be provided with vastly greater and speedier access to the inherited knowledge of the ages than he was able to command at present.

Now that the memory machine and electronic brain were upon us, it seemed that we were really facing a new revolution; not an industrial one, but a revolution of the mind, and the responsibilities facing the scientists to-day were formidable and serious. "Let us see to it," he concluded, "that we not only insist on being allowed to shoulder it; but that when we have established our right, we can also prove our fitness."

<http://www.turing.org.uk/turing/scrapbook/ace.html>

New N.P.J. Wonder

ELECTRIC BRAIN TO BE MADE AT TEDDINGTON

34 YEARS-OLD DESIGNER TALKS TO SURREY COMET

£100,000 A.C.E. WILL BE OBSOLETE BEFORE COMPLETED

SOME of the feats that will be able to be performed by Britain's new electronic brain, which is being developed at the N.P.J., Teddington, were described to the SURREY COMET yesterday by Dr. A. M. Turing, 34 years-old mathematics expert, who is pioneer of the scheme in this country.

The machine is to be an improvement on the American ENIAC, and it was in the brain of Dr. Turing that the more efficient model was developed.

THE "ELECTRONIC BRAIN"

A MISLEADING TERM

NO SUBSTITUTE FOR THOUGHT

TO THE EDITOR OF THE TIMES

Sir,—In his address to the British Institution of Radio Engineers Admiral Lord Mountbatten referred to the Eniac, the electronic calculating machine recently developed at the University of Pennsylvania, and from inquiries I have subsequently received it appears that his reference to this machine has aroused a good deal of interest.

This summer I had the privilege not only of inspecting but of actually using this machine, and am probably at present the only person in this country to have done so. Its design and construction form a remarkable achievement, of which those of your readers who are interested can find more details in a recent article in *Nature* (October 12, 1946). However, it is not of this that I write, but to deprecate the use of the term "electronic brain" as a descriptive title of this and similar machines.

These machines can only do precisely what they are instructed to do by the operators who set them up. It is true that they can be set up in such a way as to exercise a certain amount of judgment. But it must be clearly understood that the situation in which judgment has to be exercised, the criteria to be applied, the way the results of applying these criteria are to be assessed, and the decisions as to the action to be taken on these results, must all be fully thought out and anticipated in setting up the machine. As I wrote in the article in *Nature*, referred to above, "use of the machine is no substitute for the thought of organizing the computations, only for the labour in carrying them out."

It seems to me that the distinction is important, and that the term "electronic brain" obscures it, and is misleading in that it ascribes to the machine capabilities that it does not possess; and this is why I hope use of this term will be avoided in future.

Yours, &c., D. R. HARTREE.
Cavendish Laboratory, Cambridge.

THE "ELECTRONIC BRAIN"

TO THE EDITOR OF THE TIMES

Sir,—In a letter published in your columns on November 7 Professor Hartree deprecates the use of the term "electronic brain" in connexion with the new electronic calculating engines, and I wish to associate myself with his protest. In popular language the word "brain" is associated with the higher realms of the intellect, but in fact a very great part of the brain is an unconscious automatic machine producing precise and sometimes very complicated reactions to stimuli. This is the only part of the brain we may aspire to imitate. The new machines will in no way replace thought, but rather they will increase the need for it, both because the machines themselves will call for high qualities of intellect in their use, and also because as a tool they will open up new fields for study.

This subject first arose out of the recent speech of Lord Mountbatten. He had been fully informed by us of our project of the automatic computing engine, but at our request he did not mention it explicitly because it had not yet been made public. I would emphasize that he put the matter correctly in every respect, and that it was only a loose interpretation of his words that led to the present confusion.

Yours faithfully,
C. G. DARWIN, Director, National Physical Laboratory,
Teddington, Middlesex, Nov. 11.

Photo of Alan Turing's Teddington House

