

From 'Brains as machines and machines as minds', one-day meeting of Cambridge Philosophical Society at the Cavendish laboratory, Cambridge university, 7 December 1992

Minds and Machines

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There are two comments I would make: the first is a criticism of current thinking and the second is a question.

Firstly, the matter of 'artificial intelligence'. In my view the term is unsound. We heard Margaret Boden speak of the creation of art by a computer programme. She seemed to suggest that Karl Sims had programmed his computer to generate art. This misconstrues the nature of what artists do. Artists work in a manner that is externally mediated and responsive to public perception. They interpret life experiences and levels of awareness in the making of their art. No computer program, remote from experiential input or external mediation, can aspire to making any such thing. To pretend otherwise is to my mind no more tenable than to postulate that an oil-charged brush is creating art independently of the painter's hand. John Daugman has spoken of the 'creeping disappointment' experienced by those who attempt computer modelling of the brain and its information processing systems. Disappointment is inevitable, for the goal is unattainable. Nicholas Humphrey, who said he could offer no philosophical objection to a thinking machine, drew a parallel between the real ale of the true public house in comparison with keg beer, by analogy with the full-blooded flexibility of cerebral thought compared to the concept of A.I. bred, as he put it, in the 'steely vats of computers'. Christopher Longuet-Higgins told us of the domestic application of cruise missile technology: a truck that can drive for thirty miles along a freeway with nobody at the wheel. The difference between this mechanistic act and thinking lies in how the truck would react to a hitchhiker!

It is the essential artificiality of A.I. that prevents it from being intelligence. Intelligence is created from the successive unravelling of life. It is not assembled by an outside agency. A failure in human originality often makes us see new inventions as though they were imitations of familiar phenomena. When artificial fibres were first in production, they were called 'artificial silk'. When veneered chip-board came out, it was produced as 'synthetic wood'. Only in time did we start to see them as developments with their own applications, and offering particular benefits. Now that computers are in the ascendent, they are seen as the seat of 'artificial thought'. In each case we see need to see the new development as something with its own qualities and uses. It is distinct from, and often unrelated to, its natural predecessor.

I believe that Artificial Intelligence is a myth. Parallel computers can handle data on a vast scale, both more effectively and far more efficiently than can the human

mind. But they cannot imitate any of the cognitive or intellectual abilities of brains. We need a new term, something without the biological resonance of 'neural networks', because the inherent artificiality of A.I. is blinding us to its benefits and to its true reality. That's my criticism. And now, if I may, the question.

We have heard of neurons today as go- or no-go gates. This is the received opinion of our time. I see a protozoon like *Spirostomum* nosing around, making decisions as it goes. We are nothing more than the manifestation of the single cells of which we are composed, and if microbial cells can carry out intracellular information processing, then I do not accept that a highly specialised neuron within the human brain is a mere binary switch. Someone asked about pain sensation in lower creatures, and I say that all organisms sense unfavourable stimuli and react to them.

Part of the problem is an ignorance of basic biology. Dr Boden showed us Panspermia. It seemed to be an exploration of life spreading through our universe, a video poem compiled by a non-biologist. Yet we saw what was clearly a bryophyte ejecting an angiosperm seed instead of a spore; and plants like that need an atmosphere of such density as to make the attainment of escape velocity impossible. David Willshaw spoke of the over-endowment of embryonic striated muscle with endplates, and speculated as to how they come to compete until only one is left to serve each fibre. The reason, I have no doubt, is not due to axon competition at all, but because the neurons have the matter cut and dried, and sort matters out between themselves. They know what is needed. His modelling process is as unrepresentative as trying to describe a track race in terms of the behaviour of feet, without reference to the athletes.

No, it is the neuron itself which thinks. The synchronous 40-100 Hz firing mentioned by Ian Glynn is how they talk to each other. That is the language of the mind. The nearest we came to some sight of the cells was in Kevan Martin's fine talk, where he showed those marvellous views of discrete neurons. But the cell body itself was only seen as a mere outline in his illustrations. That, I contend, is where thought goes on. It is a view I first published in the 1970s, and I wish to ask - why do these speakers not consider that it is not the brain that is the computer at all; but the neuron?

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