IN SEARCH FOR ARTIFICIAL INTELLIGENCE

UPSTREAM ADVANCED (C1) – JENNY DOOLEY & VIRGINIA EVANS
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It is one of the most evocative phrases in the lexicon of science: artificial intelligence, 'AI', the creation of machines that can think. Just the mention of it conjures up images of HAL, the all-too intelligent computer in 2001: A Space Odyssey, and C3PO, the chatty, batty robot from Star Wars.

For over half a century, computer scientists have been working towards creating such machines, spending billions of pounds in the attempt. And hanging over their efforts has been a challenge set by a British mathematician widely regarded as the father of AI research: Alan Turing.

During the 1930s, Turing showed, in theory at least, that a 'universal machine' could be built, capable of performing all the tasks of any special-purpose computing machine. After war-time work on code-breaking, Turing helped to turn his discovery into the reality of an electronic computer. But he also believed his proof meant that computers could mimic the action of the human mind.

In 1951, Turing published a prediction: by the end of the century, computers would be able to hold a five-minute conversation with humans and fool 30 per cent of them into believing they were dealing with another human being.

It is a deadline that has come and gone, along with huge amounts of funding. Yet no computer is remotely close to passing the 'Turing Test'. What went wrong? Why has no one succeeded in creating AI?

In fact, AI is already here, earning its keep in banks, airports, hospitals, factories – even our own home and car. It may not be quite what many were led to expect, but then the story of real-life AI is one of misplaced dreams, bitter feuds and grant-grabbing hype.

Today's computer scientists divide into two broad camps on the issue of AI. The pragmatists see AI as a means to creating machines that do for thinking what engines have done for physical labour – taking on tasks we humans would prefer not to do: spending endless hours scouring heaps of market data for trends or scanning piles of medical images for signs of disease.

Then there are the visionaries, still wedded to Turing's challenge and trying to bring the sci-fi image to life. For them, AI is all about computerised 'assistants' that solve your printer problems and cheeky-chappy robots that talk to strangers. There are some who even see AI as the route to understanding the workings of the human mind.

Without doubt, it is the visionaries who have done most to get AI research on TV shows such as Tomorrow's World. It is the pragmatists, however, who have got AI out of the door and into successful applications: the neural network cooking controls of microwave ovens, for example, or the expert system that vets credit card transactions.

When current AI technology is pushed closer to its sci-fi image, the results can be more irritating than impressive: witness Microsoft's Paperclip Assistant, and the AI-based 'help-desks' of some high-tech companies. Even now, 50 years after work began on intelligent machines, only the bravest customers trust the automated telephone ticketing system at their local cinema.

Even so, visionary AI researchers working away from the mainstream have pulled off some striking achievements. Herbert Simon's 1957 prediction that a computer would make a mathematical discovery came to pass 20 years later, when a logic-based program named AM, developed by Douglas Lenat at Stanford University, discovered that every even number greater than four seemed to be the sum of two odd primes. In fact, AM had been pipped to this discovery by the Prussian mathematician Christian Goldbach in the 18th century; nevertheless the rediscovery of 'Goldbach's Conjecture' by AM caused a stir within the AI community.

Simon's prediction that a computer would become world chess champion also came to pass – in a manner of speaking – in 1997, when IBM's Deep Blue computer beat Garry Kasparov, the greatest human exponent of the game.

Most likely it will be one of the AI visionaries who finally creates a computer that passes Turing's 50-year-old test. For many in the mainstream AI community, however, beating the Turing Test is viewed as little more than a party trick. They are hard at work addressing far more basic issues in AI – like convincing computers to hand over the cinema tickets you've paid for.

Time limit		Imitate	
Disputes		Trick	
Groups		Achieved	
Publicity		Create in the mind	