



Photos of implants and cyborg experiments: copyright iCube Solutions

**He was cut open twice and risked paralysis for self-experimentation. His vision of 'evil machines' could redefine the meaning of technophobia. Critics say he relentlessly self-publicises at any given opportunity.**

**By Viviane Li**

## Is Kevin Warwick a visionary cyborg, or just an overexposed cybore?

I CANNOT think of another living scientist with as contradictory a public image as Kevin Warwick, Professor of Cybernetics at the University of Reading. On one hand he has many academic accolades, such as The Future of Health Technology Award from MIT (Massachusetts Institute of Technology). On the other hand he is ridiculed as an attention-seeking quack scientist.

Warwick acquired international fame as the world's first cyborg when a microchip was implanted into his arm in 1998. He went even further four years later with Cyborg 2: a hundred microelectrodes were pneumatically hammered into his nerve to investigate two-way communication between technology and the nervous system.

Unusual for a scientist, he has no hang-ups about self-experimentation. "Going back to the first implant, I realised there was a possibility that something could go wrong, and if it did go wrong with me, alright it was my fault. But for one of the researchers... I just couldn't live with that. Maybe it's a personal ethical thing. I am driving it forwards, so I take the blame. But then when it came to the second implant, having experienced the first, I enjoyed it. It was good fun. It worked and it opened my mind as to where we could go to next."

Warwick identifies the pioneering spirit as his driving force, which necessarily incurs

risks. He first thought objectively about the brain and mental processes at the age of eight, when his father developed a fear of open spaces. This was cured by neural surgery, which incidentally changed his dad into quite a good snooker player. Yet as a schoolboy, he did not enjoy science because of the unquestionable nature of its teaching. He worked for British Telecom for six years, before reading Electrical and Electronic Engineering at Aston University at 22. A PhD at Imperial College was followed by academic posts at Oxford, Newcastle and Warwick Universities. He gained his professorship at Reading in 1988, at the age of 32.

A supporter of 'strong AI' (the prediction that machines will become more intelligent than humans), Warwick foresees a potentially grim future. "I think if it learns and adapts, whether it's a machine or animal, it opens up possibilities of going outside the bounds that you set on it... [that's] why machines will take over, because we're taking a lot of the negative aspects of human kind as the initial seeds for machines, in military, in finance, and sprinkling in a bit of learning." He warns against judging computers on human terms. For example, in asking whether computers are conscious may be wholly irrelevant. "In a battlefield scenario... here's a cruise missile [with an on-board computer programmed to destroy targets] coming to blow you up, [saying]

'you are not conscious you can't hurt me' is not going to have any effect whatsoever."

No stranger to bad press, Warwick believes a combination of incidents in 2000 led to heightened criticisms – his appearance on the cover of Wired magazine, and presenting the Royal Institution Christmas Lectures both caused jealousy. "I know another group had been campaigning for a number of years to get the christmas lectures in the area of

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robotics and artificial intelligence. But then it was me that was offered it, and I think they were not [happy], having done quite a bit of work to try and get [it]."

Further criticisms came in September 2002 when he commented on the possibility of tagging eleven-year-old Danielle Duval. This happened nine months after Ian Huntley was convicted of murdering ten-year-olds Jessica Chapman and Holly Wells. Both Danielle and her mother were in favour. Warwick had no regrets, "I think ethically the question had to be raised". He believes ethics and society should steer scientific progress, but the issues need to be raised first in order for that to happen. He still receives requests from parents worldwide. "There are quite a few people saying 'please, I won't tell anybody. Let us have this technology so that my child can be safe...' then there are children's societies who say 'no, you shouldn't be doing this', or 'we don't know what you should be doing'... I think I was really just in the middle of that. I am not ashamed or feel that I shouldn't have been a part of that."

Warwick does not consider himself a 'media whore'. He believes in communicating science in an understandable way and sees television as an excellent medium, "from an education point of view, rather than talking to a room full of 30 people with half of them being asleep, you can communicate with three or four million actually sitting up and listening." Academics face international competition, he says MIT raises funds through publicity, which includes appearing on television. "I think there has been a tradition in the UK and in Europe, of scientists almost doing the

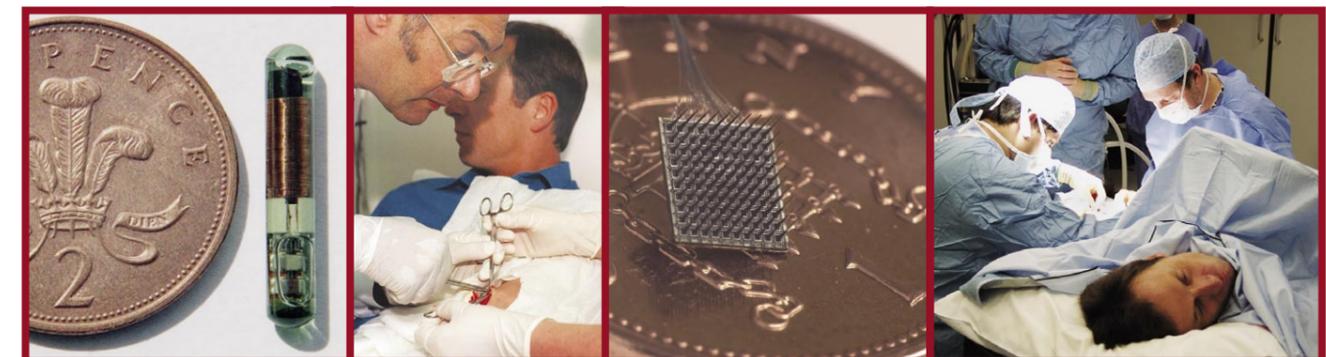
opposite, making the science they do seem a little more important than it actually is by making it unfathomable." Despite favouring mass communication, he agrees that the media distorts the portrayal of science. "Of course they do, but they distort everything... [sometimes] they quote you as having said something. If you've actually said it, you'd be lucky... [and] for sure it's gonna be modified and reworded to a certain extent, you just have to accept that." When it comes to the media, "having to talk 20 pages in a book into one or two lines" is inevitable. Sometimes, he would push things further to get a point across, "from a philosophical view, it can be good to make a point strongly. If you are having a debate, there's no point agreeing with each other over things. You're trying to take different sides, to raise issues and promote your side in a colourful, attractive way that draws people into the argument."

Given the negativity towards him, Kevin Warwick denies having made any career misjudgements. He says he tries to be a good scientist and strives to be an even better one. So what does he think is good science? "I think it's a mixture. You do need to look at the boundaries of science as we know it now and push back the boundaries to look outside them, and then to substantiate what's being done with further studies, to dig into the direction you've gone more deeply. That means good science is not sitting where you are with the science we know, twiddling with alphas and betas just to ink out your career, publish a few papers and become a fellow of this society or that society... in this country, there are a lot of scientists doing that."

**"good science is not... twiddling with alphas and betas just to ink out your career"**

Determined to push the boundaries, don't expect Cyborg 2 to be the end, "Cyborg 3, as I see it, would be someone paralysed receiving a brain computer implant." Neither is self-experimentation over, he will do it again in Cyborg 4. I tempted him with the suggestion of a brain implant, "...it is a dangerous thing. I would like to experience it, but I think I'd need to learn quite a bit first." You've been warned, I think he likes to get things done. ■

Opposite page: the professor reading at his desk. Below from left to right, Cyborg 1: the RFID implant (shown next to a 2p coin); the implant surgery. Cyborg 2: a microelectrode array (shown on a 1p coin); two surgeons performed a two and a half hour operation on Kevin Warwick's implant.



### Cyborg Experiments

**Cyborg 1 August 1998**

A radio frequency identification device (RFID) was implanted into his arm for 9 days, which allowed the University building to react to his movements.

**Cyborg 2 March to June 2002**

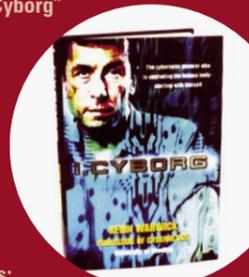
An array of 100 microelectrodes were 'hammered' into the median nerve of his left arm using a pneumatic gun.

The implant was in place for 3 months and investigated the following:

- ultrasonic extra-sensory input
- control a robot and drive a wheelchair with nerve impulses
- mirror human hand movement with a robotic hand
- remote neural stimulation over the internet
- interact with the network in the university building
- interactive wearable technology (collaboration with the Royal College of Art jewellery department)

### Win a copy of I, Cyborg

I, Science has a signed copy of the book "I, Cyborg" from Kevin Warwick.



To win it, tell us: **Which part of your body would you upgrade and why?**

E-mail your answer in 25 words or less, marked "RoboKew", to [i.science@imperial.ac.uk](mailto:i.science@imperial.ac.uk) by 30th April 2006. The best answer wins the prize!