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Clear up this fuzzy thinking on brain scans

France has banned commercial applications of brain imaging. So why approve its use in court, asks Olivier Oullier.

Neuroscience could not save Edwin Hart Turner. After years on death row, the double murderer was executed by lethal injection at the Mississippi State Penitentiary in Parchman on 8 February, despite last-minute legal appeals including brain scans that, his defence claimed, showed that he was mentally ill and therefore unfit for the death penalty. Whether or not we neuroscientists like it, our field has become the new genetics, the latest scientific field to be used and sometimes hijacked to explain human behaviour.

Hardly a week goes by without the media showcasing beautiful three-dimensional images of the brain in action, which supposedly explain how and why humans do the things we do. Most recently, people have pretended that they can use neuroimaging alone to identify paedophiles or prove that we fall in love with mobile phones.

The limits of the technology, together with our incomplete picture of how the brain functions, make it hard to take these claims seriously. But, regardless of the doubts expressed by many neuroscientists, the appeal of brain images, and the illusion they offer of understanding and explaining our daily behaviour, continues to grow.

The spreading use of neuroscience outside research and medical labs raises ethical and practical questions. Commercial services, such as marketing and lie detection, are already starting to make use of brain-imaging techniques. These services are over-interpreting the science. Although neuroimaging could help us to understand how people make decisions, it should not be sold as something that can predict or judge human behaviour. A brain on its own tells us nothing.

That a technique is still in its infancy doesn't stop people from trying to sell it or from buying it. And damage can be done even if the victims of neuromarketing hype are not the general public but the gullible heads of companies who are being overcharged.

If this business expands, it will become the most visible face of neuroimaging. We cannot afford to have public opinion turned against the development of neuroimaging because of overstated claims by commercial opportunists.

France has tried to crack down on such rogue uses of neuroscience. With the help of myself and other neuroscientists, the French parliament has revised its 2004 rules on bioethics. The result, passed last year, is a section of the law that simply states: "Brain-imaging methods can be used only for medical or scientific research purposes or in the context of court expertise." The revised law effectively bans the commercial use of neuroimaging in France, although neuromarketing companies have only to cross the border to continue their business.

The ban was controversial from the start, with many experts arguing that neuroimaging should not be singled out. Why draw attention to bogus commercial uses of the technology, they said. This was a somewhat hypocritical stance, given that these scientists consider such applications to be unscientific by default, yet they argued that neuroimaging can improve understanding of brain disorders and of how children learn to read, for example. That attitude would leave us in the undesirable situation in which the reliability of an innovative methodology is judged on its perceived value and utility for society, not on the science itself.

In view of the uncertainties in the technique, the revised law's invitation to use neuroimaging in courts is also problematic — certainly, none of the neuroscientists consulted during the drafting process said that it should be encouraged.

So far, neuroimaging has been confined mostly to a supporting role in court: in sentence mitigation, for instance. But there have been misguided and dangerous attempts in India, Italy and the United States to use brain scans as key and decisive evidence of guilt or innocence. Such efforts have not been successful, but we get closer every day to the situation that a court somewhere in the world will accept neuroimaging data as primary evidence. France should not be encouraging its use at this stage, at least not in such nonspecific terms.

French politicians' call for neuroimaging to be used in courts even though no expert advocates the move speaks volumes about the excessive trust they have in this emerging technology. Perhaps we are seeing the consequences of the hype

that surrounded the early studies and the fantasies promoted by companies who profit from the technology. Maybe this excitement, along with attempts by academic neuroscientists to interest policy-makers in the field, helped to convince the politicians that, although the brain sciences alone will not provide definitive answers to societal issues, it would be a mistake to ignore their insight and potential. We should support efforts in that direction, but is there yet enough evidence to give the green light to neuroimaging in the courts? Certainly not.

Brain scientists may not be oracles, but our research, responsibly interpreted, can help policy-makers to make informed decisions. As such, it should be given the opportunity to progress. Law and science have something in common — both can be misinterpreted. ■

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