

Neurosciences with a conscience?

Thoughts, lies and anti-terrorism

By Olivier Oullier*, Ph.D

The terrorist attacks in Europe and Asia over the last two years serve as a reminder that no continent, country or institution is safe from acts of barbarism. Presenting his anti-terrorist bill to the French cabinet in October, the interior minister, Nicolas Sarkozy, asserted that “the most important freedom is the freedom to use the metro or a bus without fear for your life” (1). The reference to the 7 July attacks on London is unambiguous.

The French government sees the war on terror as a pretext for the systematic deployment of the latest technological and scientific advances with the avowed aim of controlling transport, communications and both public and private spaces. These measures echo a recent deal whereby the United Kingdom government is paying a major mobile phone operator \$1.50 million to hold data for a year (2). The idea is to allow the authorities faster access to higher quality intelligence, as is already the case in the United States under the Patriot Act (3).

In an attempt to prevent further attacks, the UK will film its population’s activities using millions of cameras installed in public places. But does national security justify this? British public opinion seems to be divided. Surveillance cameras played a major part in the subsequent identification of the alleged London bombers, but failed to prevent the catastrophe. Nothing, it seems, can match the human eye in detecting suspect behaviour.

But that may soon change. As part of the fight against terrorism, automated information-processing tools are in development. Experts in the science of human movement and behavioural neuroscience have been involved in the development of new “intelligent” cameras, driven by sophisticated analytical software, which will allow the ultra-rapid detection of unusual individual behaviour or suspect groupings.

Despite the possible threat to individual liberties, the UK and France are committed to biometric data archiving and real-time behavioural analysis. Meanwhile, as well as using these techniques as part of its anti-terrorist arsenal, the US is focussing on another target for observation and surveillance: the human brain. According to a recent article in the scientific journal *Nature*, it may now be possible to use

functional magnetic resonance imaging (fMRI) as part of the war on terror (4). In a study partly funded by the US Army Office of Research’s Defense Advanced Projects Agency, researchers at the University of Pennsylvania in Philadelphia have apparently managed to identify the neural signature of lying (5).

In their experiments they asked subjects to lie (or not) about the identity of a playing card. They then compared the brain activity recorded when individuals lied with what occurred when they told the truth. But any immediate application of this laboratory experiment to any kind of real-life situation -- let alone the war on terror -- seems problematic on several levels.

Any form of functional neuroimaging requires the subject’s head to be immobile. A movement of as little as two millimetres is enough to invalidate the data. How would it be possible to prevent suspects from moving their heads, since they must be conscious in order to answer questions about their possible membership of a terrorist organisation?

From a scientific point of view, although the results reported in *Nature* indicate increased activity in the frontal lobe when an individual lies, the fact that the brain operates as a network makes it impossible to claim a one-to-one link between activity in one given area and complex conscious behaviour. There are many other thought processes, including those involving working memory or response selection, that also stimulate the frontal lobe of the human brain. So a subject undergoing interrogation might, in theory, only have to perform a task requiring one of these processes in order to stimulate the frontal lobe as well as other parts of the brain. And by the same token the subject could potentially drown out the difference between the levels of brain activity associated with truth and deception that underpins the proposed method of lie detection.

Finally -- and this is perhaps the technique’s most serious flaw -- despite a claimed 99% success rate in detecting lies, it is really too simplistic just to ask someone whether they belong to a terrorist organisation. Many socio-political studies have shown that terrorists do not regard themselves as such. Any practical application of the technique faces a fundamental problem: if the suspects do not

see themselves as terrorists, how can anyone tell if they are lying or not? In other words, what are their terms of reference – and what should those of the interrogator be?

The sheer quality of images of brain activity might lead us to suppose that it is easy to understand its functioning. Far from it. This is an illusion mainly put about by the media. Obviously one of the keys to human behaviour lies in the brain, but its interaction with the external political and historic environment remains paramount. The results reported in *Nature* were secured under laboratory conditions and cannot simply be transposed to the world outside, even in the context of the war on terror. Yet since 2001 respected international scientific periodicals have published no less than 15 articles reporting similar applications of neuroimaging to lie detection.

For now, registering brain activity to decode and read an individual's thoughts, memories or intentions is more science-fiction than reality. Nevertheless, early in 2006 a US company -- in collaboration with researchers from the Medical University of South Carolina -- intends to market a lie-detection service based on some of these scientific studies.

According to an eastern proverb, knowledge can overcome ignorance but not a twisted mind. History is full of discoveries and techniques, scientifically validated or not, that have been diverted and distorted. Neuroscience, unfortunately, is not exempt. A recent study published in the *British Journal of Psychiatry* (6) announced the discovery of structural differences between the brains of pathological liars and those of "normal" people.

There is every reason to fear that the results obtained by these researchers will be used alongside commercial and other studies into how the brain operates when lies are told. Whatever their original intentions, they may find their work used to support the categorisation of individuals and even abusive discrimination. The fact that neuroscientific methods may soon be used in the fight against terrorism, in judicial procedures and even in job recruitment, must raise legitimate ethical concerns.

In the US, where the frontier between public research institutes and private companies is becoming increasingly porous, the National Institutes of Health (NIH) has realised the need for some frame of reference. Accordingly it has financed a project to develop specific rules on permitted uses of neuroimaging within the fields of medicine, industry and the law (7).

Neuroimaging in itself is not responsible for its possible misuse. Over the last decade fMRI has allowed major advances in the identification, prevention and treatment of many pathologies ranging from concussion to Parkinson's disease. The behavioural neurosciences, too, have benefited from these advances, allowing a better understanding of how individuals and societies function.

The use of the behavioural sciences in the struggle against terrorism must go beyond the laboratory. Multidisciplinary collaborations between researchers in political science, economics and neuroscience will be required to open up new lines of research and new weapons against this plague (8). But such collaborations cannot be conducted without examining neuroethical considerations. As Rabelais famously remarked, "knowledge without conscience is but the ruin of the soul" (9). More than four centuries later, we must ensure that neuroscience is not used without conscience.

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Translated by Donald Hounam

(1) "Pièces à conviction", France 3 Télévision, 26 September 2005. A debate on his proposals began on 22 November.

(2) See Jenny Booth, "Clarke calls for EU terror accord on sharing data", *The Times*, London, 7 September 2005: <http://technology.timesonline.co.uk/article/0,,19509-1769215,00.html>

(3) Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act, 2001. The US Congress passed the Patriot Act after the 9/11 attacks, giving extended powers in the war on terror.

(4) Jennifer Wild, "MRI scans can pick up lies, but raise ethical issues", *Nature*, Basingstoke, 22 September 2005.

(5) Daniel D Langleben et al, "Telling truth from lie in individual subjects with fast event-related fMRI", *Human Brain Mapping*, 26, Wiley-Liss, 2005. See <http://www.uphs.upenn.edu/trc/conditioning/tellingtruth.pdf>

(6) Yaling Yang et al, "Prefrontal white matter in pathological liars", *British Journal of Psychiatry*, 187, London, 2005.

(7) The NIH, a US government-funded medical research centre, is financing a research programme, "Advanced neuroimaging: Ethical, legal and social issues", at Stanford University. This research aims to establish rules of conduct and use to be respected when cerebral imaging is used in any area. See http://scbe.stanford.edu/research/projects/illes_advanced_neuro.html

(8) Patrick Lagadec and Erwann Michel-Kerjan, "A new era calls for a new model", *International Herald Tribune*, Paris, 1 November 2005.

(9) François Rabelais, Gargantua and Pantagruel (1532), 2.8; see <http://www.gutenberg.org/files/1200/1200.txt>