

Lie detection**Making windows in men's souls**

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**The science of lie detection has a chequered past. But it is becoming more reliable**

THE truth, the whole truth, and nothing but the truth is a fine aspiration. But, as Pontius Pilate said to Jesus, "What is truth?" For decades, researchers have grappled with the problem of creating a machine that can tell, definitively, whether a person is lying. Until recently, their efforts have been unsatisfactory. The current generation of lie-detection technologies has been put under scientific scrutiny and found wanting. But science, ever resourceful, is coming up with new ideas. Soon, at least in some cases, that old courtroom platitude may itself come to resemble the truth more closely.

Mention the term "lie detector" to most people and they will probably think of the polygraph. This was invented in 1921. It looks at changes in a range of physiological phenomena—such as a person's breathing rate, pulse, blood pressure and perspiration—that take place while a suspect is being questioned. These are supposed to indicate if the answer given is untrue.

Polygraph evidence is accepted in many jurisdictions, notably in America. Although American military courts will not allow it, the only civilian courts there that have deemed it completely inadmissible are those of the District of Columbia and the Fourth Circuit (the group of states immediately south of the Mason-Dixon line). In other states its use is at the judge's discretion. Unfortunately for people in areas where they are still used, polygraphs do not work—or, more charitably, are easily duped. That was the

conclusion of a report released in 2002 by America's National Academy of Sciences.

Another apparently promising candidate, voice analysis, does not seem to work either. There are repeated claims that tremors in a person's voice can reveal when he is lying. But a study by Mitchell Sommers of the University of Washington in St Louis, showed that—at least in the case of a system called Vericator—it is not as reliable as had been thought. Voice analysis can, Dr Sommers concluded, indicate an individual's level of stress. But that does not correlate with dishonesty.

The problem with both polygraphy and voice analysis is that they rely on second-hand signs of lying which a good actor can suppress. Furthermore, someone who is telling the truth might exhibit just these signals, because the very act of being questioned by the authorities is stressful. Instead, current research is looking directly at the source of lies, the brain itself.

Lies, all lies

Daniel Langleben, of the University of Pennsylvania, in Philadelphia, uses a brain-scanning technique called functional magnetic-resonance imaging to probe his subjects' honesty. The lie which those subjects are asked to tell is a small one: they have to persuade Dr Langleben, or one of his assistants, that they are holding a particular playing card when often they are actually holding a different one. Each successful deception earns a subject \$20. The researchers have not had to hand out much cash, though. The brains of lying subjects light up in particular places—notably the anterior cingulate gyrus and left prefrontal cortex—in ways that they do not in the honest.

A second technique for probing the brain directly during questioning is the "cognosensor" developed by Britton Chance, who also works at the University of Pennsylvania. His subjects wear a headband that beams infra-red light through their skulls and into their brains. Part of this light is reflected back, and the pattern of reflection indicates activity in the tissue it has been reflected from—in particular, changes in the flow of blood to that tissue.

According to Dr Chance, different emotional disturbances have characteristic reflection patterns. And when a person lies, more of the light is reflected, and the reflections come from a wider area, than when he is telling the truth.

A third brain-probing lie-detection technique, based on electroencephalography (EEG), has actually made it out of the laboratory and into the courtroom. Lawrence Farwell, the founder of Brain Fingerprinting Labs in Seattle, Washington, calls it MERMER (memory and encoding related multifaceted electroencephalographic response). It is, he claims, 99.9% accurate at determining the veracity of certain sorts of statement.

MERMER works by hooking someone up to a standard EEG machine and asking him about specific details of, for example, a crime scene. Lack of a brainwave called P300 denotes lack of familiarity with the details in question, suggesting any denial should be taken at face value.

The technique has already stood up to legal scrutiny twice—once when it supported a conviction, and once when it freed an innocent suspect. It will soon be used again, in the appeal by Jimmy Ray Slaughter, from Oklahoma, against his conviction for murdering his ex-girlfriend, Melody Wuertz, and their 11-month-old daughter, Jessica, in 1991. MERMER suggests that Mr Slaughter had no recollection of important facts about the murder, such as which rooms the victims' bodies were located in.

Although not yet foolproof, these three methods do offer possible alternatives to the antiquated techniques of the polygraph. The truth is out there. It is just a question of finding it.

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