

## Case 7.

Imaging technologies, such as magnetic resonance imaging (MRI), have proven to be powerful diagnostic tools in clinical medicine, allowing physicians to identify the presence and course of many diseases and conditions that may otherwise go undetected or be misdiagnosed. This same technology also has provided biomedical researchers with a detailed map of a wide range of physiological processes, especially those related to the human brain. A recent innovation, *functional* magnetic resonance imaging (fMRI), permits neuroscientists to track the flow of blood through the brain, allowing them to correlate various mental states and processes with neuronal activity in certain areas of the brain. Researchers have found that some parts of the brain are specifically associated with language use and development, while others correlate more closely with particular cognitive and emotional states. Neuronal patterns associated with complicated processes, such as decision-making and memory retrieval, and with personality traits, such as empathy and extraversion appear to be identifiable through fMRI.

While the commercial use of brain scans to test for personality traits is only hypothetical at this time, another kind of practical application of the fMRI is already available to consumers. Last year, San Diego-based No Lie MRI, opened its doors for business. No Lie MRI offers lie-detection services using the fMRI, and has since expanded its operations to the Philadelphia area. Likewise, Cephos Corp. of Pepperell, MA offers the same services at the Medical University of South Carolina. Both boast an accuracy rate of 90-93 per cent, slightly higher than that boasted by polygraph makers of (85-90 per cent). Polygraphs sense, among other things, perspiration, heart rate, and respiratory activity. Subtle increases in heart rate or perspiration are associated with the nervousness people typically experience when lying. These signs can be suppressed, however, so fMRIs may enjoy an advantage. According to Dr. Ferdinand B. Mohammed, director of Temple University's Functional Brain Imaging Center, "Since brain activation is arguably less susceptible to being controlled by an individual, our research will hopefully eliminate the shortcomings of the conventional polygraph test and produce a new method of objective lie detection that can be used reliably in the court room and other settings." However, using fMRIs to detect deception is both complicated and cumbersome. A subject lies down with his head inside an MRI machine. Then "yes or no" questions are presented on a small screen directly in front of the subject's face, and subjects respond by pushing buttons. By tracking neuronal activity associated with lying, an examiner can identify the veracity of statements with a high rate of accuracy.

The fMRI has found practical applications unrelated to medicine, lie-detection, or pure research. One proposed use relates to the possibility of detecting personality traits and mental capacities. Employers, insurers, and schools are interested in the character tendencies and capacities of applicants. Applicants for sales positions might be screened for extroversion or persistence. Others might be screened for the capacity to multi-task. Health insurers might screen for personality traits associated with high-risk behaviors. Credit card, mortgage, and other financial institutions might screen applicants against specific character traits.

Not everyone shares the enthusiasm surrounding the use of fMRIs for lie-detection and characterization of personality traits. Civil libertarians worry that it is one more threat to individual privacy. Says Barry Steinhardt, director of the American Civil Liberties Union's Technology and Liberty Project, "They are going to be deployed to read people's thoughts... (And) little, if any, attention has been paid to potential misuses and the devastating impact it would have on our civil liberties." Information that is usually legally off-limits could be gathered through an fMRI. There may be temptation for employers and schools to use this technology to screen applicants for desirable traits and to weed out candidates whose tests suggest undesirable characteristics.

Another concern relates to the storage of personal information gathered through the use of fMRIs. How will confidentiality be maintained? Some worry that brain scans have not proven themselves in the real world. That is, they may work reliably with test subjects when little is at stake, but may provide inaccurate results when there are serious real-life consequences. Stronger critics reject the claims of an exceptionally high accuracy rate for fMRI as no better than similar claims for the polygraph, a device denounced by one critic as "a ruse, carefully constructed as a tool of intimidation, and used as an excuse to conduct an illegal inquisition under psychologically and physically unpleasant circumstances." <http://www.csicop.org/si/2001-07/polygraph.html>

"Nonetheless, entrepreneurs of fMRI technology remain unconvinced that any serious irresolvable ethical challenges loom on the horizon. "We understand that there are further ethics conversations needed when science pushes the envelope," says Steven Laken of Cephos Corp, "but we don't see these tests being set up in dressing rooms and shopping malls. That's not going to happen."