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Brains in the courtroom

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BRAINS IN THE

no objections, your honor

Margaret McGuinness

Imagine the future for humans on Earth: Will it include time-travelers' wives? Invisibility cloaks? Lady-Gaga-Strange styles? Robot mutinies? Alien invasions? Dream catching? Mind reading? ...The list can go on.

The future is generally uncertain. However, the near future seems promising for neuroscience, particularly with the progress of brain imaging. With the accompanying advancements in current research, accessing and even manipulating the human mind might not be so far off...

Spooked out? Although exciting to most scientists, the ability to mind read or record dreams probably frightens some people, especially if used in legal proceedings. What if we could be punished for just thinking of doing bad things? Where would our personal privacy come into play? Would we feel safer if we took those off the street who merely harbored criminal thoughts? Would the First Amendment include our rights to freedom of thought too, no matter what the subject matter is? If not, should it?

While many questions arise from the prospect of neuroscience evidence being used in legal proceedings, none of these questions are actually novel or difficult enough to hinder such use. As of now, neuroscience evidence is not as accurate, reliable, or informative as it is expected to become with more research advancements, according to Thomas Nadelhoffer, and colleagues. Along with colleague and leading cognitive neuroscience researcher, Michael Gazzaniga, Nadelhoffer is a member of the Governing Board of the MacArthur Law and Neuroscience Project³.

Initiated in 2007 at U.C. Santa Barbara, this project received support from The John D. and Catherine T. MacArthur Foundation with a \$10 million grant. After four years of phase-one exploratory research, it launched the planning of phase two, acknowledging useful leads from phase one and narrowing in on a set of high-impact studies carried out by a diverse team of experts in neuroscience and law. Including Stephen Morse and Martha Farah of the University of Pennsylvania, the team expects to report updates as soon as possible. The planning of phase two was supported with a \$700,000 grant and these plans will be executed with a \$4.85 million grant.

Under the direction of Owen Jones at Vanderbilt University, the

project will continue to be used as “an interdisciplinary network examining the impact of modern neuroscience on criminal law”⁶. Owen says, “the dramatic expansion of new imaging and analytic techniques has generated the hope that neuroscience, properly

deployed, might help to further the goals of criminal justice.”⁶

Until the completion of more research on the benefits or risks of using neuroscience findings in legal proceedings, courts should still consider all of the evidence available. The types of evidence used in contemporary legal proceedings can be quite distorted, inaccurate, and unreliable. For example, eyewitness testimonies have often been criticized for its unreliability, placing a lot of weight on the accuracy of human memory and perception. Henceforth, neuroscience findings should not be excluded for potential flaws. Nadelhoffer notes, if current predictions of liability “continue to satisfy evidentiary standards of admissibility, then neuropredictions are likely to pass muster as well.”³ Scott Grafton, director of the Brain Imaging Center at the University of California, Santa Barbara adds that judges have told him “Look, everything else everybody’s bringing into a mitigation hearing is extremely unreliable, so why should we hold scans to a different standard”³.

In *Brown v. Entertainment Merchants Assoc.*, Supreme Court Justice Breyer actually considered neuroscience findings in a case involving video game playing and aggression. A majority vote overturned a law that banned selling violent video games to children because of ‘speech’ protection by the First Amendment.⁷ Considering neural activity studies, Justice Breyer asserted at least a postponement of this overturn.

In a case that hit the Italian courts, Judge Luisa Lo Gatto of Como similarly considered neuroscience findings when she reduced the sentence of Stefania Albertani, a convicted murderer, from life to 20 years. Along with genetic tests, the neuroimaging results proved to the judge that Albertani suffered from partial mental illness⁸. Also, in 2009, a judge “partially agreed that a murderer was mentally ill on the basis of abnormalities in brain-imaging scans and in genes linked to violent behaviour- including the so-called ‘warrior gene’ MAOA.” The scientists from the 2009 case also worked on the Albertani case because of conflicting conclusions on her mental state. They concluded from the imaging results that Albertani was not in “full possession

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of her faculties.”⁸

Stephen Schleim, a cognitive scientist at the University of Groningen in the Netherlands, says, “There is no one-to-one relation between a certain brain area and a certain psychological process, and structural findings on aggression are very unspecific,” specifically the MAOA gene. Stephen Morse, working on the Law and Neuroscience project, notes that the DSM-5 will not consider neuroscientific criteria to diagnose mental illness. However, a scientist from the Albertani case thinks, “neuroscientific means can already help in assessing mental illness and can be used in forensic science to help reduce subjective variability, without leading us to determinism.”⁸

Considering the thoughts of Morse and Schleim on the above cases, caution should be taken with neuroscience findings, since they are still gaining in accuracy and reliability, but the use of such findings can still offer new angles. Nicole A. Vincent in *Neuroimaging and Responsibility Assessments* notes that the problems arising with neuroimaging use “apply equally to the behavioral approach ...and hence such problems cannot provide us with a reason to prefer the behavioral approach over the neuroimaging approach.”⁵

With regard to ethics, these neuroscience findings do not conclude anything about free will, responsibility, liability, or other philosophical topics that might make them at odds with society’s existing ideology. However, it is what neuroscience’s introduction into the society would entail that is at issue. Not until more research is done will we know if neuroscience definitively refutes any philosophies of life, whether it is our own, our nation’s, or say, Aristotle’s. However, for now, as long as lawyers, ethicists, philosophers, and the like continue to challenge scientists whose findings may one day challenge philosophies, no one should have to worry about getting punished simply for their thoughts or proclivities.

So what exactly do we have to gain from the use of brain imaging in legal proceedings?

Some may argue that certain methods do not add anything useful. For example, functional magnetic resonance imaging (fMRI) scans represent measurements of blood flow to the brain instead of direct activity and therefore, meaning is difficult to ascribe to such scans. While blood flow and brain activity may correlate, they are not the same. Others retort that areas receiving blood flow indicate energy and oxygen use on which task performance depends, and thus neural correlates of behavior and decision making. Still others question whether some other factor, such as noise, may be involved. Debatable, brain-imaging evidence has been presented in legal proceedings for over the past two decades and despite its criticism more people should

be aware of its useful functions.

To start, imaging provides more unbiased evidence for psychiatric assessments of insanity, illness, or other mental impairment¹. By relying on biological markers, rather than someone’s own character evaluations, imaging evidence cannot be as easily distorted or exaggerated to sway the jury a certain way. Furthermore, imaging results—if in question—could be analyzed and interpreted by an unbiased group of experts. While analyses of imaging results can help the determination of one’s liability, they cannot do much more than that at this point. Imaging does not impose a lot of power on the criminal justice system—only aid.

In aiding these psychiatric assessments of insanity, illness, or other mental impairment, imaging can also help eliminate the stigma against such defendants, as well as point to areas of treatment. Testing and attaining methods of treatment can not only enhance our understanding of these disorders and impairments but also help these people and their families find some relief.

Since societal safety and norm-setting are high priorities of the criminal justice system, those people deemed unaccountable for their crime by brain imaging could still be prevented from committing more crimes, as in the Italian case where Albertani’s sentence was reduced². In determining these sentences or punishment, imaging results may certainly aid legal experts by providing them with a new viewpoint from which to identify future risk.

Unfortunately, without more definitive research, imaging cannot yet make questions about risk and punishments any easier to answer. It is extremely difficult to decipher someone’s mental state during a past criminal event¹. In fact, deciphering what the mental state at a time of criminal action was would be extremely difficult, if not impossible. Regardless, lawyers, legal experts, and the like must determine what the threshold responsibility level is and what the imaging results and psychiatric assessments mean for responsibility.

Helen Mayberg, a neurologist at Emory University School of Medicine in Atlanta, Georgia, says, the use of brain imaging in legal proceedings “is a dangerous distortion of science that sets dangerous precedents for the field.”⁴ Since 1992, she has actively testified in dozens of cases against the use of brain imaging. However, as long as the limitations of the techniques are addressed and neutral analyses of the results are conducted, Mayberg should not find brain imaging to pose much more danger to legal proceedings than other pieces of evidence. It is only as dangerous as we let it be and as of right now, the use of neuroscience and brain imaging in legal proceedings does not

answer all questions nor provide an outright reliable and accurate source of evidence. However, it can help the criminal justice system better punish, treat, and protect members of society⁵. Advances in the neurosciences are crucial to understanding the nature of violence, in which biological markers, neural correlates, and so on can be quite useful in legal practices.

Hopefully, with more research and advancements in technology, we will be able to improve the reliability and accuracy of current techniques or even create new and better ones, as many expect considering the rate of current advances. Hopefully we will also be able to understand the interaction between brain and behavior more completely. Not until then will questions regarding the roles of genetics, brain plasticity, predispositions, habit, environment, etc. on behavior be answered. With more definitive answers, we could then discuss how privacy, mental freedom, and free will (or “free won’t”—termed by Vilayanur S. Ramachandran) are affected.²

Many of the issues that critics present have existed before neuroscience and brain imaging even debuted in legal proceedings. Actually, many more benefits seem to arise: unbiased evidence can provide the legal system a better understanding of violence and consequently, of handling crime. Neuroscience and brain imaging can be used in other areas of law, such as lie detection and suspect familiarity, but it is much more important to urge people to understand its larger and more global role in determining punishments and protecting our society. So, after all is considered, why shouldn’t brain imaging be used and valued in legal proceedings? It seems worthy of entry into courtrooms, placement on the stand, and thorough cross-examination. Then, with time, its apparent issues will be resolved only to reveal its benefit to society.

Margaret McGuinness is a junior Neuroscience major from Nanuet, New York. She is studying abroad in Sydney and will be working with a clinical psychologist at the Brain & Mind Research Institute in March 2012. She plans to attend graduate school and pursue a doctoral degree in the biological sciences.

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