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SCOPE OF NEUROSCIENCE BEYOND DETERMINING RESPONSIBILITY: LEGALITY AND RESPONSIBILITY OF BRAIN IMPLANTS

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INTRODUCTION

The intersection between law and neuroscience is a new and still a highly doubtful one, but this interdisciplinary is necessary for the normal functioning of society and the justice system. More so, the interaction is inevitable. The effectiveness of the legal system is seen through how justice is being provided and justice can be provided only through the regulation of behaviour that is dependent on weighing evidence from both sides. The evidence includes why the person behaved the way that they did and what caused such behaviour, what was their mental state while committing the act, was the person aware of his/ her actions and other such crucial questions. These questions can be answered with the help of neuroscience. This is where the two disciplines interact. While it can be understood that neuroscience will prove to be effective to help provide justice, there are definitely negative sides to it. Keeping this interaction in mind, the term “neurolaw” was introduced.¹ The effectiveness of the interdisciplinary depends on the people involved in both the professions, i.e., legal scholars and neuroscientists. While the neuroscientists can help identify the medical issues in the brain if the defendant using the different equipment and technology that are available to them, the legal scholars can ensure that the particular evidence being produced is relevant and admissible in court. There is also a concern of misuse of such technology by the lawyers of the parties and also a lack of understanding by the judges and the jurors.² This is where the two need to bring about a balance.

ETHICAL NEUROLAW ISSUES

There are many issues that come with making neuroscientific evidence admissible in court. The main use of neuroscientific evidence in court, as mentioned previously, is to understand the behavioural abnormalities of the defendant by reading their respective brain activity. An analysis

¹ Garland B (2004) Neuroscience and the law: brain, mind, and the scales of justice (Dana, Washington, D.C.).

² Owen D. Jones, Joshua W. Buckholz, Jeffery D. Schall, Rene Marois (2014) Brain Imaging for Judges: An Introduction to Law and Neuroscience (University of Nebraska, Lincoln).
<https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1459&context=ajacourtreview>

of the admissibility of such evidence in court proves that there has been a leniency in the punishment given to the defendants, and this leniency increases when it comes to the cases of death penalty.³ The defendants are forgiven because they did not commit the crime, “their brain made them do it.” A conflict arises here as to whether such evidence can be an advantage or a disadvantage to the defendants. There are two ways to go about this conflict. Several legal theorists and scholars have proved that neuroscientific evidence acts as a “double-edged sword.”⁴ On one hand, it reduces the desire of the judge or the jurors to punish the defendant that eventually leads to them providing a lesser punishment than they usually would provide. The reason behind their actions is the brain disorder resulted in such an act by the defendant rather than any choice on his/her part. But on the other hand, brain disorder evidence can also lead to an increased punishment as there can be an increase in punitive motivations towards the defendant and he/she may seem more dangerous. The reason behind this is that the brain disorder caused the defendant to behave in such a manner and there is high probability that the behaviour could “occur again”, even multiple times, later on.⁵

Brain evidence can be applied to both civil and criminal cases. In the legal system, it is generally assumed that people are responsible for their own actions, while neuroscientists and other scientific and philosophic scholars believe otherwise. Law expects people to prove that they are innocent, and, in cases of criminal responsibility, law looks into the intentions and motives of the defendant. If one has committed a prohibited act, he/she must also have done it with a “culpable state of mind.”⁶ Humans are a combination the genes and DNA given to them by their ancestors and also the environment/ surroundings that they grow up in. Therefore, people are not technically responsible for their actions. But, this line of argument cannot be used in court by a defence attorney. Neuroscience, in law, should not cast a doubt on the responsibility of the defendant, but should help in determining the defendant’s responsibility.

While aiding law in recognising the responsibility of the defendant, neuroscience does this in two ways. One is identifying a group- based neuroscientific evidence. For example- the immaturity and lack of self-control in adolescents that has helped the legal system to form a separate procedure

³ Corey Hill Allen, Eyal Aharoni (2019) Brain scan evidence in criminal sentencing: A blessing and a curse (The Conversation, Australia).

<https://theconversation.com/brain-scan-evidence-in-criminal-sentencing-a-blessing-and-a-curse-113088>

⁴ Barth, A. S. (2007). A Double-Edged Sword: The Role of Neuroimaging in Federal Capital Sentencing. American Journal of Law & Medicine, 33(2–3), 501–522.

<https://doi.org/10.1177/009885880703300214>

⁵ Ibid.

⁶ Ibid.

and law for them as they are permitted to have diminished responsibility which has been scientifically proven. The other, or second, method is providing specific neuroscientific evidence to that of an individual. Here, one can take the example of *New York v. Herbert Weinstein*⁷ case where, with the help of brain imaging techniques, scientists were able to identify a large arachnoid cyst compressing the defendant's prefrontal cortex.⁸ With the help of this evidence, the defence attorney was able to argue that the defendant had impaired self-control. Due to this reasoning, the attorney was successful in his reasoning and got a favourable judgement.

Though neuroscience helps laws in many ways, there are many ethical issues that come with it. The ethical issues arise when it comes to the admissibility of such evidence in court. This directly pertains to the procedural lapses while taking such evidence, the lack of knowledge and information of the judges and the jurors on whether a certain procedure has been followed correctly or not, the method's accuracy, the consequences of false positives and negatives. Neuroscience is developing rapidly and new changes come with it quite often. It is difficult for the judges and the jurors to keep up with the change and identify the accuracy of it.

BRAIN IMPLANTS, THEIR LEGALITY AND RESPONSIBILITY

When it comes to the advancing technology in neuroscience, brain implants play a huge role in today's medical world. Brain implants, also termed as neural implants, are devices that are placed on the brain of an individual or on his/ her cortex. It usually connects directly to the biological brain of the person, but other times, it is also used to create an interface between neural systems and computer chips. Implants in the brain are usually done to treat an already existing brain disorder. But there have been several cases where these implants have influenced the individual's perception of the world and caused them to behave in an unexpected manner. Taking two examples, one of a Dutch man who received deep brain stimulation (DBS) as a treatment for his severe case of obsessive-compulsive disorder⁹ and the other of a 22-year-old man who had severe cases of epilepsy and seizures after he had contracted the West Nile virus at the age of 10.¹⁰ Both the men received DBS and both the surgeries were deemed to be successful and effective as both the participants showed a promising improvement in their behaviours. But, later on, it was

⁷ *New York v. Herbert Weinstein*. No. 156 Misc.2d 34 (591 N.Y.S.2d 715, 1992).

⁸ *Ibid.*

⁹ Nicky Woolf (2014) Man develops powerful love of Johnny Cash following deep brain stimulation (The Guardian). <https://www.theguardian.com/music/2014/may/27/johnny-cash-deep-brain-stimulation-urge-listen>

¹⁰ Nsikan Akpan (2014) ScienceShot: Deep Brain Stimulation Triggers Hallucinations (American Association for Advancement of Science).

<https://www.sciencemag.org/news/2014/04/scienceshot-deep-brain-stimulation-triggers-hallucinations>

identified that the former developed a powerful love for Johnny Cash, the singer, only when the device was turned on and the latter hallucinated or visualised his doctors morph into Italian chefs in a local pizza place. These two incidents prove that brain implants and stimulations can lead to unexpected behaviour on the part of the participants of the surgery. The DBS, in both cases, triggered a different perception of the world to the patients.

With such an improvement in neurotechnology, the question of responsibility that is important to the legal system becomes an important and a difficult one to determine. This is a clear challenge on the question of responsibility. Who can be held responsible for the actions of people with brain implants? There are many layers to this question. With the advancement in technology, it is better to answer certain questions before they occur in real life. Taking a hypothetical example of one Mrs. A who has recently had a brain implant surgery for a particular brain disorder. One day, as she was driving past a crowd, she has the sudden urge to drive over the crowd and she eventually commits to those thoughts and desires. She even drives through a bus station and injures several people. Later on, it is identified that she had received a brain implant that malfunctioned at the time she was committing the actions while driving. She even claims that the bus station was not even there.¹¹ Who is to be held responsible in this case? Is it Mrs. A, the engineers who were involved in the creation of the implant or the doctors who placed it in her brain? Can either of them be held solely responsible for their actions? Can the device itself be blamed?

Determining the moral and legal responsibility in history was a simple task as it was assumed and largely focused on an individual. Individuals were looked at as autonomous entities who act on their own without the influence of external forces. But in the modern world, it has become difficult to determine the responsibility of a particular act. With advancement, not only technology but also philosophy and law, scholars are attempting to answer larger questions for the benefit of society. When it specifically comes to the question of brain implants, even if one considers the possibility of holding the engineer of the implant liable, it leads to a problem in itself. Technology, these days, is not only being created by humans but also artificial intelligence.¹² There are several hands that are involved in the making of brain implants. The fact is that the human autonomy that has been believed to exist for the longest of times is now being challenged by science and technology. And when there is a challenge on humans being autonomous entities, then how can

¹¹ Laura A. Cabrera, Jennifer Carter- Johnson (2018) It's not my fault, my brain implant made me do it (The Conversation, Australia).

<https://theconversation.com/its-not-my-fault-my-brain-implant-made-me-do-it-91040>

¹² Sara Reardon (2017) AI-controlled brain implants for mood disorders tested in people (Nature, Vol. 551 Issue 7682).

<https://www.nature.com/news/ai-controlled-brain-implants-for-mood-disorders-tested-in-people-1.23031>

responsibility be ascribed to an individual?

There are a lot of grey areas that one needs consider before attempting to answer questions regarding this matter. Responsibility, here, can be broadly divided into two categories. One including causal responsibility and the other, liability responsibility.¹³ Causal responsibility is referred to as the token (or actual) causation. The agent here is held to be “causally” responsible for the effect, i.e., the awareness that he/ she has caused it. With this meaning, one can hold the device and its maker responsible for Mrs. A’s actions because of the clarity that the device is what caused her to behave in such a manner. The other category being liability responsibility refers to something that one is legally responsible for, therefore, if one is liable for something, then they are legally responsible for the act. Talking about legal responsibility, the doctors and surgeons can be held legally responsible for not taking reasonable care or due care, which is a tort law principle, prior to implanting the device. Product liability can also be held against the companies that have manufactured the device, professional responsibility on the engineers and technicians. In fact, Mrs. A can also be held responsible as she was well aware of the side effects of implanting the device and yet decided to get it implanted. This proves that multiple parties share the responsibility in such a scenario. Shared responsibility is not the answer or the conclusion as the determination of the distribution of responsibility must be looked into next.

Wireless devices that decode brain waves are now being used in paralysed patients to help them communicate their needs to doctors and other in general.¹⁴ This is a huge risk as there is high probability that hackers might use such devices for their malicious purposes. There has already been hacking in devices like insulin pumps and cardiac defibrillators.¹⁵ This poses an even bigger question of responsibility. There is no doubt that such devices and technology can be used for evil and illegal purposes. There have been no instances of hacking in wireless brain implants, but this does not prove that it will never happen.¹⁶ Moreover, there are also privacy and other ethical concerns that come with such devices. Posing these questions is important as the division of

¹³ Ibid.

¹⁴ R. Douglas Fields (2016) Wireless Brain Implant Allows “Locked-In” Woman to Communicate (Scientific American).

<https://www.scientificamerican.com/article/wireless-brain-implant-allows-ldquo-locked-in-rdquo-woman-to-communicate/>

¹⁵ Lily Hay Newman (2019) These Hackers Made an App That Kills to Prove a Point (Wired).

<https://www.wired.com/story/medtronic-insulin-pump-hack-app/#:~:text=Two%20years%20ago%2C%20researchers%20Billy,trigger%20a%20potentially%20lethal%20overdose.>

¹⁶ Laurie Pycroft, Sandra G. Boccard, Sarah L.F. Owen, John F. Stein, James J. Fitzgerald, Alexander L. Green, Tipu Z. Aziz (2016) Brainjacking: Implant Security Issues in Invasive Neuromodulation (Science Direct, Vol. 92, 454-462).

<https://www.sciencedirect.com/science/article/abs/pii/S1878875016302728?via%3Dihub>

liability/ responsibility may lead to patients going through a dilemma between potential criminal liability or treating their troubling brain conditions. This dilemma will also interfere with the patients' right to health which is recognised as a fundamental right under the Constitution of the World Health Organisation (WHO).¹⁷

POSSIBLE SOLUTION?

One solution that can be offered for defendants is lesser prison sentences and more or increased involuntary hospitalisation.¹⁸ But this can become an issue in itself as there is increased involuntary hospitalisation of the defendant. When one thinks of it, why does the defendant really need to be put in a hospital for something that he/ she tried to cure in the first place. Moreover, the intention behind hospitalisation is not that of punishment but that of protection. Protection includes the protection of the society at large and that of the defendant, who now is at a higher risk of committing the actions in the future which can be harmful to even his/ her well- being.

NEUROSCIENCE BEYOND DETERMINING RESPONSIBILITY

Most of the discussion surrounding neuroscience and law are regarding criminal responsibility or criminal liability. If neuroscience can help in proving the physical state of people's brain with varied mental states, then it can definitely prove to be more helpful than just identifying if someone can be held responsible or not. It may help in understanding the current state of mind of people, it can help in eliminating future behaviour, it can help in enhancing human mental capacities, it can also help in treating other non- mental behavioural issues in people and much more. Law will be direct and indirectly involved in offering such help to neuroscience, and vice versa.¹⁹

Neuro imaging techniques can help in identifying or predicting a person's future behaviour. This can be done by diagnosing certain diseases prior to their occurrence. For example, early detection of diseases like Alzheimer's can be done through PET scanning amyloid plaque build-up or from biomarkers in cerebral spinal fluid.²⁰ In other cases, any genetic variants and future Alzheimer's can be detected by pure prediction of the diseases. This can lead to an understanding of who is at a risk of being affected by brain and mental conditions like Parkinson's, schizophrenia, Alzheimer's, and others. By detecting such diseases in people, they may no more be accepted or denied employment, insurance, and other benefits. All these facilities have a direct legal bearing.

¹⁷ World Health Organization (1946)

¹⁸ Ibid.

¹⁹ Greely HT (2009) Law and the revolution in neuroscience: an early look at the field. *Akron L Rev* 42:687–715.

²⁰ Ibid.

Early diagnosis of such diseases can also help through legal proceedings like looking into the competency or the trustworthiness of a witness, the perceptions of the complainant and others.

The most direct help that neuroscience can provide the legal system with, is its ability to predict someone's future behaviour, whether violent, criminal or intentional. Such predictions are already being used in the legal system through preventive detention methods. These methods are old and are a combination of the sciences and social sciences. With the advancement of neuroscientific technology, the predictions can be more accurate, fast, trustworthy and free of any subjectiveness, wherever possible.

The truth in what the plaintiff or the complainant is claiming can also be attested with the help of neuroscientific methods. Usually, the claims of the complainant are taken at face value or with the help of very little evidence, but, with the help of neuroimaging technology, it can be proven if the complainant is legit going through the feelings and emotions and the pain that he/ she claims to be going through.²¹ In simpler words, neuroscientific evidence will strongly support the claims of the complainant. It can be easily understood if the complainant is trying to deceive the judges, jurors, the defendant(s) and the lawyers.

In the outside world, neuroscience can be used to improve human capabilities in several fields. There exists a lot of controversy as to whether medical and specifically brain related test can be done on humans for the enhancement of drugs and other technologies. Law plays a major role here in drawing boundaries between what can and cannot be allowed to be tested on humans and what are the necessary procedures and due processes to be followed for the proper application of such new drugs and equipment. Interpreting and setting limits for neuroscience to function ethically and morally is another role that the legal system has to role in. All this proves that neuroscience can help the legal system in other ways than just in determining the responsibility of an individual or group.

CONCLUSION

Neuroscientific evidence is definitely going to increase in the coming years and the legal system needs to be ready to answer several questions that will arise with it. The legal and medical or the neuroscientific scholars that are involved in the particular fields are the main players that this interdiscipline is dependent on. The neuroscientists and lawyers, judges and other legal scholars

²¹ Kolber AJ (2007) Pain detection and the privacy of subjective experience. *Am J L Med* 33:433–456.

need to realise what the intersection of the two disciplines can offer and their potential for the betterment of the society and work towards the avoidance of misrepresentation and the misinterpretation of neuroscientific evidences. The engagement between the two must bring about a balance between the neuroscience and law. The effectiveness and the efficiency of the intersection can be looked through the lens of being able to answer questions and conflicts that are already known to arise with the technological advancement and be ready for newer issues.

