

MENTAL PRIVACY IN A CONNECTED WORLD: PSYCHOLOGICAL VULNERABILITIES AND LEGAL PROTECTIONS IN THE ERA OF BRAIN COMPUTER INTERFACE

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ABSTRACT

The emergence of Brain-Computer Interface (BCI) technology marks a ground breaking shift in human-machine interaction, offering applications across sectors like healthcare, education, and entertainment. While BCIs have the potential to transform industries and enhance quality of life, they also bring forth intricate various legal challenges. This research article aims to provide a legal introduction to brain-computer interfaces, a technology that enables a direct communication pathway between organic nervous systems and information and communication technologies. A brief explanation of the technology is offered, as well as a summary of its capabilities. The legal ramifications of the applicable fundamental human rights are discussed. The impact of technology on human dignity, the right to privacy, free thought, and free expression are specifically investigated. The conclusion offers commendations for future legislative actions. Framers of the law should carefully study the technology and established a legal framework that would utilised brain-computer interfaces to enlarge freedoms and rights of humans rather than perimeter it or use the technology for public purposes.

Key Words: Brain-Computer Interface, human rights, right to privacy, freedom of thought, freedom of expression, human dignity, free will, identity.

INTRODUCTION

The swift progress of Brain-Computer Interface (BCI) technology is transforming human-machine interaction, signifying a significant change in sectors including healthcare, education, and entertainment.¹ By enabling direct communication between the brain and external devices, BCIs have the potential to overcome physical and cognitive limitations, affecting the intellectual and perceptive thinking transforming and metamorphosing lives and industries. This pioneering and cutting edge technology offers unprecedented opportunities to improve quality of life, enhance learning and understanding experiences, and create more immersive and ingressive digital environments. In healthcare, BCIs are being used for neuro-rehabilitation, helping patients recover motor functions after strokes or spinal cord injuries, and controlling advanced prosthetics that respond to neural signals.² BCIs help with individualized learning in the classroom by enabling simultaneous and immediate customization of instructional materials based on real-time monitoring of students' cognitive engagement. Notwithstanding their capacity to revolutionize, BCIs present intricate legal issues that call for versatile and all-encompassing legal frameworks. These legal issues must be resolved by creative regulatory strategies in order to realize their full potential while preserving private rights and fostering fair access.

Brain-Computer Interface (BCI) Technologies

Brain-Computer Interface (BCI) technology, pioneered by Dr. Grey Walter in 1964, allows users to control external devices using brainwaves. Initially, Dr. Walter demonstrated this by connecting electrodes to a patient's brain during surgery and monitoring brain activity to control a slide projector.³

The BCI system works by monitoring a person's brainwaves, either through invasive implants or non-invasive devices like wearable headsets. These brainwaves are processed by algorithms and translated into commands that control devices, such as prosthetic limbs or computers.⁴

BCI technology has evolved beyond simple control of external devices to include two-way communication with the brain. This enables not only controlling devices but also stimulating specific brain areas, such as through deep

¹ Gerd Grubler & Elisabeth Hildt, *Brain Computer Interfaces in their ethical, social & cultural context*, Springer, 2014.

² DelveInsight. (n.d.). *Brain-Computer Interface (BCI) in Healthcare: Transforming Patient Care*.

³ Griemann, B. Allison, B. & Pfurtscheller G.(Eds.) 2010, *Brain Computer Interfaces: Revolutionizing Human-Computer Interaction*, Springer, Berlin.

⁴ Guger, C. Allison, B.Z. & Edlinger G.(Eds.) 2013, *Brain Computer Interfaces Research: A State-of-Art Summery*, Springer, Heidelberg.

brain stimulation, which helps treat disorders like Parkinson's disease and depression.⁵ This advancement has led to the development of robotic limbs that offer intuitive movement and sensory feedback, such as pressure or heat. The technology has also enabled the connection of two nervous systems, and in ground breaking experiments, the first brain-to-brain communication was achieved. In 2009, researchers at the University of Southampton demonstrated the transfer of thoughts between minds using BCI. Further experiments, like the interconnection of a human and a rat's nervous systems, showed that one brain could control another organism's movement.⁶ BCIs are currently used in various fields, including healthcare, military, gaming, and productivity improvement. They help people with conditions like "locked-in syndrome" communicate and control devices with their brain activity. While the technology is advancing, it remains far from perfect, and ethical concerns, including privacy and security, continue to emerge.⁷ Some even predict that BCIs may lead to human enhancement, allowing for new sensory experiences or cognitive improvements in the future.

Interaction between BCIs and Law

New technologies pose challenging issues to legal systems, frequently upending conventional ideas about how things are conducted and regulated. To maintain social stability in the face of challenges to morality and social norms, new strategies must be developed. The best method of controlling these social dynamics to date is through the legal system. These factors include commonly held opinions, the dissident viewpoints of different social categories, novel incentives from other cultures, or uncertainty brought on by a lack of awareness. Regarding the interaction between law and emerging technologies, law can be viewed as "a method of technological risk management and plays a constantly increasing role in that regard."⁸

A) Human Rights to Life with Dignity

Human dignity cannot be easily disregarded, despite the assertions of some that it is "no more than respect for persons or their autonomy"⁹ and that "dignity is a useless concept in medical ethics and can be eliminated without any loss of content"¹⁰ Human dignity represents a key legal idea, a value that serves as the foundation for both the fundamental human rights and the equality of all people.¹¹ According to Article 1 of the Universal Declaration of Human Rights, "All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood."

There are different interpretations of dignity. The first idea links human worth—a certain significance of a human being that how individuals accept himself. In this sense a right to autonomous behavior needs to be noted.

According to Malpas "what counts as a diminution in human autonomy—a diminution in the capacity of human beings rationally to make their own decisions and to determine their own lives—is ipso facto a diminution in human dignity and in human being"¹²

Furthermore, there is compelling psychological justification for the idea of upholding human dignity since it prevents violence in society by valuing people and their particular groupings and by avoiding their commodification. In this sense, BCIs have the potential to either fully suppress a person's autonomy or increase it by giving her more options for making decisions (for example, a BCI that helps a person move more effectively or communicate more effectively with her surroundings gives her new options to achieve her goals). As previously mentioned, a neurological system can be effectively stimulated by a variety of techniques to the point where an individual loses control of their own muscles. However, such use is in direct opposition to any idea of human dignity.

B) Right to Privacy

The right to privacy is a fundamental human right that is recognized globally. As described by Art. 12 of the Universal Declaration of Human Rights, "no one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honour and reputation. Everyone has the right to the protection of the law against such interference or attacks."¹³ Posner's defines privacy as a right of an individual "to conceal discreditable facts about himself"¹⁴

Unfortunately, in order for BCIs to function properly, they must constantly track their users' brain activity, which means they must gather and handle sensitive and private data about them. Even the ability to actually read minds

⁵ Tan, D. S. & Nijholt A. (Eds.) 2010, *Brain Computer Interfaces: Applying your Minds to Human-Computer Interaction*, Springer London.

⁶ Yoo, S.-S., Kim, H., Filandrianos, E., Taghados, S.J. & Park, S. 2013. 'Non-Invasive Brain-to-Brain Interface (BBI): Establishing Functional Links between Two Brains', *PLoS ONE* 8(4), e60410

⁷ Pöysti, T. 2004, 'ICT and Legal Principles: Sources and Paradigm of Information Law', *Scandinavian studies in law*, vol. 47, pp. 559-60

⁸ *ibid*

⁹ Macklin, R. 2003, 'Dignity is a useless concept', *BMJ: British Medical Journal*, vol. 327, no. 7429 pp 1419-1420

¹⁰ *Supra* note 9

¹¹ Malpas, J. & Lickiss, N. (Eds.) 2007, *Perspectives on Human Dignity: A Conversation*, Springer, Dordrecht.

¹² *ibid*

¹³ Article 12, *Universal Declaration of Human Rights*, 2024

¹⁴ Solove, D. J. 2008, *Understanding Privacy*, Harvard University Press, London

and recognize the thoughts of those under observation is a goal of the technology. It goes without saying that such mental interference disrupts a person's most private space.

The law would have to figure out how to protect this privilege because it is biologically justified and allows people to live their lives regularly without worrying about being revealed, which makes them extremely vulnerable.

C) Right to Freedom of Speech and Expression

As expressed in article 19 of the Universal Declaration of Human Rights “Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regard less of frontiers.”¹⁵

To guarantee a BCI's operation, a person is typically asked to think in a specific way. The extent of the freedom that is provided may be limited as a result of the precise expression that is required of someone. Social pressure would compel people to use their brains in a particular way, and conflicts with other protected fundamental rights would arise, particularly if BCI technology were extensively employed, for example, for everyday interactions or validation.

D) Issues relating to Accountability and Liability

This issue arises due to integration of BCI in the decision making process of humans. Accountability concern arises if the BCI malfunctions and causes harm. Who bears responsibility for BCI malfunctions—the operator, user, or manufacturer? In addition, neuro-crimes like BCI hacking promote prejudiced conduct, which poses particular legal difficulties.¹⁶

E) BCI and Criminal Justice

BCI makes suggestions for tracking illegal activity and identifying deception. In the meanwhile, there have been legal disputes about the validity of neurological testimony in court. The use of BCI in the criminal justice system raises serious concerns about fairness because it may lead to self-incrimination and violate the right to mental privacy.¹⁷

CONCLUSIONS & SUGGESTIONS

The rapid ascent of brain-computer interface (BCI) technology presents a paradigm shift for humanity, poised at the precarious intersection of profound benefit and unprecedented risk. This research has demonstrated that while BCIs hold immense promise for restoring mobility, facilitating communication, and augmenting human capabilities, they simultaneously threaten the very bedrock of human autonomy and legal personhood. The direct pathway BCIs create between the human brain and the external digital world forces a critical re-evaluation of our most fundamental legal and ethical frameworks.

The core conclusion of this analysis is that existing legal protections are insufficient to guard against the unique vulnerabilities inherent in BCI technology. The convergence of its capabilities—reading, interpreting, and even influencing neural activity—creates specific threats that current interpretations of human rights cannot fully contain.

1. **The sanctity of the mind is at risk:** the most significant implication of BCIs is the erosion of mental privacy. The ability to monitor brain activity in real-time transforms the mind from a private sanctuary into a territory open to data extraction and surveillance. This directly imperils the right to freedom of thought, as individuals may self-censor for fear of their unexpressed opinions being accessed.

2. **Human dignity is under threat:** BCIs possess a dual capacity to both enhance and diminish human dignity. While they can restore autonomy to individuals with disabilities, they can also be used to override an individual's will, manipulate their decisions, or commodify their neural data. Any use of BCI that diminishes human autonomy constitutes a direct assault on human dignity as enshrined in international law.

3. **Legal frameworks are ill-equipped:** current liability and accountability laws are challenged by the integration of BCIs into human decision-making. In cases of malfunction or misuse, assigning responsibility between the user, developer, and manufacturer becomes a complex legal puzzle. Furthermore, the potential for “neuro-crimes,” such as BCI hacking or neural data theft, demands new and specific legal definitions and penalties.

4. **Foundations of justice are being tested:** The proposed use of BCIs in the criminal justice system for lie detection or monitoring criminal intent raises grave concerns. It threatens the privilege against self-incrimination and risks creating a system where a person's thoughts, rather than their actions, become the basis for prosecution, fundamentally contradicting principles of a fair trial.

In summary, without proactive and nuanced legal intervention, the deployment of BCI technology risks creating a world where the freedom of the inner mind is compromised, human agency is diluted, and existing inequalities are exacerbated by a new form of cognitive divide.

¹⁵ Article 19, Universal Declaration of Human Rights, 2024

¹⁶ Farahany N, *The Neuroscience of Law: The Role of Brain Science in Law and Policy* (Cambridge University Press 2019).

¹⁷ McCay-Peet L, 'The Legal Implications of Cognitive Enhancements via BCIs' (2022) 28(1) *Journal of Law and the Biosciences* 58