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Neuroweapon Proliferation, Sixth Domain of Warfare, and IHL

Muhammad Sohail Asghar[1] & Hafsa Naz[2]

[1]*Assistant Professor of Law, University of Okara, Email: muhammad.s.asghar@gmail.com*
[2]*Visiting Lecturer (Corresponding Author), University of Okara, Email: hnhafsa777@gmail.com*

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Corresponding Author:
Hafsa Naz
Email:
hnhafsa777@gmail.com

ABSTRACT

The battle for power originates and concludes in our minds, where actuality is perceived and preserved. The constant pursuit of power and influence has led us towards a scientific race to decipher human brain. The evolving arena of neuroweapons has already stared to defy the traditional perceptions as to war. This paper debates on the emergence of sixth domain of warfare – the mind, and how is it likely to alter the military operations and fundamentally change the conflict and warfare. The development and deployment of neuroweapons is expected not only to create unprecedented dangers arising from their misuse but also to disrupt the foundational principles of armed conflict under International Humanitarian Law (IHL). On the basis of the available literature, this paper attempts to access the legality of the future uses of neuroweapons under contemporary framework of IHL.

Introduction

The human brain, an incredibly complex organ with its about 100 billion neural connections, is the fundamental reason for our superior intellect and logical reasoning. Unravelling its mysteries is the greatest trail to ever be commenced. Advancements in the neurological research and innovations have facilitated us to read and write human brain activity, not only to understand and predict human behaviour and decision-making processes but also to weaponize human brain. Weaponry advancements are always linked with the element of surprise: always be the first one with the latest. In a number of battlefield scenarios, it is evident that human mind is capable of detecting threats much faster than any computer, on the other hand, computers are faster than the human mind while calculating countermeasures. Consequently, any group engaged in an armed conflict, that successfully combines human perception with computer calculation will be at an advantage.

Dr. James Giordano (Giordano, 2014), Dr. Robert McCreight (Giordano, 2014), and Dr. Armin Krishnan (Krishnan, 2016) have attempted to define the term neuroweapon; however, its highly intricate nature renders it ambiguous. This emerging technology consequently remains widely unregulated, unlike other modern highly advanced weapons such as biological or chemical ones. Irrespective of definition, neurotechnology pertains to controlling and potentially manipulating the most important component of a human being—their mind. These weapons primarily aim at human brain, affecting its cognitive functions such as thought, perception, reasoning, judgement, and emotions.

Images can be simultaneously processed by humans. This allows us to identify targets and categorise them within 200 milliseconds, far faster than we could become aware of what we see (Churchland, 1986), and far more quickly, and this is the point, than a machine could complete the same operation. Subconsciously, the brain responds to such impressions by signalling readiness to pertinent areas of the motor system. Received a great number of milliseconds earlier than any conscious decision generated in the brain, this signal is passed on by its neural networks. Why should this be a problem? Avoiding human consciousness, a military learning to master the integration of that subconscious signal into a weapon system would save time. Such a military would have an overall advantage over enemy forces still depending on the conventional path from perception over human consciousness to a human direction to the weaponry system. It will be prudent to assert that "neuroweapons," are those systems that (i) combine synaptic and neuronal functions of the human brain into a weapon system and (ii) so significantly lessen the role of human consciousness prior to aiming a target.

Brain Computer Interfaces challenge our core philosophies as to mind and body: are these two different things or is one always required to be explained with reference to the other? If this is the case, is it the body or the mind that pulling the strings? Or is it a combination of the two? Do our postulations are dependent on the subsistence of a greater power that someway synchronizes the both? In philosophy of mind, these questions are called mind-body problem. But this paper is not that much concerned to tackle this problem as part of a theoretical discussion. This paper is much concerned with the idea that what it means to be human under international humanitarian law and finding out the meaning of being human. To be aware of the neural process of our brain is merely one initial aspect in the process of recognition.

The Cuba incident in late 2016 (Entous & Anderson, 2018) is the earliest reported case that employed a neuroweapon. A wide range of methods that are specifically designed to affect the brain activities or central nervous system of an individual are referred to as neuroweapons. The core purpose of these weapons is to alter the behaviour of a person in a predictable manner by manipulating his mental state and cognitive abilities (Walton C. D., 2018). Though the available literature indicates that neuroweapons are at initial stage of their development and deployment, the immediate assessment of their implications regarding International Humanitarian Law (IHL) is prudent.

Classifying Neurotechnologies

The United Kingdom Royal Society’s report classifies the use of neuroscience and technology into two broad categories; performance augmentation and performance degradation.

1. Performance Augmentation

These tools seek to enhance brain capabilities by improving cognitive ability, visual and auditory faculties, memory, and motivation, while reducing the adverse effects associated with insomnia, fear, stress, pain, and other negative emotions simultaneously. Although performance augmentation approaches are generally considered beneficial, experiments involving the modification and manipulation of the human mind have elicited serious concerns.

Performance augmentation can be classified into three overarching categories: (i) neuropharmacology employs specialized drugs that affect specific regions of brain (Ford & Glymour, 2014). (ii) Brain stimulation involves sending electric signals to the targeted areas of the human brain in order to improve different brain functions such as cognitive learning(Giordano, 2014). (iii) Brain computer interface (BCI), also known as neural interface system (NIS) or human-machine interface (HMI). It facilitates connection between human brain and computer, making a bidirectional exchange of information possible (Cutter, 2015).

a. Neuropharmacology

For millennia, militaries have increased the performance of their troops by using drugs such as alcohol, amphetamine, cocaine, opiates, and meth (Krishnan, 2016). Neurotechnology continues to develop pharmaceuticals that can enhance brain and cerebral activities. Currently, such pharmaceuticals are developed that utilise nanotechnology to target and penetrate blood-brain barrier in order to address neurological illnesses (National Research Council, 2008). The current trends in the field of neuropharmacology are indicative of the fact that in the near future military commanders may have the ability to monitor and regulate the cerebral activities of their troops through precise administration of specific pharmaceutical meth (Krishnan, 2016).

b. Brain Stimulation

Transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS) are two contemporary developments in the brain stimulation technologies. TMS uses a magnetic field whereas tDCS employs a continuous, low direct current to enhance the functionality of the certain neural cells in the brain (Giordano, 2014), which are responsible for the shooting precision and decision-making velocity (Rocha, 2020). These technologies are currently under experimentation for the military use.

Affixation of brain stimulation devices on the helmet of a military personnel can significantly enhance his cognitive ability. Army troops with enhanced cognitive abilities will hold a strategic edge in combat due to enhanced battle field comprehension and situational awareness. Brain stimulation technologies can also offer a cost-effective method for military training, allowing for customized training to address an individual's deficiencies and requirements.

c. Brain Computer Interface (BCI)

Human brain integrated systems are known by various names, such as brain machine interfaces, brain-computer interfaces or neural interface systems. Use of the online EEG signals to monitor soldiers' neural activities in order to detect sleepiness (Resalat & Afdideh, 2012) and the use of EEG signals for communication purposes (silent talk) in extremely noisy places such as battlefields are the recent examples of brain computer interfaces (Kotchetkov & Hwang, 2010).

Proposals such as 'Cognitive Technology Threat Warning Systems' and 'Tele Presence' are other examples of brain machine interfaces (Pei, Hill, & Schalk, 2012).

The advancement of brain-computer interfaces (BCI) in both civilian and military domains is unprecedented. Robotic prosthetic limbs are employed to improve the mobility of the persons suffering from spinal cord disorders. Contemporary BCIs are also used for the exoskeleton to increase strength and protection (Bogue, 2009). BCIs are capable to establishing a relationship between a human brain and hardware or software working as an extension of his cognitive abilities. This development has led to the creation of advanced remotely operated military apparatus ensuring the safety of human soldiers. Consequently, the entire armies may engage in combat using most advanced neurotechnologies without causing any danger to human lives (National Research Council, 2008). Neurotechnological developments are destined to significantly alter military technological and acquisition strategies globally. Moreover, BCIs may eventually facilitate the direct transfer of knowledge and skills to the targeted regions of human brain, hence making rapid learning possible. Once we attain a more profound understanding of human brain function, the potential applications of BCIs will be restrained only by imagination.

While enhancement technologies hold potential for safeguarding human lives and national interests, their possession by an adversary could cause great harm by enabling him to employ them for destructive ends, hence highlighting the risks linked with advancement of neuroscience & technology. The risks are exceptionally high, as are the incentives, making it inevitable that it's only a matter of time these ideas will be materialized into realities.

Performance Degradation

Conversely, the purpose behind the development of performance degradation tools is to impact or impair the cognitive capabilities of a person, rendering him ineffectively perform his duties or potentially leading to fatal outcomes. A little discourse is available on the performance degradation of neurotechnologies, frequently attributed to the classification issues and the need to avoid a neurowar arms race (Krishnan, 2016).

Analogous to the neuropharmacology for performance enhancement, pharmaceuticals could also be administered with ulterior motives to impair or manipulate the behaviours of adversaries or civilians alike (The Royal Society, 2012). Biological agents such as viruses, bacteria, or genetically modified bugs have the capacity to target the human brain or nervous system to induce customized behavioural changes (Krishnan, 2016). Waves or energy could also be weaponised if concentrated enough in space and time. There is a broad range of wave-based weapons that utilize concentrated energy in order to cause impairment or even destruction (The Royal Society, 2012). The behavioural changes caused by the use of waves or energy based neuroweapons are referred to as Havana Syndrome(Entous & Anderson, The Mystery of the Havana Syndrome., 2018)

Finally, the human brain can be hacked by software driven weapons. Although contemporary incidents relating to the hacking of BCIs are rare, the increased use of BCIs and their integration with the big data will make them more suspectable to such attacks. However, it is essential to differentiate direct information attacks on the human brain from manipulative indirect information attacks which are often related to psychological warfare and are not regarded as neuroweapon strikes.

International Law and Neurotechnology

Weaponization of the human brain or attacks on it remain widely underregulated under international law. Although certain neuro-biological, toxic, and chemical weapons are restricted by contemporary United Nations biological and chemical weapons treaties (BWC & CWC), majority of the neuroweapons could not be regulated under any of these as they cannot be classified in either category.(DeFranco, DiEuliis, & Giordano, 2020).

(con) Even though legislations to regulate modern neuroscience and technology may be imminent, these are not proactive while addressing the challenges caused by them. Furthermore, considering the fact that neurotechnology is an emerging field of knowledge, the definitions that were established years ago are insufficient to comprehensively define it, these are excessively broad, ambiguous, or irreverent to prospective neuroweapons.

Dr. Dando in his book in 2015, meticulously considered the legal, ethical, and social repercussions of neuro science and technology and pointed out its potential misuses. In this work, he examines such advancements of neuroscience and technology within the ambit of civilian research that potentially carry hazardous multipurpose applications. He further records the initiatives of the international community to prevent the misuse of this research for malicious ends (Dando, 2015). In 2008, a few of these legal problems were addressed by White, who concluded that weapons using BCIs are unlikely to contravene with IHL but those are definitely going to cause some novel challenges in the jurisprudence of war crimes (White, 2008). Another challenge while restricting the proliferation of neuroweapons is that many states are in the pursuit of military neuroweapons on the pretext of health care research, concealing their endeavour under commercial norms such as trade secrets or intellectual property rights (Giordano, Weaponizing the Brain: Neuroscience Advancements Spark Debate, 2017).

As the future holds expansion of neurotechnology, its social and military applications will potentially increase. The legal and ethical concerns that must be confronted will become critical when technology intersects with mankind through numerous avenues.

International Humanitarian Law (Ihl) and Neurotechnology

International humanitarian law affects the selection of targets and the way we approach them. While dealing with the armed conflict, we can reduce the relevant IHL rules into two: the first is distinction, and the second one is proportionality. According to the first rule, while directing the military operations, the conflicting parties must always distinguish between combatants and civilian population and between the military objectives and the civilian objects; the military force can only be used against the military objectives(Henckaerts & Doswald-Beck, 2005). The second rule requires the conflicting parties to make sure that the military power must never be used in an excessive manner, the power used must be proportionate with the required military objectives and anticipated advantage (Henckaerts & Doswald-Beck, Customary International Humanitarian Law, Rule 14., 2005).

As the use of weapons that do not comply with the international warfare rules such as distinction and proportionality is prohibited (Rule 71, CIHL), the development or deployment of neuroweapons makes no sense, sticking to the adherence of these rules. Article 36 of Additional Protocol-l to the Geneva Convention makes it mandatory for all the signatory states to proactively assess the legality of the potential future use of their weapon systems. This article is formulated to

have a wide scope and includes not only the weapons but also the methods of engaging in warfare. States are responsible for evaluating the compatibility of their weapon systems, utilizing neurotechnology, with their commitments under IHL (ICRC, 2001). Nevertheless, the states are keeping these reviews confidential due to the obvious reasons (Fry, 2005), consequently making it impossible for the rest of the world to know for sure to what extent their neurotechnology conforms with Article 36 of API.

Though numerous scholarly writings are available on neurotechnology and law, there is a lack of text that specifically addresses the legality of neuroscience under international humanitarian law. White's 2008 writing (White, 2008) provides an extensive analysis of neurotechnology based weapons. White, in his writing, asserts that there is no explicit prohibition on the use of brain machine-interfaced weapons (neuroweapons) under international law, mainly due to their exceptional precision and legal domestic use in homeland operations. International law has also been sluggish in condemning unmanned ariel vehicles (UAVs), White further argues. Although his argument regarding direct denunciation of neuroweapons from the international law's perspective seems legitimate, his reliance on state practice or opinion juris cannot be sustained while claiming the degree of precision of such weapons, as these have not yet been deployed in contemporary war scenarios, causing the absence of precise information.

White suggests that the purported absence of contemporary IHL limitations regarding neuroweapons necessitate new legislation in order to regulate neuroweapon systems. He supports his proposal for the new legislation with the argument that neuroweapons make it impossible to establish the element of mens-rea under the current legislative framework. This assertion seems fair, as the means rea of the operator of the neuroweapon system is quite difficult to establish. Although the solution offered by the White for the culpability cannot be relied upon, he believes that impunity may be addressed by declaring all the individuals guilty who are involved in the development of neuroweapon system. The problem with this solution is that it is quite impossible to clearly distinguish the responsibilities of developers, command, and subordinates. White's recommendation regarding declaring 'operator' accountable for serious violations of the principles of proportionality or distinction is impractical, as the IHL visualizes the state as well as the individuals liable under criminal law for breaching these mentioned principles. Violations of these principles are indicative of deliberate judgements made by the persons in authority. If we begin to implement the operator rule, as recommended by White, we are going to believe that it's the operator who is determining how a machine operates. In this case, it is plausible to consider that a BMI weapon system is controlling a human being rather than the other way around. It is exceedingly difficult to draw a line between conscious and unconscious decision making when it comes to the operator of a neuroweapon system.

One might expect that this disadvantage could be mitigated by invoking the powers of Article 28 of the Rome Statute on the 'Responsibility of commanders and other superiors'; however, such optimism is misplaced as the superior responsibility under this statute is contingent on the existence of a subordinate who either has committed or is expected to commit a crime under IHL. Furthermore, the phrasing of Article 25 of the statute makes it obvious that when the drafters used the terms 'forces' and 'crimes' together, they meant a natural human being carrying natural qualities rather than a BMI or neuroweapons. In case a human being is used who is controlled by a machine, he could not be classified as subordinate under the Rome Statute and international humanitarian law.

The most serious concern is how to ensure that the neuroweapons will conform to fundamental norms of IHL during active war scenarios. Professor Noll proposes a two-phase pragmatic solution to this problem by suggesting that human decision-making process could be mapped in computer-understandable form to make IHL complaint weapon systems. In the first phase, we have to gather a diverse range of IHL experts from across the globe with proven records of applying IHL principles in various war situations. Subsequently, they will be linked to devices capable of recording their brain activity and eye movement. After that, they will be engaged with multiple audio-visual war simulations necessitating the application of IHL norms while deploying multiple weapon systems under diverse circumstances. The cerebral activities, ocular movements, and legal judgments of the experts will be recorded. The same mapping exercise shall also be used on a non-expert group for a contrasting analysis. The analysis of both data sets shall help us in deriving decision-making patterns and the spectrum of results that define IHL experts. These results will be encoded into computer comprehensible form, hence enabling the weapon system to operate an IHL software. In the second phase, the IHL experts and software are integrated. The experts evaluate the decisions made by the IHL software in various combat simulations and rectify them in case of any inaccuracies. The software is now prepared for the deployment. It is capable to apply IHL principles more rapidly than humans could and will only communicate with a human commander in the event of unforeseen circumstances. Aside from this emergency delegation to humans, this system shall operate like an automatic anti-missile system deployed abord a military aircraft (Noll, 2014).

Conclusion

This paper underscores the rapid development in the field of neuroweapons and their profound consequences in the military operations and international armed conflicts, thereby present the mind as the sixth domain of Warfield. Malicious use of neuroscience is expected to escalate over time as neurotechnology evolves into global enterprise, with both state and non-state actors seeking to opt for this technology for human brain manipulation to establish a novel power dynamic, thereby presenting significant legal, social, and ethical dilemmas under the framework of contemporary international humanitarian law (IHL). International community needs to attend these newly evolved challenges proactively ensuring that the laws governing warfare evolve to deal with the complexities introduced by this new arena. The prediction as to the legality of the future uses of the neuroweapons under international humanitarian law (IHL) is impossible to make at the moment. Further research and discourse are crucial to navigate the ethical and legal landscapes of this emerging threat.

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