COGNITIVELY ENHANCED HUMANS AS BOTH WARFIGHTERS AND WEAPONS OF WAR

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Abstract

With the advent of neuromorphic computing, artificial intelligence and machine learning can now behave in a human-like manner by analyzing information and responding with subjective reasoning. And when this informed decision-making process is combined with brain-computer interfaces (BCIs), not only could a neuromorphic BCI take direction from the brain, but it could also observe its complexity and use that information to incorporate new knowledge and capabilities into the brain itself as it exploits the plasticity, or adaptability, of the brain. This combination of biological and technological intelligence could lead to the development and delivery of thoughts/outputs that are powerful enough to classify this merger as a weapon capable of delivering an armed attack. The intelligent powers of this weapon would be unrivaled. Because defensive and offensive measures against the weapon would be largely ineffective, States would be justified to act in self-defense under Article 51 in the Charter of the United Nations to prevent the production of this weapon.

INTRODUCTION

War is on the brink of reformation, and the role and function of the warfighter is changing in order to remain integral to combat and compete with the speed of technology.[1] In a future battlefield dominated by robotic systems, warfighters will necessarily integrate their capabilities with machines by using computer chips that interface their thoughts with the movements of robotic systems.[2] This brain-computer interface (BCI) technology enables instant communication between human and machine

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1. ALEXANDER KOTT ET AL., VISUALIZING THE TACTICAL GROUND BATTLEFIELD IN THE YEAR 2050: WORKSHOP REPORT 9 (2015) [hereinafter ARMY 2050].

2. *Id.* at 8.

and would bridge the "capability gap" between technological innovation and human involvement in combat.[3]

BCIs also have the potential to shift from being mere facilitators to being "collaborative" or "co-adaptive" partners due to a unique form of technology known as neuromorphic computing—an advanced form of artificial intelligence (AI) and machine learning that independently analyzes and adapts to dynamic situations similar to how a human would.[4] Because this technology computes, or "thinks," like a human, a neuromorphic BCI (nBCI) would not only interact with the brain, but it would also study and exploit it.[5]

This type of human machine collaboration could also be repurposed for another use in combat. Human intelligence—more generally, the human brain—is a largely untapped resource that "will be key to survival and operational dominance in the future."[6] By accessing the brain's full potential, this human-nBCI collaboration could yield unprecedented cognitive power that could be delivered as outputs.[7] These outputs could be organized to cause both kinetic and non-kinetic destruction to the degree that the human/nBCI collaboration (H/nB)[8] could be used and classified as a weapon that is capable of producing an armed attack under the *jus ad bellum* (law of going to war).

And because of the incredible power that H/nB could develop and wield as the nBCI unlocks and learns from the dynamic and varied phenomena and minutia of the human brain,[9] States may perceive the

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3. Justin McClelland, *The Review of Weapons in Accordance with Article 36 of Additional Protocol I*, 85 INT'L REV. RED CROSS. 397, 401 (2003).

4. Robbin A. Miranda et al., *DARPA-funded Efforts in the Development of Novel Brain-Computer Interface Technologies*, 244 J. NEUROSCIENCE METHODS 52, 57 (2015) [hereinafter *DARPA-funded Efforts*].

5. *Intel Scales Neuromorphic Research Systems to 100 Million Neurons*, INTEL NEWSROOM, https://newsroom.intel.com/news/intel-scales-neuromorphic-research-system-100-million-neurons/#gs.mddnrd [https://perma.cc/J8QP-XYAV] (last visited Apr. 2, 2021) (noting that researchers are "creat[ing] chips that function less like traditional computers and more like the human brain").

6. Michael Joseph Gross, *The Pentagon's Push to Program Soldiers' Brains*, THE ATLANTIC, Nov. 2018, https://www.theatlantic.com/magazine/archive/2018/11/the-pentagon-wants-to-weaponize-the-brain-what-could-go-wrong/570841/ [https://perma.cc/S5Y3-YDGB] (quoting Michael Goldblatt: "Soldiers having no physical, physiological, or cognitive limitation will be key to survival and operational dominance in the future.").

7. ARMY 2050, *supra* note 1, at 7. *See also* ANIKA BINNENDIJK, TIMOTHY MARLER & ELIZABETH M. BARTELS, BRAIN-COMPUTER INTERFACES: U.S. MILITARY APPLICATIONS AND IMPLICATIONS 7–8, 16 (2020).

8. Pronounced: Hannibal.

9. Woodrow Barfield & Alexander Williams, *Cyborgs and Enhancement Technology*, 4 PHILS. 1, 15 (2017). *See also* Elizabeth Landau, *Brain's 'Background Noise' May Hold Clues to Persistent Mysteries*, QUANTA MAG. (Feb. 8, 2021), https://www.quantamagazine.org/brains-background-noise-may-hold-clues-to-persistent-mysteries-20210208/ [https://perma.cc/EJ5J-J9S6].

existence of this weapon as a threat and act in self-defense under the 1945 UN Charter's exception to the prohibition on the use of force.[10] However, these measures of self-defense would have to be initiated in order to prevent the construction of the weapon (as opposed to preventing the use of the weapon) because once such a weapon is constructed and fielded, self-defensive measures against it would be largely ineffective due to its range of capabilities—particularly in the cyber sphere.

In short, once the cognitive capabilities of the nBCI and human are combined, these results (outputs) could be used for specific purposes, such as highly influential cyberattacks. This is due to the nBCI accessing untapped thought ecosystems within the brain and then using this knowledge to reprocess digital data in order to curate original forms of data-based targeting.[11] These destructive outputs, that are both produced and delivered by H/nB, are what can transform a human/nBCI merger into a weapon of war. And because this weapon could so fully disrupt conventions of combat by foreseeing and preempting offensive measures, States could invoke their inherent right to self-defense in order to prevent its production.

To clarify this assertion, it is first necessary to have a basic understanding of the capabilities of BCIs and neuromorphic computing. Part II will briefly discuss this technology. Part III will then evaluate how a human/nBCI collaboration could be capable of producing an armed attack. Part IV will then analyze States' rights to preventive self-defense in anticipation of H/nB's attack as well as the ramifications of introducing H/nB into combat. This will then be followed by the conclusion.

I. NEUROMORPHIC BCI TECHNOLOGY

BCI technologies have primarily been used to help facilitate recovery after an injury, such as restoring mobility through the use of a prosthesis, by using the human's electrical brain signals to "interact with, influence, or change their environments."[12] These electrode-computer constructs, made to "extract and decode information from the nervous system to generate functional outputs" are also being configured to enhance healthy

10. *See* U.N. Charter art. 51 ("Nothing in the present Charter shall impair the inherent right of individual or collective self-defense if an armed attack occurs against a Member of the United Nations, until the Security Council has taken the measures necessary to maintain international peace and security.").

11. *See* Barfield & Williams, *supra* note 9, at 15–16; Landau, *supra* note 9.

12. Jerry J. Shih et al., *Brain-computer Interfaces in Medicine*, 87 MAYO CLINIC PROC. 268, 268 (2012), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3497935/ [https://perma.cc/QJ39-G23T].

persons for purposes such as neuroprotection, increased memory, cognitive enhancement, or sensory augmentation.[13]

Currently, implantable BCIs are the most effective due to their proximity to the brain, thus avoiding the "scattering and weakening of signals as they pass through skin, skull, and brain tissue."[14] However, implanted BCIs can only last in the body for a short amount of time due to the corrosive nature of organic material in the body and the subsequent degradation of the foreign materials.[15] While improved durability and insulation of implanted materials may be possible in the future, alternative non-invasive options will continue to be explored as technology advances and the preference for non-invasive BCIs persists.[16]

Additional BCI capabilities are also being tested in order to facilitate a more dynamic discourse between the human and computer.[17] Neuromorphic computing is central to this research because the technology departs from the rigid computing processes of traditional AI and machine learning by instead mimicking the plasticity of the human

13. Max O. Krucoff et al., *Enhancing Nervous System Recovery through Neurobiologics, Neural Interface Training, and Neurorehabilitation*, 10 FRONTIERS IN NEUROSCIENCE 1, 6 (2016); *see also TNT Researchers Set Out to Advance Pace and Effectiveness of Cognitive Skills Training*, DARPA (Apr. 26, 2017), https://www.darpa.mil/news-events/2017-04-26 [https://perma.cc/6CUL-BYS4] [hereinafter *TNT Researchers*].

14. *Nonsurgical Neural Interfaces Could Significantly Expand Use of Neurotechnology*, DARPA (Mar. 16, 2018), https://www.darpa.mil/news-events/2018-03-16 [https://perma.cc/QF66-ULJB].

15. Krucoff et al., *supra* note 13, at 11 (noting that for clinical viability, BCIs need to be reliable for approximately a decade, whereas current BCIs last around a year).

16. *See Boosting Synaptic Plasticity to Accelerate Learning*, DARPA (Mar. 16, 2016), https://www.darpa.mil/news-events/2016-03-16 [https://perma.cc/X5MG-8PW8] [hereinafter *Boosting Synaptic Plasticity*]. An innovative way to facilitate less-invasive BCIs is through "nanotransducers," which are being fielded as an option for temporary and nonsurgical delivery to the brain to improve signal resolution. *Six Paths to the Nonsurgical Future of Brain-Machine Interfaces*, DARPA (May 20, 2019), https://www.darpa.mil/news-events/2019-05-20 [https://perma.cc/3RJC-MAEA].

17. *See* Woodrow Barfield, *The Process of Evolution, Human Enhancement Technology, and Cyborgs*, 4 PHILS. 1, 9 (2019) ("Research funded by the HBP is Heidelberg University's program to develop neuromorphic computing. The goal of this approach is to understand the dynamic processes of learning and development in the brain and to apply knowledge of brain neurocircuitry to generic cognitive computing. Based on neuromorphic computing models, the Heidelberg team has built a computer which is able to model/simulate four million neurons and one billion synapses on 20 silicon wafers. In contrast, simulations on conventional supercomputers typically run factors of 1000 slower than biology and cannot access the vastly different timescales involved in learning and development, ranging from milliseconds to years; however, neuromorphic chips are designed to address this by operating more like the human brain. In the long term, there is the prospect of using neuromorphic technology to integrate intelligent cognitive functions into the brain itself."). *See also Bridging the Bio-Electronic Divide*, DARPA (Jan. 19, 2016), https://www.darpa.mil/news-events/2015-01-19 [https://perma.cc/PC89-88EX].

brain.[18] This means that not only can neuromorphic chips detect neural signals in a brain similar to a traditional BCI, but they can also learn from and mimic brain neurocircuitry due to their own flexible brain-like processes that enable this learning.[19] Stated further:

> Although the BCI technologies . . . have proved quite remarkable in enabling direct neural control of robotic limbs, the neural decoding algorithms do not capitalize on one of the brain's fundamental characteristics—plasticity. Importantly, brain function is not fixed or static, but rather it adapts in response to learning new information (such as meeting a new person) or new behavioral skills (such as riding a bicycle).[20]

This plasticity not only creates the ability for the BCI to autonomously learn from and alter its functions based on activity generated by the brain, but it is also extremely energy efficient, thus presenting new possibilities for highly complex workloads.[21]

The United States' Defense Advanced Research Projects Agency (DARPA) has funded efforts among several institutions to explore different approaches to activate brain plasticity through its Targeted Neuroplasticity Training (TNT) program.[22] Indeed, DARPA has been an investor in research and development of BCI technology since 1974—just three years after the concept was proposed by Jacques J. Vidal in 1971.[23]

Mastering this plasticity function is particularly significant because it is what sets neuromorphic technology apart as a cognitive entity (in relation to previous versions of AI and machine learning). And this ability to adapt, or make informed decisions, can also be used by nBCI's in order to more effectively facilitate the brain's own learning processes. By

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18. *DARPA-funded Efforts*, *supra* note 4, at 56–57. *See also* Carolyn Sharp, *Status of the Operator: Biologically Inspired Computing as Both a Weapon and an Effector of Laws of War Compliance*, 28 RICH. J.L. & TECH. 161, 196 (2021).

19. *DARPA-funded Efforts*, *supra* note 4, at 56. *See generally* Steve M. Potter, *Wetware-Hardware Hybrids*, INST. FOR THE FUTURE, https://www.iftf.org/future-now/article-detail/wetware-hardware-hybrids/ [https://perma.cc/FS97-827K] ("It's a bit shocking how poorly we understand the brain, considering how important it is in our lives. Neurobiologists don't really understand what a thought is, where feelings come from, how memories are stored, or how we learn. We are at a stage equivalent to the Victorian understanding of the sun: it is likely there are concepts of brain function we can't conceive of yet, in the same way nuclear fusion would boggle an 18th century scientist. . . . Advances in neuromorphic software and hardware may supersede the use of actual living tissue to compute, in the same way that jet planes superseded the need to build flapping wings to make things that fly fast.").

20. *DARPA-fuded Efforts*, *supra* note 4, at 56.

21. Sharp, *supra* note 18, at 19.

22. *TNT Researchers*, *supra* note 13.

23. *DARPA-funded Efforts*, *supra* note 4, at 53–54.

stimulating regions of the brain involved with learning, the nBCI could trigger synaptic plasticity and release neurochemicals so that neural connections can be reorganized.[24] In other words, peripheral nerve stimulation is "a way to reopen the so-called 'Critical Period' when the brain is more facile and adaptive,"[25] and rather than the brain facilitating the learning process, the nBCI would be doing it instead.[26]

Thus, as BCIs incorporate "higher-level biomimetic models of reinforcement learning," both the brain and the nBCI can learn new information and behavioral tasks, and adapt to one another through closed-loop BCI performance.[27] Notably, this collaboration would also allow the nBCI to "precisely modulate peripheral nerves to control plasticity at optimal points in the learning process,"[28] which would expedite the pace of learning and "maximize long-term retention of even the most complicated cognitive skills."[29] This novel stimulation could enhance executive function, perception, and spatial navigation, significantly improve abilities to understand and speak foreign languages, and increase object and threat recognition.[30] In sum, humans could become nearly unlimited in their cognitive capabilities.[31]

Additionally, nBCIs could also monitor others' "emotional, cognitive, and physical states. . . . thus, detecting when a person is fatigued, paying attention, has high or low cognitive workload, or is significantly stressed."[32] Stated further: "[I]t will be possible to sense [people's] moods and whether or not they are vulnerable to deception or primed to act in a certain manner (resist or be passive)."[33] While similar "neuro-marketing" models are already being developed by corporations seeking to better understand and micro-target consumers with advertisements,[34] the increased capabilities from a human/nBCI merger could exploit manipulative outcomes beyond current applications as the computer not

24. *Boosting Synaptic Plasticity*, *supra* note 16.
25. *Id*.
26. *Id*.
27. *DARPA-funded Efforts*, *supra* note 4, at 57.
28. *Boosting Synaptic Plasticity*, *supra* note 16.
29. *Id.*
30. *TNT Researchers*, *supra* note 13.
31. Barfield & Williams, *supra* note 9, at 15. Interestingly, the former partner to one of the founders of Neuralink (Elon Musk) recently noted that while Neuralink's implants are an "experimental surgery," if successful the recipient will "have the knowledge of the Gods." *See* Sose Fuamoli, *Grimes and Lil Uzi Vert Are Keen to Get 'Brain Chips' Together*, ABC NEWS (Feb. 9, 2021), https://www.abc.net.au/triplej/news/musicnews/grimes-lil-uzi-vert-elon-musk-brainchips/13136328#:~:text=During%20a%20Clubhouse%20session%2C%20Musk,games%20with%20only%20his%20mind [https://perma.cc/4YJK-4RZ2].
32. BINNENDIJK ET AL., *supra* note 7, at 16.
33. *ARMY 2050*, *supra* note 1, at 12.
34. *Id.* at 13.

only learns from the brain's adaptive processes, but also strategically adapts its own activities based on changing information and context.[35]

Such a capability to understand and manipulate individuals may raise some concerns about the risks of using nBCIs.[36] Indeed, the risks of using neuromorphic BCIs could be great;[37] however, the reward may result in the possibility of humans operating at their full cognitive potential.[38] The question now becomes whether the merging of the human and the nBCI would result in outputs that could be regarded as an armed attack under the *jus ad bellum* paradigm.

II. H/NB AS A WEAPON

As a matter of survival, human resourcefulness has enabled our species to develop specialized tools, starting with the hand axe,[39] in order to compensate for a lack of embodied features. And as challenges to our survival are ever-changing, we necessarily continue to develop and rely

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35. *See DARPA-funded Efforts*, *supra* note 4, at 61.

36. Jonathan Wolpaw, the Director of the National Center for Adaptive Neurotechnologies notes:

> The unique thing about BCIs is that they provide the brain with a new kind of output, which is output from brain signals. Instead of driving muscles, you go directly to a part of the brain, measure its activity in one way or another, and you convert that into some sort of action. The individual pieces of the brain that have evolved, as far as we understand, with the sole purpose of controlling muscles, they are now being turned into the outputs themselves. The basic question for BCIs is how well the brain can learn to do this kind of thing that it wasn't designed for, and it wasn't evolved to do. And the answer up to the present is, it can sort of do it, but not all that well with our current methods.

Ray Schroeder, *We Are Underestimating Artificial Intelligence and BCI*, INSIDE HIGHER ED (Oct. 14, 2020), https://www.insidehighered.com/digital-learning/blogs/online-trending-now/we-are-underestimating-artificial-intelligence-and-bci [https://perma.cc/C5PJ-YF29].

37. Other risk-factors related to BCIs include hacking, which could potentially cause physical harm, confusion, the infiltration of personal and highly sensitive data, internal manipulation by trusted sources, legal accountability concerns, user fatigue in interfacing with the computer, the potential for the computer to detect, diagnose and intervene on human behaviors deemed to be impairments, as well as unknown long-term mental and physical side effects. *See* Theresea Hitchens, *DoD Needs New Policies, Ethics For Brain-Computer Links (Jacked-In Troops?)*, BREAKING DEF. (Aug. 27, 2020), https://breakingdefense.com/2020/08/dod-needs-new-policies-ethics-for-brain-computer-links-jacked-in-troops/ [https://perma.cc/QB7U-BJQB]. *See also* BINNENDIJK ET AL., *supra* note **Error! Bookmark not defined.**, at 21.

38. Doug Weber, TNT Program Manager notes: "DARPA's goal with TNT is to further enhance the most effective existing training methods so the men and women of our Armed Forces can operate at their full potential." *TNT Researchers*, *supra* note **Error! Bookmark not defined.**.

39. INST. FOR THE FUTURE, THE NEXT ERA OF HUMAN/MACHINE PARTNERSHIPS, EMERGING TECHNOLOGIES' IMPACT ON SOCIETY & WORK IN 2030 7 (2017).

on new tools.[40] Indeed, such developments have expanded to include internal and external technologies that can repair, replace, or enhance the functions of the body and mind in order to gain even a slight advantage in survival and in combat.[41] Here, the question is whether the merging of a human and nBCI would constitute a new type of tool for twenty-first century survival, that is also capable of producing an armed attack. This is an important distinction because self-defense, which is governed by the *jus ad bellum* paradigm, is only an option when the most serious use of force is applied.[42] In other words, self-defense is justified only when it is in response to an armed attack.[43]

First, it is helpful to understand how the source of such an attack would be classified. In other words, would the merging of a human and nBCI result in a new classification of weapon that is capable of an armed attack? While there are many definitions of what a weapon is, this Article will work with Justin McClelland's definition of "an offensive capability that can be applied to a military object or enemy combatant."[44] This definition fairly reflects most States' definitions and is also more exacting in that it only addresses offensive capabilities.[45]

Modifications from nBCIs would be different from the human-technology combination of a human using a hand axe, for example, because nBCIs are not merely a tool used by the human, they are integrated with the human in such a way that the two essentially constitute a formed partnership that can create new intelligent capabilities from within the collaborative process. Essentially, the human and the nBCI both contribute to the development of a thought, which is then transmitted

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40. PATRICK LIN, MAXWELL J. MEHLMAN & KEITH ABNEY, ENHANCED WARFIGHTERS: RISK, ETHICS, AND POLICY 4 (2013).

41. One reason for this is that

> Today's armed forces deal with vastly more raw data and information than at any time in history. Headsets, video feeds, instant messaging and radio transmissions all add to the cacophony of data that modern military forces are facing. This unprecedented amount of raw data helps by permitting more accurate targeting and in limiting collateral damage; however, these advantages must be balanced against the dangers of soldiers succumbing to the resulting "information overload," which can lead to tragic mistakes.

Heather A. Harrison Dinniss & Jann K. Kleffner, *Soldier 2.0: Military Human Enhancement and International Law*, 92 INT'L L. STUD. 432, 445, 482 (2016).

42. Military and Paramilitary Activities in and against Nicaragua (Nicar. v. U.S.), Judgement, 1986 I.C.J. 14, ¶ 205 (June 27).

43. *See* U.N. Charter art. 51.

44. McClelland, *supra* note 3, at 404.

45. *See* Thibault Moulin, *No More Humans? Cybernetically-Enhanced Soldiers Under the Legal Review of Article 36*, THE FEDERMANN CYBER SEC. RSCH. CTR., https://csrcl.huji.ac.il/book/no-more-humans-enhanced-soldiers-weapon-means-or-method-warfare [https://perma.cc/HJP5-BL5K] (last visited Apr. 15, 2022).

as an output. Thus, metaphorically, rather than the human using a hand axe, the human becomes part of the hand axe. This novel capability would be particularly beneficial in cyberspace where states must contend with the "continuous and pervasive" destabilizing influence that traditional weapons cannot address.[46]

Therefore, because the collaborative process between human and machine can turn thought into harmful action (e.g., manipulative exploits), H/nB is capable of offensive measures. The next question is whether these capabilities, or outputs, could be applied to a military object or enemy combatant. Although the gamut of possible means is beyond the scope of this Article, it is necessary to have some insight into potential uses in order to distinguish H/nB as capable of offensive measures.

The Narrative Networks (N2) program is a research initiative developed by DARPA to take a quantitative approach in analyzing the influence of narratives on human cognition and behavior.[47] This program likely originated from the discovery that narratives "can be particularly important in security contexts" because they "exert a powerful influence on human thoughts, emotions, memories, and behavior."[48] While nBCIs are not explicitly referred to, this BCI-based program notes that "tools are being developed to detect brain activity associated with narrative influence and to emulate this activity in the context of larger environmental factors with models of narrative influence on individual and group behavior."[49]

With nBCI as the "researcher," and with its connection to data in the cybersphere, the collaborative dynamic between human and machine could not only detect and provide insights into the effects of narratives, but also formulate this information into its own stream of highly curated narratives that would be directed at specific individuals or groups of people via cyberspace.[50] Stated differently:

> Since the brain is the proximate cause of behavior, N2 has focused much of its early research on understanding how stories impact the brain. . . . N2 researchers have explored how narratives can reinforce in-group and out-group memberships and induce profound empathy gaps between members of these groups. . . . Having detected a number of neural states associated with narrative influence, investigators are using this information to develop novel

46. *Id*.
47. *DARPA-funded Efforts*, *supra* note 4, at 61.
48. *Id*.
49. *Id*.
50. *Id*.

> brain-in-the-loop systems to improve narrative creation and delivery. [51]

While the delivery of narratives may seem benign, the combined capabilities within H/nB could produce carefully tailored narratives that, when applied with laser-like timing, duration, and intensity, could result in subtle yet immensely powerful effects on enemy combatants that could ultimately prove destructive (as will be illustrated in Part IV).

Therefore, not only can the combination of a human-nBCI merger generate offensive capabilities, but this collaboration is also what produces the outputs that would be applied to a military object or enemy combatant. Because of this, H/nB would meet the required standards under the definition of a weapon and would be classified as a weapon.

As an integral component of H/nB, the human collaborator would inevitably be incorporated into H/nB's classification as a weapon and would accordingly adopt the status of "weapon." As noted by Rain Liivoja and Luke Chircop, "[a] warfighter will only constitute a weapon when used as an instrument to cause injury, death, damage, or destruction."[52] It is noted here that the *warfighter* constitutes a "weapon" under certain circumstances. The warfighter is still regarded as a warfighter because they would still be existing as a warfighter. In other words, additional advantage or enhancement, as a result of integration, "transforms the person,"[53] but the person's status is not swallowed up in this transformation process. This means that, regardless of enhancements or changing legal classifications, the warfighter does not lose their identity as warfighter; instead, they are assuming an additional qualification as a weapon. The unchanging element is the human classification. In other words, the human (or warfighter) is always the point of reference.

As noted earlier, a human qualifies as a weapon because the human and the nBCI both constitute an incomplete portion of the instrument delivering the harm. Stated differently, the harm delivered is a result of the neuromorphic chip mediating the incomplete strengths of technology with the incomplete strengths and capabilities of the human to form a complete output. And even though this arrangement would be qualified as a human enhancement, it would not disqualify a warfighter as unhuman based on their atypical status of being cognitively modified.[54] Heather Dinniss notes that modern-day courts have been fairly clear about what it means to be human:

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51. *Id*.

52. Rain Liivoja & Luke Chircop, *Are Enhanced Warfighters Weapons, Means, or Methods of Warfare?*, 94 INT'L. L. STUD. 161, 176 (2018).

53. Dinniss & Kleffner, *supra* note 41, at 434.

54. *Id.* at 453.

> Lest the argument be made that a genetic change, technological implant or biological modification somehow remove the enhanced soldier from the human family, it should be recalled that the jurisprudence of human rights bodies, such as the European Court of Human Rights (ECtHR), have found breaches of protected rights of those whose brains are not yet fully formed (in cases involving an unborn child), those who have physiological differences, those who have genetic or chromosomal abnormalities and those whose bodies have been changed by medical intervention.[55]

Therefore, the human comprising H/nB is not only a weapon, but also a warfighter in the sense that this person would be actively engaged in hostilities. In other words, this human would simultaneously bear the role (and responsibilities and obligations) of a warfighter and a weapon. So, not only would the H/nB warfighter be the one attacking, but they would also be the armament doing the attack.

Since H/nB would be a weapon, and its decision-making capacity would allow it to operate independently from a third-party, it is useful to pause and consider the weapon's lawfulness under the law of war paradigm (*jus in bello*), which, in this case, would require both a weapons review and compliance with the principles of the law of armed conflict (LOAC) in order to understand whether such a weapon could conceivably be used during armed conflict.[56]

Article 36 of Additional Protocol I to the Geneva Conventions requires that "new weapons, means or methods of warfare" be reviewed and deemed lawful before use in combat.[57] In this case, the combination of the human and the nBCI would be the weapon, or the means, whereas the method, or "how warfare is conducted," is the output.[58] While there are a variety of applications for BCI technology in combat, such as flying drones with thought, the combined capabilities of H/nB are the methods that will be analyzed here because these would be the primary "offensive or defensive strategies and tactics" used "in order to gain or preserve a military advantage."[59] Stated differently, the "ammunition" of this weapon is the combined data, thought, and unparalleled

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55. *Id.*

56. *See*Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts art. 36, Dec. 7, 1978, 1125 U.N.T.S. 3.

57. *Id.*

58. U.S. DEP'T OF DEF., DEPARTMENT OF DEFENSE LAW OF WAR MANUAL 184 (2016) [hereinafter DOD MANUAL].

59. Thibault Moulin, *supra* note 45 at 16.

conceptualization and execution of an attack.[60] Because there are no laws prohibiting attacks in this form, these methods would not be unlawful under international law.[61]

Next, H/nB would also need to be capable of complying with the principles of the LOAC due to the unique nature of the weapon, in that the weapon would also be the independent decision maker. Interestingly, the dominant decision maker in this collaboration may not always be the warfighter.[62] Because the neuromorphic technology could detect brain activity and interact with the brain based on that information, it is possible for the human to be acted upon in the decision-making process.[63] In simple terms the nBCI would be analogous to both a doctor and medication, where the computer would diagnose an issue in the brain and then take action to regulate problematic behavior.[64] Depending on the nature of the issue, it is possible that the human may not have power to intervene in the computer's decision-making process. For example, the technology may override inappropriate behavior by blocking or regulating specific chemicals in the brain in order to alter problematic behavior and emotions, much like the role and function of drugs.[65]

Inappropriate behavior has long been exhibited on the battlefield and has been cause for concern among those who advise on LOAC compliance.[66] Indeed, proponents of lethal autonomous weapons systems (LAWS) have regarded emotions as limitations in combat and have advocated for LAWS to be decision makers due to their non-emotional

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60. Sydney J. Freedberg Jr., *Don't Share ALL the Data: Army CDO*, BREAKING DEF. (Jan. 25, 2021), https://breakingdefense.com/2021/01/dont-share-all-the-data-army-cdo/ [https://perma.cc/MBW6-JWVT] ("Army leaders have started saying that, in the future AI-driven fight, data is the new ammunition. Markowitz agrees – but, he added, that means you need to handle data as carefully as live ammo. . . ."). *See also* Joseph Lacdan, *Leaders See Data as 'Ammunition' in Future Warfare*, ARMY NEWS SERV. (July 16, 2020), https://www.army.mil/article/237298/leaders_see_data_as_ammunition_in_future_warfare [https://perma.cc/F6XU-XLCX] ("'Data, the ammunition of the future fight, is a strategic asset of the Army,' McPherson said. 'Our data provides us a competitive advantage over adversaries. As with any strategic asset, we must manage and protect our data.' . . .").

61. DOD MANUAL, *supra* note 58, at 316.

62. *See Journey of Discovery Starts toward Understanding and Treating Networks of the Brain*, DARPA (May 27, 2014), https://www.darpa.mil/news-events/2014-05-27 [https://perma.cc/3668-D89L] [hereinafter *Journey of Discovery*].

63. *See id*.

64. Krucoff et al., *supra* note 13, at 11, 13 (noting that BCIs may be used to modulate psychiatric illnesses by regulating neurons known to release serotonin (5HT), norepinephrine (NE), and dopamine (DA)).

65. *See Journey of Discovery*, *supra* note 62.

66. *See* ANDREW FEICKERT, JENNIFER K. ELSEA, LAWRENCE KAPP, & LAURIE A. HARRIS, CONG. RSCH. SERV., R45392, U.S. GROUND FORCES ROBOTICS AND AUTONOMOUS SYSTEMS (RAS) AND ARTIFICIAL INTELLIGENCE (AI): CONSIDERATIONS FOR CONGRESS 34 (2018) (noting that machines who exhibit no emotion can perform with a more deliberate focus).

state.[67] This same rationale would almost certainly apply to H/nB in order to prevent costly and irreversible mistakes. With the option to choose between an emotional decision maker and a non-emotional one, it is likely that militaries would opt to program the computer chip to override inappropriate emotional decisions, particularly when the lawful use of the weapon's decision-making abilities depends upon LOAC compliance.

H/nB's ability to comply with the LOAC would primarily be considered in relation to the principles of distinction, proportionality, military necessity, and humanity—all of which require context-specific evaluations.[68] As these laws were written with humans in mind, it is generally assumed that a human is capable of complying with them. As neuromorphic chips used in the weapon system may at times operate as the dominant decision maker, the chip must also be capable of complying with the LOAC without any human input or control. Therefore, because the LOAC requires context-specific judgements, such as distinguishing a combatant from a civilian, the nBCI must prove that it is capable of detecting and adjusting to continuously changing variables and distinguishing lawful from unlawful objectives.

Neuromorphic chips are able to adapt to changing circumstances due to their unique architecture that allows circuits to learn and continually select and improve upon calculations in a given situation.[69] Stated further:

> [N]euromorphic systems include accelerated on-chip learning, they can interpret the features extracted from images, perceive and analyze multi-faceted situations during an attack, and adapt behavior based on the information gathered. This capability is especially practical in today's unique battlefield environments, where situations are constantly changing, and new information must be continuously reassessed when distinguishing between combatants and civilians.[70]

Because neuromorphic technology allows the computer to "think" like a human, it has the capacity to analyze dynamic situations in combat and adjust to them as circumstances change in order to meet the requirements of the LOAC.[71] Thus, the nBCI could be a decision-maker in combat based on its capability to comply with the LOAC.[72]

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67. Charles P. Trumbull IV, *Autonomous Weapons: How Existing Law Can Regulate Future Weapons*, 34 EMORY INT'L L. REV. 533, 545–46 (2020).

68. Sharp, *supra* note 18.

69. *Id*.

70. *Id*.

71. *Id*.

72. To date, Conventional AI and machine learning's decision-making processes are rigid and prone to bias. *Id.* They also have not been explainable due to the systems configuration. *Id.* It is neuromorphic chips' capability for adaptability that sets them apart. *See* Sharp, *supra* note 18.

Although both the human and the machine are capable of independent compliance to the LOAC, this does not mean that H/nB has met the requirements of the Article 36 review paradigm.[73] As noted earlier, it is the outputs that are the methods of war, and these can only be produced when the human and machine collaborate with each other. Therefore, a weapons review would require the review of H/nB as a whole.[74] Until this happens, it is not certain that H/nB could pass a weapons review, though it is a possibility.

Ultimately, under the current legal paradigm, because H/nB is capable of producing offensive measures against enemy combatants and a weapon of this type is not prohibited by law, it is possible that future combat may be comprised of this cognitively superior warfighter-and-weapon-in-one—a daunting prospect for unequally matched States. Indeed, the ability for States to anticipate H/nB as an impending threat may be the deciding factor in whether they can protect the life and sovereignty of their state.

III. STATES' RIGHTS TO SELF-DEFENSE

In the context of going to war (*jus ad bellum*), the regulations that govern acceptable uses of force are found in the Charter of the United Nations, which prohibits force except in certain enumerated situations, including cases of self-defense.[75] Article 51 establishes that "[n]othing in the present Charter shall impair the inherent right of individual or collective self-defense if an armed attack occurs against a Member of the United Nations, until the Security Council has taken measures necessary to maintain international peace and security."[76]

While it is contended that an armed attack must take place before a State can respond in self-defense, some States, including the United States, hold that self-defense is an "inherent right" to invoke and act upon in situations where an armed attack is imminent.[77] This rationale is also

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Their analyses and decisions are explainable, and because of this, their rationale behind the analysis and decisions would provide predictability and assurance that the computer is operating as intended. *Id.* Thus, neuromorphic non-human decision makers could comply with the LOAC whereas traditional AI and machine learning could not. *See* Sharp, *supra* note 18.

73. Indeed, the United States has come under fire for doing weapons reviews on components of weapons systems rather than the system as a whole. *See* HUMAN RIGHTS WATCH, LOSING HUMANITY: THE CASE AGAINST KILLER ROBOTS (2012), https://www.hrw.org/report/2012/11/19/losing-humanity/case-against-killer-robots# [https://perma.cc/BY84-4M44].

74. The United States has dodged at least one weapons review by claiming that it was adequate only to review the components making up a weapon system. *Id.*

75. U.N. Charter art. 51.

76. *Id*.

77. Brian Egan, *International Law, Legal Diplomacy*, *and the Counter-ISIL Campaign: Some Observations*, 92 INT'L L. STUD. 235, 239 (2016), https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=1668&context=ils [https://perma.cc/89GA-573Y] (noting that

applied to non-imminent attacks where preventive measures would be the "last feasible window of opportunity" to protect the State.[78] Ashley Deeks, Noam Lubell, and Daragh Murray note:

> [I]n some contexts it may be appropriate for a state to act to prevent a particular, tangible, and serious threat from turning into an armed attack, even if the attack is not imminent. Some have referred to the permissibility of acting in the "last feasible window of opportunity" before the attack occurs, particularly when the threat is posed by cyber operations or weapons of mass destruction.[79]

Ideally, the existing legal framework would both adequately constrain States and also provide them with a legal responsibility to prevent an attack, such that preventive action taken against a State would be explicitly lawful (or unlawful depending on the case). In cases where there are gaps in the law, for instance, cases relating to new technology, preventive self-defense would still be significant (if not more so) *because* there is no codified guidance. This particularly applies to situations where the laws simply do not contemplate exceptional threats that could challenge the life and sovereignty of a State. A State's authority to act in preventive self-defense, whether by law or inherent right, will almost certainly be prevailed upon when it is a matter of survival.

In the cyber sphere, survivability depends on an ability to understand, navigate, and dominate myriad battlefields that are regularly developing within the cyber ecosystem (e.g., cyberattacks).[80] Unlike traditional battlefields, "the cyber ecosystem is entirely humanmade and therefore can be manipulated in ways other domains may not be."[81] As noted by the Cyberspace Solarium Commission, "[t]he cyber ecosystem is more than the technology—information, network, and operational technology—that constitutes the internet. The ecosystem is also the people, processes, and organizations that plug into the technology and the data they combine to produce."[82] This autonomous association of people

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immanency is determined by factors such as "the nature and immediacy of the threat; the probability of an attack; whether the anticipated attack is part of a concerted pattern of continuing armed activity; the likely scale of the attack and the injury, loss, or damage likely to result therefrom in the absence of mitigating action; and the likelihood that there will be other opportunities to undertake effective action in self-defense that may be expected to cause less serious collateral injury, loss, or damage.").

78. Ashley Deeks, Noam Lubell & Daragh Murray, *Machine Learning, Artificial Intelligence, and the Use of Force by States*, 10 J. NAT'L SEC. L. & POL'Y 1, 5 (2019).

79. *Id.*

80. U.S. CYBERSPACE SOLARIUM COMM'N, COUNTERING DISINFORMATION IN THE UNITED STATES 8–16, 71 (2020), https://drive.google.com/file/d/1lpfOQdsHC2ZaawMcB5zeCIaO6y3vNp4p/view [https://perma.cc/9J3Z-TTFE].

81. *Id.* at 71.

82. *Id*.

and technology is the ideal setting for "disruptive" innovators to generally engage themselves in the processes of reshaping and operating the cyber ecosystem—from digitally connecting critical infrastructure to creating globally connected communities.[83]

And while this ecosystem has provided economic growth and improved quality of life, the reverse is also true. Malicious cyberattacks are increasingly spilling over into the natural world, with the effects being acutely felt by both public and private sectors.[84] At its core, this destabilizing influence is fundamentally generated by the power of knowledge.[85] In cyber warfare—which ensnares state and non-state actors alike—it is unparalleled intellect and ingenuity that distinguishes the superior from the weak.[86] In other words, whoever reigns in knowledge becomes the ruler of the cyber world.[87]

As such, several private sector entities are also working on their own versions of neurotechnology and BCIs.[88] These technological achievements may be happening at a significantly more advanced pace in the private sector because private entities have the resources to hire the best global talent and are not slowed down by the formalities of democratic governments.[89] Accordingly, non-state actors could soon achieve intellectually dominant cyber capabilities. Thus, not only is it conceivable, but it is also probable that non-state actors such as private corporations with the technological capability and interest in producing

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83. *Id*. at 1.

84. *Id*.

85. The cybersphere is data-driven, with information being the key resource for both creating and destroying digital and tangible resources. *See id*. at 92.

86. U.S. CYBERSPACE SOLARIUM COMM'N, *supra* note 80, at 99

87. Echoing a statement made by Russian President Vladimir Putin on Russia's National Knowledge Day: "Artificial intelligence is the future, not only for Russia, but for all humankind. It comes with colossal opportunities, but also threats that are difficult to predict. Whoever becomes the leader in this sphere will become the ruler of the world." RT (Sept. 1, 2017), https://www.rt.com/news/401731-ai-rule-world-putin/ [https://perma.cc/47CH-H2MX].

88. For example: The Allen Institute for Brain Science, Neuralink, Kernel, and Google's Brain Team.

89. In 2011, Eric Schmidt, Chairman of Google, cited former Intel CEO Andy Grove, stating:

> High tech runs three-times faster than normal businesses. And the government runs three-times slower than normal businesses. So we have a nine-times gap. . . . And so what you want to do is you want to make sure that the government does not get in the way and slow things down.

Lillian Cunningham, *Google's Eric Schmidt Expounds on His Senate Testimony*, WASH. POST (Oct. 1, 2011), https://www.washingtonpost.com/national/on-leadership/googles-eric-schmidt-expounds-on-his-senate-testimony/2011/09/30/gIQAPyVgCL_story.html [https://perma.cc/P24U-ZKDS].

H/nB could also be implicated in preventive self-defense measures against these weapons.

If a State or non-state actor were to construct and use H/nB against a population or select persons, it is possible that an attack could happen without the target even being aware of the hostilities—to the degree that the attackers bypass armed conflict altogether and consolidate control over the territory without the State's knowledge.[90]

For example, in a scenario where H/nB exercised manipulative warfare by taking advantage of and heightening already existing feelings among key leaders (using exceptional methods not currently obtainable by man or machine independently), this attack could be a form of "indirect effective control" or "long-arm occupation."[91] Notably, a hostile invasion of this type theoretically only requires "effective control over persons rather than effective control over foreign territory (or parts of it)."[92] In this scenario, if and when the affected State were to become aware of the occupation, they could no longer respond in self-defense as that window of opportunity would have already passed.[93]

Though it may be difficult to imagine such a scenario, its premise highlights two important points: the increasingly central role cyber operations are taking in modern-day warfare, and the essential right of States to preventive self-defense. Because of the nature of H/nB attacks, if a State were to refrain from acting in self-defense until after it was subjected to an attack, the likelihood of success would be slim as the State would no longer be in a position to defend itself. The ability to digitally communicate and act, or even unify, could effectively be crippled by H/nB. Consequently, States' preventive measures of self-defense against H/nB would be an appropriate use of force because this would be the last feasible window of opportunity to defend themselves.

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90. BINNENDIJK ET AL., *supra* note 7, at 22.

91. INT'L COMM. OF THE RED CROSS, EXPERT MEETING: OCCUPATION AND OTHER FORMS OF ADMINISTRATION OF FOREIGN TERRITORY 23 (2012).

92. *Id.* at 25.

93. At least not through the framework of the UN Charter because the attack has now shifted to an occupation. They could respond through the legal paradigm of the Marten's Clause. This clause was initially crafted to meet the concerns of weaker states in protecting themselves against an occupying authority. In 1948, the United States Military Tribunal in Nuremberg noted:

> The preamble [to the 1899 and 1907 Hague Convention] is much more than a pious declaration. It is a general clause, making the usages established among civilised nations, the laws of humanity and the dictates of public conscience into the legal yardstick to be applied if and when the specific provisions of the Convention and the Regulations annexed to it do not cover specific cases occurring in warfare, or concomitant to warfare.

Trial of Krupp, Case No. 58, Judgment (U.S. Military Trib., Nuremberg Nov. 17, 1947), https://tile.loc.gov/storage-services/service/ll/llmlp/Law-Reports_Vol-10/Law-Reports_Vol-10.pdf [https://perma.cc/AV4B-G6UD].

Case law also supports the position that preventive use of force is appropriate when the life of a State is at risk.[94] This is, quintessentially, with regard to the threat or use of nuclear weapons.[95] And while it may be tempting to invoke the idea of mutually assured destruction to negate the importance of preventive self-defense measures, once H/nB is created and engaged it would be nearly impossible to respond in kind as the weapon could likely foresee and prevent countermeasures to duplicate it.[96] Consequently, there is little threat of mutually assured destruction with H/nB. Rather, the *incentive* is to act first because the power of H/nB would be so asymmetric that future combat would effectively become futile.

In addition to States' right to self-defense to prevent an operational H/nB, any State that considers introducing H/nB into combat would also need to anticipate and prepare for the ramifications of potentially introducing illegitimate warfighters into combat based on the warfighter's inability to adhere to the warrior code of conduct.

Starting with the 1863 Lieber Code, modern-day initiatives to codify international laws of combat have been shaped and limited by the principles of justice, faith, and honor.[97] For example, the United States Department of Defense law of war manual holds honor as a core principle to be observed during combat, noting that "the principle of honor draws from warriors' codes from a variety of cultures and time periods."[98] Section 2.6.3 further states that "[h]onor demands a certain mutual respect between opposing military forces" and "[o]pposing military forces should respect one another outside of the fighting because they share a profession and they fight one another on behalf of their respective States and not out of personal hostility."[99]

These regulations of war "hold the warrior to a higher ethical standard than that required for an ordinary citizen within the general population of the society the warrior serves."[100] Indeed, "[t]he code restrains the warrior. It sets boundaries on his behavior. It distinguishes honorable acts from shameful acts."[101] Accordingly, if "virtue and character matter in

94. *See generally* Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 95 (July 8).

95. *Id*.

96. H/nB could aid an entity in essentially owning and operating the cybersphere. As was noted earlier, the only requirement for this feat is supreme knowledge. By dominating cyber, H/nB would dominate digital connectivity, including communications, and by extension (and to a lesser degree) the users and producers of data.

97. ABRAHAM LINCOLN, GENERAL ORDERS NO. 100, INSTRUCTIONS FOR THE GOVERNMENT OF ARMIES OF THE UNITED STATES IN THE FIELD art. 30 (1863).

98. DOD MANUAL, *supra* note 58, at 66.

99. *Id*. at 68.

100. LIN, MEHLMAN & ABNEY, *supra* note 40, at 81.

101. *Id*. at 82.

military ethics," then it very much matters how H/nB modifies the warfighter.[102]

Because of the unique nature of H/nB, the warfighter would be a component of the weapon and would in a literal sense be operating in the loop with the systems' decision-making processes. Typically, when humans are operating in the loop, "human decisions are a required step in a process and thus humans are exercising positive control."[103] However, with H/nB, the warfighter would not always be exercising positive control because the nBCI would have the capability to override his or her decisions, such as emotional decision-making deemed inappropriate for combat.

While it is true that too much emotion would render a warfighter unfit for combat, too much suppression of emotion would likewise render a warfighter unfit for combat.[104] Here, the nBCI in H/nB would be devoid of emotion altogether and would instead be operating in a paradigm of complete indifference. This emotionless state of indifference would be the only point of reference when making subjective, context-specific analyses as to which of the *warfighter's* emotions are appropriate for combat or not.[105] This would also encompass positive emotions necessary for combat, such as the emotion of respect.

And even in the unlikely scenario that the warfighter were to retain total control of their emotional decision-making capabilities, the warfighter may give deference to the nBCI anyway.[106] Indeed, "[s]ome studies have found that operators of automated systems tend to trust those systems' answers, including in circumstances in which their own judgment or experience would have led to a different conclusion."[107] Because nBCIs would be making decisions based on input from the warfighter's brain, bias toward the computers judgement would be particularly persuasive.[108] Nevertheless, mimicking emotions is not the

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102. *Id*. at 79.
103. ARMY 2050, *supra* note 1, at 11.
104. Dinniss & Kleffner, *supra* note 41, at 445, 482.
105. Dinniss & Kleffner, *supra* note 41, at 445–46 note:

> While a certain level of suppression of empathy is necessarily provided in combat training to produce effective combatants, permanent [] suppression beyond the individual soldier's control risks producing troops that are unable to show the required levels of compassion and humanity for the wounded, sick or shipwrecked or for those who fall into their power, for example through surrender or as detainees.

Id.

106. Deeks, Lubell & Murray, *supra* note 78, at 17–18.
107. *Id*.
108. *See id.*

same as understanding them, and explanations about emotions cannot replace experiencing them.

If the warfighter cannot incorporate the positive emotion that undergirds and regulates the negative emotion in combat, the warfighter would be in violation of the warrior code of conduct. Stated further:

> When they are trained for war, warriors are given a mandate by their society to take lives. But they must learn to take only certain lives in certain ways, at certain times, and for certain reasons. Otherwise, they become indistinguishable from murderers and will find themselves condemned by the very societies they were created to serve.[109]

With an inability to exercise unfettered control over their own decision-making capabilities, and by extension an inability to exercise respect and other positive emotions toward opposing military forces, a warfighter of H/nB would be conducting operations under a purely vicious paradigm and would therefore be considered an illegitimate warfighter. If a State were to introduce this type of warfighter into combat, they would need to be prepared for the liability and ramifications stemming from such an action (in addition to the possibility of States taking preventive measures of self-defense against such a weapon).

In sum, the inherent right to self-defense against an attack produced by H/nB would necessarily be exercised as preventive self-defense because the nature of the weapon's capabilities would be largely impossible to defend against once operational. Furthermore, if the warfighter is unable to comply with the longstanding requirements of the warrior code of conduct, their presence in battle may be an additional concern among States who are seeking to prevent the use of H/nB.

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109. Stated further:

> Veterans who believe that they were directly or indirectly party to immoral or dishonorable behavior (perpetrated by themselves, their comrades, or their commanders) have the hardest time reclaiming their lives after the war is over
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> . . . .
>
> . . . If they take this awesome responsibility too lightly—if they lose sight of the moral significance of their actions—they risk losing their humanity and their ability to flourish in human society
>
> . . . .
>
> By setting standards of behavior for themselves, accepting certain restraints, and even "honoring their enemies," warriors can create a lifeline that will allow them to pull themselves out of the hell of war and reintegrate themselves into their society, should they survive to see peace restored.

LIN, MEHLMAN & ABNEY, *supra* note 40, at 82–84.

CONCLUSION

As neural interfacing between human and computer becomes increasingly sophisticated, the constraints governing modern-day warfare may very well fracture under the added weight of the emerging weapons and warfighters of the future. Indeed, the cerebral force produced by uniting neuromorphic computing capabilities with human intelligence could result in destructive effects unmatched by any weapon seen today. Because of this exceptional nature, a State's right to preventive self-defense permits them to act against H/nB by preventing the weapon from becoming operational.

And while current laws may not contemplate a warfighter as a weapon, they do contemplate standards for a warfighter. A warfighter is honor-bound to protect and serve and to internally regulate themselves based on the warrior code of conduct. H/nB warfighters would almost certainly be incapable of this internal regulation. Therefore, the ramifications of allowing these warfighters to engage in combat would also need to be considered by States intending to deploy them.

In sum, H/nB would be capable of producing an armed attack, and States would have a right to preventive self-defense in order to keep H/nB from being introduced into combat due to its unique capabilities. This inherent right to act is based on a State's authority as a sovereign nation, as noted in the UN Charter. And because this technology is nearly at their doorsteps, their time to act is now.