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Soldier 2.0: Military Human Enhancement and International Law

Heather A. Harrison Dinniss & Jann K. Kleffner

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* Senior Lecturer in International Law, Swedish Defence University.

** Professor of International Law and Head of the International Law Centre, Swedish Defence University.

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I. INTRODUCTION

Whether it is science fiction classics such as Huxley's *Brave New World* or Heinlein's *Starship Troopers*, beloved characters like Captain America or the more modern versions shown in films such as 2012's *The Bourne Legacy*, the idea of human enhancement, particularly the enhancement of members of the armed forces, is one that has inspired, alarmed and enthralled generations of authors, readers, movie-goers and real-world scientists alike.¹ As twenty-first century science takes great strides into making these imagined worlds possible, armed forces and their legal advisors need to reflect carefully on the implications of these technologies for the international legal frameworks under which they operate. Of particular concern are the law of armed conflict and human rights law and their application vis-à-vis technologically enhanced armed force personnel and those who are subjected to actions by such personnel.

1. ALDOUS HUXLEY, *BRAVE NEW WORLD* (1932); ROBERT A. HEINLEIN, *STARSHIP TROOPERS* (1959); *THE BOURNE LEGACY* (Universal Pictures 2012). Marvel Comic's Captain America first appeared in a comic series of the same name in March 1941. *See also* JEFFREY K. JOHNSON, *SUPER-HISTORY: COMIC BOOK SUPERHEROES AND AMERICAN SOCIETY* 34–35 (2012).

For the purpose of the present analysis, human enhancement is defined as the process of endowing an individual with an ability that goes beyond the typical level or statistically normal range of functioning for humans generally (or the personal unenhanced capabilities of a particular individual), where the ability is either integrated into the body or is so closely worn or connected that it confers an advantage similar to an internal or organic enhancement that transforms the person.² While the science is constantly and rapidly evolving, human enhancement technologies can be broadly divided into three main categories: biochemical, cybernetic (or brain-machine interfaces) and prosthetic.³ Although there is a certain amount of overlap between the categories (particularly between cybernetics and prosthetics), each category raises slightly different legal issues.

Biochemical enhancement refers to the use of drugs or other pharmacological agents to enhance specific functions in the body. In recent years, one of the most talked about examples of biochemical enhancement is the use of modafinil. A neuro-enhancing drug originally designed for the treatment of narcolepsy, in otherwise healthy individuals modafinil acts as a cognitive-enhancer, as well as increasing wakefulness and the ability to focus. Not only have these properties made it the underground drug of choice of students taking examinations or writing essays,⁴ but modafinil has also been approved for use by the armed forces of both the United States and France, and has been investigated by the United Kingdom and Canada (among others) for possible military use.⁵ While the ability to operate effectively for long periods of time without the need for sleep has long been the holy grail of potential military enhancement, biochemical enhancement of any kind is not an automatic panacea. It raises complex legal issues in terms of the treatment of enhanced soldiers detained by an adversary (for exam-

2. Patrick Lin, *Ethical Blowback from Emerging Technologies*, 9 JOURNAL OF MILITARY ETHICS 313 (2010); Norman Daniels, *Normal Functioning and the Treatment-Enhancement Distinction*, 9 CAMBRIDGE QUARTERLY OF HEALTHCARE ETHICS 309 (2000).

3. One might also point to genetic enhancement or gene therapy as a further possible category of enhancement. However, it has not been included in this research, other than as a passing reference, as it remains highly speculative.

4. See Helen Thomson, *Narcolepsy Medication Modafinil is World's First Safe "Smart Drug,"* THE GUARDIAN (Aug. 19, 2015), <https://www.theguardian.com/science/2015/aug/20/narcolepsy-medication-modafinil-worlds-first-safe-smart-drug>.

5. William Saletan, *The War on Sleep*, SLATE (May 29, 2013), http://www.slate.com/articles/health_and_science/superman/2013/05/sleep_deprivation_in_the_military_modafinil_and_the_arms_race_for_soldiers.html.

ple, whether sleep deprivation would still constitute inhuman and degrading treatment of personnel who have taken modafinil or a more permanent variation thereof) and an individual's ability to refuse to be subjected to the enhancement, as well as issues regarding the effect on individual accountability for any actions taken while under the influence of an enhancement.

The need for sleep is not the only "human failing" that armed forces are looking to manipulate with biochemical enhancement. Other drugs are being investigated for their utility in reducing the incidence of post-traumatic stress disorder and the reduction of fear—long implicated in the commission of war crimes—as well as reducing traumatic memory formation.⁶

The field of cybernetics has also provided many technological advances of interest to the military. Brain-machine interfaces, also known as neural interface systems, attempt to connect the brain directly to a machine without the need for manual input, such as a keyboard, joystick or other device. The interfaces use electrodes (whether surgically implanted in the brain or merely resting on the scalp) to record and translate the user's brain signals into commands that operate computer-controlled devices. The technology has been used both to actively control an external device (e.g., the ability to operate drones with the mind⁷) and to passively sift information by using the brain's power to unconsciously detect anomalies in large amounts of data.⁸

Prosthetic technology has made huge strides in the past two years. Scientists have developed prosthetics capable of providing sensory feedback

6. Michael N. Tennyson & Jonathan D. Moreno, *Neuroscience, Ethics, and National Security: The State of the Art*, PLOS (Mar. 20, 2012), <http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001289>; Alain Brunet et al., *Effect of Post-retrieval Propranolol on Psychophysiological Responding during Subsequent Script-driven Traumatic Imagery in Post-traumatic Stress Disorder*, 42 JOURNAL OF PSYCHIATRIC RESEARCH 503 (2008); Roger K. Pitman et al., *Pilot Study of Secondary Prevention of Post-traumatic Stress Disorder with Propranolol*, 51 BIOLOGICAL PSYCHIATRY 189 (2002).

7. See, e.g., Pierre Bienaimé, *Mind-Controlled Drones Are Already a Reality*, BUSINESS INSIDER (Oct. 24, 2014) <http://www.businessinsider.com/drones-you-can-control-with-your-mind-2014-10>. In fact the technology has spread sufficiently enough that 2016 saw the first mind-controlled drone race organised by the University of Florida.

8. See, e.g., the Cognitive Technology Threat Warning System (CT2WS) developed by the U.S. Army and DARPA, which detects brainwaves in order to signal when the subconscious evaluates a visual threat. Neal Ungerleider, *DARPA's Cybernetic Binoculars Tap Soldiers' Brains to Spot Threats*, FAST COMPANY (Sept. 21, 2012), <http://www.fastcompany.com/3001501/darpas-cybernetic-binoculars-tap-soldiers-brains-spot-threats>.

from replacement limbs;⁹ ways of linking prosthetics using neural interfaces or nerve endings to provide thought-controlled movement;¹⁰ and visual prosthetics to provide augmented vision for those with normal vision and restore vision to those who have lost it.¹¹ Armed forces are already using exoskeletons such as Lockheed Martin's Human Universal Load Carrier and investigating prosthetics to enable soldiers to target their weapons more accurately.¹²

In this article, we will address these three forms of military human enhancement technologies from an international legal perspective by examining, first, questions that arise under the law of armed conflict and, second, questions that arise under international human rights law.

II. LAW OF ARMED CONFLICT

A. Weapons Reviews

In the study, development, acquisition or adoption of a new weapon or new means and methods of warfare, a State which is a party to Additional Protocol I (AP I) is under an affirmative obligation to determine whether its employment would be prohibited under the Protocol or any other rule of international law applicable to that State.¹³ A number of States not party to AP I, including the United States, have adopted review mechanisms along similar lines, albeit as a matter of policy rather than international legal

9. See David Talbot, *An Artificial Hand with Real Feelings*, MIT TECHNOLOGY REVIEW (Dec. 5, 2013), <https://www.technologyreview.com/s/522086/an-artificial-hand-with-real-feelings/>.

10. *Id.*; Katie Drummond, *Prosthetics Breakthrough Might Fuse Nerves with Fake Limbs*, WIRED (Feb. 27, 2012), <https://www.wired.com/2012/02/nerve-prosthetics/>.

11. See, e.g., Philip Sherwell, *Blind Man Describes Joy at Seeing Wife for First Time in Decade Thanks to "Bionic Eye"*, THE TELEGRAPH (LONDON) (Feb. 24, 2015), <http://www.telegraph.co.uk/news/worldnews/northamerica/usa/11433149/Blind-man-describes-joy-at-seeing-wife-for-first-time-in-decade-thanks-to-bionic-eye.html>.

12. Charles Choi, *New Army Exoskeleton Makes Soldiers' Gunshots More Accurate*, POPULAR SCIENCE (June 2, 2015), <http://www.popsci.com/army-has-exoskeleton-makes-soldiers-better-shots>; Thomas Black, *Iron Man Meets HULC as Lockheed Enters Exoskeleton Race* (Mar. 19, 2013), <http://www.bloomberg.com/news/articles/2013-03-19/iron-man-meets-hulc-as-lockheed-enters-exoskeletons-race>.

13. Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts art. 36, June 8, 1977, 1125 U.N.T.S. 3 [hereinafter Additional Protocol I].

obligation.¹⁴ The first issue that arises in connection with the use of military human enhancement technologies is whether and to what extent such technologies trigger the requirement of a review as provided for in AP I and/or domestic regulations and practice. An answer to that query hinges in turn on the question of whether human enhancement technologies—or more precisely a given specific human enhancement technology—qualify as a weapon or means or method of warfare.

The term “weapon” is understood to refer to a means of warfare used in combat operations that is capable of causing either injury to or death of persons, or damage to or destruction of objects.¹⁵ As such, a weapon “connotes an offensive capability that can be applied to a military object or enemy combatant.”¹⁶ The term “means of warfare” is broader than a weapon inasmuch as it “extends . . . to weapon systems or platforms employed for the purposes of attack,”¹⁷ and includes associated equipment used directly to deliver force during hostilities.¹⁸ Means of warfare, and its sub-category of weapons, hence apply only in the context of attacks, that is “acts of violence against the adversary, whether in offence or in defence.”¹⁹ Finally, methods of warfare refers to activities designed to adversely affect the enemy’s military operations or military capacity and extends to the various general categories of operations (bombing, ground, close-air support, etc.),

14. U.S. Deputy Secretary of Defense, DoDD 5000.01, The Defense Acquisition System, encl. 1, ¶ E1.1.15 (2003), <http://www.dtic.mil/whs/directives/corres/pdf/500001p.pdf>. See also OFFICE OF THE GENERAL COUNSEL, U.S. DEPARTMENT OF DEFENSE, LAW OF WAR MANUAL §§ 6.2, 19.20.1.2 (2015); Maya Yaron, Address before the Group of Experts Meeting on Lethal Autonomous Weapons Systems: Statement on Lethal Autonomous Weapons (Apr. 13, 2016), [http://www.unog.ch/80256EDD006B8954/\(httpassets\)/A02C15B2E5B49AA1C1257F9B0029C454/\\$file/2016_LAWS_MX_GeneralDebate_Statements_Israel.pdf](http://www.unog.ch/80256EDD006B8954/(httpassets)/A02C15B2E5B49AA1C1257F9B0029C454/$file/2016_LAWS_MX_GeneralDebate_Statements_Israel.pdf).

15. See PROGRAM ON HUMANITARIAN POLICY AND CONFLICT RESEARCH, MANUAL ON INTERNATIONAL LAW APPLICABLE TO AIR AND MISSILE WARFARE r. 1(ff) (2009) [hereinafter AMW MANUAL]; PROGRAM ON HUMANITARIAN POLICY AND CONFLICT RESEARCH, COMMENTARY ON THE MANUAL ON INTERNATIONAL LAW APPLICABLE TO AIR AND MISSILE WARFARE 55 (2010).

16. Justin McClelland, *The Review of Weapons in Accordance with Article 36 of Additional Protocol I*, 85 INTERNATIONAL REVIEW OF THE RED CROSS 397, 404 (2003). See also WILLIAM H. BOOTHBY, WEAPONS AND THE LAW OF ARMED CONFLICT 4 (2009).

17. AMW MANUAL, *supra* note 15, r. 1(t).

18. BOOTHBY, *supra* note 16, at 4 n.7.

19. Additional Protocol I, *supra* note 13, art. 49(1).

as well as the specific tactics used for attack.²⁰ A common shorthand for methods of warfare is “the way in which [weapons] are used” in hostilities.²¹

Despite the occasional assertion to the contrary,²² these working definitions suggest that the enhanced human soldier, per se, is not to be considered a weapon, because it is not the *person* that constitutes the offensive capability that can be applied to military objectives or enemy combatants. At the current state of development in the realm of human enhancement technologies, a distinction between the human, on the one hand, and the enhancement technology, on the other, remains possible since the use of the technology does not convert the human into an object that could be considered a weapon. While further developments may lead us down a path that makes that distinction more complicated, we do not seem to have arrived at the crossroads where enhancement technologies transmute humans into mere objects for the purpose of the law of armed conflict.

A given human enhancement technology may very well, however, constitute a weapon. This is the case when the technology is capable of causing either injury to or death of persons, or damage to or destruction of objects. Whether human enhancement technology possesses such offensive capabilities depends on the specific technology in question. On the one hand, a clear-cut instance where that question can be answered in the negative is biochemical enhancements of members of the State’s own armed forces, since the enhancement itself does not cause injury to or death of enemy personnel nor damage to or destruction of objects. On the other hand, a possible instance where the answer is in the affirmative would be a prosthetic enhancement that integrates an offensive capability that is itself a weapon, such that the prosthetic is able to fire a munition or has the capability of a stun gun/taser.

Furthermore, human enhancement technologies may fall into the notion of means of warfare. An example would be a neural interface system

20. AMW MANUAL, *supra* note 15, r. 1(v).

21. COMMENTARY ON THE ADDITIONAL PROTOCOLS OF 8 JUNE 1977 TO THE GENEVA CONVENTIONS OF 12 AUGUST 1949, ¶ 1402 (Yves Sandoz, Christophe Swinarski & Bruno Zimmermann eds., 1987); BOOTHBY, *supra* note 16, at 4 n.7.

22. *See, e.g.*, PATRICK LIN, MAXWELL J. MEHLMAN & KEITH ABNEY, ENHANCED WARFIGHTERS: RISK, ETHICS, AND POLICY 31–32 (2013), http://ethics.calpoly.edu/greenwall_report.pdf.

through which weaponized drones are operated since the cybernetic system would form part of a weapons system employed for the purposes of attack.

Last, but not least, human enhancement technologies can be considered to be methods of warfare if and when their use constitutes an integral part of offensive activities at the strategic and tactical levels. In other words, if human enhancement technologies were to emerge as organizational features of, and techniques for, weapons and military units to deliver force against opposing armed forces and military objectives, they will trigger the review obligations under Article 36 of AP I and/or under domestic regulations.

What, then, are the main substantive principles of the law of armed conflict that would be utilized in such reviews and what idiosyncratic issues are raised when these principles are applied to human enhancement technologies?

B. *Superfluous Injury and Unnecessary Suffering*

The principle concerning superfluous injury and unnecessary suffering (SIrUS) has been recognized as one of the “cardinal principles” of international law by the International Court of Justice (ICJ).²³ First given form in the preamble to the 1868 Declaration of St Petersburg, the principle, which bans weapons, projectiles, materiel and methods of warfare that cause superfluous injury or unnecessary suffering, has evolved through its restatement in subsequent law of armed conflict treaties.²⁴ It is also now recognized as a rule of customary law applicable in both international and non-international armed conflicts.²⁵ However, the difference in language in con-

23. Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 226, ¶ 238 (July 8) [hereinafter *Nuclear Weapons*].

24. For a description of the evolution of the different wording, see W. Hays Parks, *Conventional Weapons and Weapons Reviews*, 8 YEARBOOK OF INTERNATIONAL HUMANITARIAN LAW 55, 86–87 n.123 (2005). The most recent versions include Article 35(2) of Additional Protocol I which provides: “It is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering.” Identical wording is used in the preamble to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects, Oct. 10, 1980, 1342 U.N.T.S. 137 [hereinafter *CCW Convention*].

25. 1 CUSTOMARY INTERNATIONAL HUMANITARIAN LAW r. 70 (Jean-Marie Henckaerts & Louise Doswald-Beck eds., 2005) [hereinafter *CIHL*].

secutive legal instruments containing the prohibition²⁶ has made it difficult to determine whether the prohibition should be interpreted as prohibiting weapons “of a nature to cause” superfluous injury or unnecessary suffering (an objective standard) or whether it prohibits those weapons that are “calculated to cause” such injury. That is, the difference is between the necessary effects of the weapon and the intent of the user in designing and using it.²⁷

It is this difference that may prove important not only when looking at the impact of the enhancement techniques themselves, but also on any countermeasures that will inevitably be developed in order to combat the military advantage gained through enhancement. For example, any weapon or technique designed to be used against enhanced soldiers that would cause greater suffering than is militarily necessary when employed against an unenhanced soldier would remain legal as its design and intended application is against enhanced soldiers. However, if one adopts an effects-based approach, the fact that the weapon may be used against unenhanced soldiers (perhaps without knowledge of their unenhanced status) would constitute a breach of the principle. The better view is that it is the intended design and normal effects of the weapon which is relevant to any assessment of the SIrUS principle.

A question also arises as to how the enhancements of soldiers should be viewed. For some enhancements, particularly those of a biochemical or genetic nature,²⁸ the question may be moot as there is no meaningful distinction between the soldier and the enhancement. However, for those enhancements which are cybernetic or prosthetic in nature, a distinction may be made between viewing the enhancement as a specific piece of technology separate from the soldier and as the soldier and technology combined into an integrated unit. To a certain extent this will be dependent on the nature of the enhancement technology in question. As noted above,

26. Parks, *supra* note 24. See also BOOTHBY, *supra* note 16, at 55–61.

27. An ill-fated project by the International Committee of the Red Cross (ICRC) in 1997 attempted to introduce an effects-based methodology which relied solely on medical evidence and, generally, the worst-case wounding effect of the weapon rather than the intended or normal effect. Parks, *supra* note 24. The ICRC project was heavily criticized for ignoring the balance to be struck with military necessity and was eventually withdrawn in 2001. *Id.*

28. As noted in *supra* note 3, genetic enhancement is not generally addressed in this study, however, it is worth observing in passing that, by definition, any genetic enhancement would not introduce any component external to the human body.

the separation in the law of armed conflict between personnel and materiel means that enhanced soldiers themselves should not be viewed as weapons; however, that is different from saying that the enhancement should not be viewed as a means of warfare. Where the enhancement technology is intimately connected with soldiers' bodies and, in some cases, their brains, questions about the appropriate countermeasures that may be taken against those enhancements must be considered.

For example, if a brain-computer interface is viewed as a separate legitimate military objective, such that any physiological injury to the soldier would be viewed as incidental or collateral to the destruction or neutralization of the technology,²⁹ a different calculation may result when viewing the soldier and his or her enhancement as an integrated entity.

Clearly both the enhancement and the soldier may be considered legitimate targets. However, if it is permissible to kill the soldier or render him or her *hors de combat*, is it then automatically permissible to overload an implanted chip such that it may cause brain damage through an electrical overload of neural circuits? There are two issues at play in this situation. First, the SIrUS principle generally allows for more serious injuries resulting from anti-materiel weapons (for example, the use of depleted uranium shells in anti-tank weaponry or incendiary weapons against armored vehicles and fortifications) than it would for weapons typically designed for anti-personnel use.³⁰ This is because the military advantage resulting from destruction of the tank means the inevitable suffering of the tank's crew is not unnecessary. If one views the neural chip implanted in the brain of a cybernetically enhanced soldier as military materiel separate from the individual, the permissible level of injury and harm necessitated by the effects of a weapon designed to counter that chip may be higher than that of a weapon directed at unenhanced personnel. One might argue that any countermeasure used against implantable brain chips is designed to destroy the electronics in the implanted chip and any resulting brain damage to the soldier would be incidental. But, as Boothby notes in relation to the matter

29. Note that this does not refer to collateral damage in the sense of proportionality or precautions in attack, which refers only to civilians and civilian objects rather than military personnel (who, with limited exceptions, may be targeted at all times).

30. See generally Christopher J. Greenwood, *The Law of Weaponry at the Start of the New Millennium*, in *THE LAW OF ARMED CONFLICT: INTO THE NEXT MILLENNIUM* 185, 196 (Michael N. Schmitt & Leslie C. Green eds., 1998) (Vol. 71, U.S. Naval War College International Law Studies).

of the design, purpose and intent of blinding laser weapons, if it can be shown that a weapon will necessarily cause blindness when used in the circumstances for which it was procured, it may be difficult to show that it was not designed for that purpose.³¹ Any determination would be highly fact-specific based on the technology employed, but a similar argument may be made for countermeasures which result in permanent brain injury or damage to neural circuitry.

A second point must also be considered. Abhorrence of particular types of injury has been the driver for many of the bans of specific weapons or uses of weapons as a method of war.³² For example, blinding laser weapons were one of the few weapons that were prohibited before being fielded on the grounds that permanently blinding a soldier was superfluous and caused unnecessary suffering.³³ One can foresee that any countermeasure against implanted brain chips that would result in permanent brain damage might also fall within this category.

However, it should be borne in mind that the two elements of the prohibition on unnecessary suffering and superfluous injury are both comparative terms. Clearly a certain amount (and in some cases a great deal) of suffering and injury is permissible in armed conflict. What is prohibited is suffering or injury that is in excess of that necessary to realize a legitimate military goal (i.e., military necessity). Thus, if the only way to negate the threat posed by enhanced soldiers using implantable brain chips is to overload the chips, the resulting brain damage may in fact be necessary and the injury not superfluous.

Ironically, the prohibition against blinding laser weapons noted above is unlikely to apply to a soldier with enhanced vision. Certainly those with optical implants, or prostheses such as telescoping contact lenses, would not be covered by Article 1 of the Protocol on Blinding Laser Weapons which limits the prohibition to “unenhanced vision, that is to the naked eye or to the eye with *corrective* eyesight devices.”³⁴ Article 3 specifically excludes

31. BOOTHBY, *supra* note 16, at 210–11.

32. *See, e.g.*, Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons, Oct. 10, 1980, 1342 U.N.T.S. 171; Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction, Jan. 13, 1993, 1974 U.N.T.S. 45.

33. Protocol on Blinding Laser Weapons, Oct. 13, 1995, 1380 U.N.T.S. 370.

34. Emphasis added. A more difficult question may arise where the soldier’s vision has been enhanced through genetic means, thus the soldier still relies on his or her naked eye. The answer would perhaps depend on the nature and degree of the enhancement.

from its ambit any blinding which takes place as an “incidental or collateral effect of the legitimate military employment of laser systems used against optical equipment.” A question remains about those with vision that has been enhanced by other means. For example, Rain Liivoja raises the question of whether eyesight which has been augmented through surgical manipulation would fall within this definition (particularly if it would leave vision more susceptible to damage by laser).³⁵ Similar questions may be asked of eyesight which has been improved by other methods; for example, “biohackers” have been experimenting with increasing their night vision by using eye drops made from enzymes derived from deep-sea fish.³⁶

C. *Distinction, Proportionality and Precaution Issues*

The principle of distinction requires that parties to an armed conflict distinguish between civilians and civilian objects on the one hand, and combatants and military objectives on the other; parties must only direct their military operations against the latter.³⁷ Along with the prohibition against unnecessary suffering (discussed above), it is considered one of the cardinal principles of international humanitarian law.³⁸ The principle of proportionality requires parties to refrain from, or cancel, attacks that are expected to cause incidental civilian injury or death, or damage to civilian objects (also known as collateral damage) which would be excessive in relation to the concrete and direct military advantage anticipated to be gained from the attack.³⁹ Compliance with these principles is impacted by both the environment and tempo of modern armed conflict, particularly in relation to information flows and current limits on the ability of humans to process such flows.

35. Rain Liivoja, Senior Lecturer and Branco Weiss Fellow, Melbourne Law School, Remarks at the Swedish Defence University: Bioenhanced Soldiers and the Prohibition of Unnecessary Suffering (Sept. 9, 2015).

36. The group dropped a chlorophyll analog (Chlorin e6) found in plants and some deep-sea fish into the eyeballs to give improved night vision. Alejandro Alba, *Group of Biohackers Test Eye Drops to Give Humans Night Vision*, NEW YORK DAILY NEWS (Apr. 5, 2015), <http://nydn.us/1bZtIQa>.

37. See, e.g., Additional Protocol I, *supra* note 13, art. 48; CIHL, *supra* note 25, rr. 1, 7.

38. *Nuclear Weapons*, *supra* note 23, ¶ 78.

39. The principle of proportionality runs as a thread through many of the substantive provisions of IHL. See, e.g., Additional Protocol I, *supra* note 13, arts. 51(5)(b), 57(2)(a)(iii), 57(2)(b); CIHL, *supra* note 25, r. 14.

Today's armed forces deal with vastly more raw data and information than at any time in history.⁴⁰ 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.⁴¹ Work is ongoing in several research projects into increasing the brain's ability to multitask in order to be able to utilize the increased amount of data without becoming overwhelmed by it. These applied cognition methods range from attempts to train and "rewire" the functioning of the attention system to promote "mindfulness," to heads-up displays that monitor brain activity in order to identify threats before they are recognized (or overlooked) by the conscious brain.⁴²

If such methods are successful, the requirement to take all feasible precautions in attack and to ensure that any targets struck are legitimate military objectives will necessarily be revised to take account of what is feasible when using the new technology. It should be noted that, as with past technological developments, most States consider that the law does not impose an obligation to acquire such technologies; however, if the State possesses the technologies it must field them when feasible.⁴³ In this sense, the use of human enhancement technologies may improve compliance with the requirements emanating from distinction and proportionality and their mani-

40. One estimate puts the increase in data flow across the U.S. armed forces at 1,600 percent since the events of 9/11. Thom Shanker & Matt Richtel, *In New Military, Data Overload Can be Deadly*, NEW YORK TIMES, Jan. 16, 2011, at A1, <http://www.nytimes.com/2011/01/17/technology/17brain.html?pagewanted=all&r=0>.

41. *Id.* When U.S. officials looked into an attack by American helicopters that left twenty-three Afghan civilians dead, they found that informational overload was an underlying cause. *Id.*

42. *See, e.g.*, Kalwinder Kaur, *New Sensor System Improves Target Detection*, AZO ROBOTICS (Sept. 21, 2012), <http://www.azorobotics.com/News.aspx?newsID=3237> (discussing DARPA's Cognitive Technology Threat Warning System program).

43. Customary international law places a general requirement on States to avoid and, in any event, minimize collateral damage. One of the ways in which this is done is through the choice of means and methods of attack. *See generally* CIHL, *supra* note 25, r. 17 (discussing the requirement to take "all feasible precautions" to minimize incidental damage). *See also* HEATHER A. HARRISON DINNISS, *CYBER WARFARE AND THE LAWS OF WAR* 213–15 (2012) (discussing new technologies and the choice of weapons as a feasible precaution).

festation in the realm of precautions, but does not directly affect the content of the legal rules.

Another project currently under investigation by scientists is to inhibit or remove fear.⁴⁴ This is another instance in which the science may have interesting consequences for compliance with the principles of distinction, proportionality and precautions by allowing the soldier to make decisions without being motivated by fear. However, as noted, although such technologies may increase the likelihood of compliance with the existing laws, it will not impact the content of the legal principles themselves.

At the far (and perhaps speculative) end of the enhancement spectrum, exists the possibility of what Ingmar Persson and Julian Savulescu refer to as “moral enhancement.”⁴⁵ Although fraught with ethical issues and of dubious practical use in the environment of an armed conflict, the theory of moral bio-enhancement suggests that by amplifying those biological factors which underlie a sense of justice and altruism, people will be compelled to act in a way that is morally (and, in the present context, legally) right.⁴⁶ The obvious difficulty would be ensuring that soldiers are trained to identify compliance with the law as the morally correct course of action, in contrast to increasing the sense of empathy (which is the course of action proposed by Persson and Savulescu in order to protect the environment), which may result in soldiers unfit for combat. It should be noted that in most popular science fiction treatments of the topic, the opposite is usually postulated, i.e., the removal or minimization of empathy to create so-called “super-soldiers”; it invariably ends badly.⁴⁷ While a certain level of suppres-

44. JONATHAN D. MORENO, *MIND WARS: BRAIN SCIENCE AND THE MILITARY IN THE 21ST CENTURY* 149–51 (2012).

45. INGMAR PERSSON & JULIAN SAVULESCU, *UNFIT FOR THE FUTURE: THE NEED FOR MORAL ENHANCEMENT* (2012). While the concept of deliberately manipulating morality is speculative, it should be noted that the science behind it is not. A recent study found that common drugs used in the treatment of depression and Parkinson’s disease sway moral decision making when administered to healthy people. Hannah Devlin, *Parkinson’s and Depression Drugs Can Alter Moral Judgment, Study Shows*, THE GUARDIAN (July 2, 2015), <http://www.theguardian.com/science/2015/jul/02/parkinsons-and-depression-drugs-can-alter-moral-judgement-study-shows>.

46. In their original study, Persson and Savulescu argued for moral enhancement based on a need for protection of the natural environment. PERSSON & SAVULESCU, *supra* note 45, at 107–34.

47. Lack of empathy is also associated with several psychological and personality disorders and is characteristic of psychopathy (or antisocial personality disorder). For examples in film and television, see, e.g., *ROBOCOP* (Metro-Goldwyn-Mayer et al., 2014) or the

sion of empathy is necessarily provided in combat training to produce effective combatants, permanent biochemical 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.

D. Principle of Protection (Detention and Treatment of the Wounded and Sick)

The principle of protection requires that all persons who are not—or who are no longer—taking part in hostilities are treated humanely without any adverse distinction based on race, nationality, religious belief or political opinions, or any other distinction founded on similar criteria.⁴⁸ When considering enhancement technologies, one of the areas in which the principle raises particular issues is with regard to detention. These pertain primarily to the detainee who has been enhanced, but also in certain circumstances to the enhanced detainer. With regard to the latter, one can envisage situations where the use of particular enhancements by the detaining power on their own armed forces would reduce the possibility of abuses occurring through moral enhancement as discussed earlier or through methods such as optical recording (recording of the video stream of an implanted optical prosthetic could provide a view much like that of a headcam video feed) designed to increase rule compliance by detention personnel.⁴⁹ Although the use of such technology is likely to raise questions regarding the human rights of the personnel involved (particularly with regard to self-

character of Travis Verta in *Continuum* (Reunion Pictures & Shaw Media, 2012–2015), part of a super-soldier program in which the character is implanted with a control chip that lowers empathy and compassion while ramping up aggression, making him an unstable psychopath. For a general discussion of the popular culture trope of the “super-soldier,” see *Super Soldier*, TVTROPES, <http://tvtropes.org/pmwiki/pmwiki.php/Main/SuperSoldier> (last visited Sept. 29, 2016).

48. CIHL, *supra* note 25, r. 88.

49. It is well established that people comply with rules, and monitor and regulate their behavior when they believe that they are under surveillance. See, e.g., Sander van der Linden, *How the Illusion of Being Observed Can Make You a Better Person*, SCIENTIFIC AMERICAN (May 3, 2011), <http://www.scientificamerican.com/article/how-the-illusion-of-being-observed-can-make-you-better-person/>. Jeremy Bentham's thought experiment of the panopticon and the subsequent discussion by Michel Foucault are classic treatments of the psychological phenomena. MICHEL FOUCAULT, DISCIPLINE AND PUNISH: THE BIRTH OF THE PRISON 201 (Alan Sheridan trans., 1977).

incrimination),⁵⁰ it does not implicate the law of armed conflict per se. Broadly speaking, the law of armed conflict generally does not concern itself with the protection of a State's own forces with regard to detention issues. This is subject to only limited exceptions in the area of the protection of the wounded, sick and shipwrecked in international armed conflicts (which extends to all those who are in need of care or assistance) and in non-international armed conflicts (where the protection of persons *hors de combat* extends to all members of armed forces).⁵¹

In applying the principle of protection to treatment of detainees, whether military or civilian, the law of armed conflict is directly implicated in a number of circumstances.

1. Coercion

Article 17 of the Third Geneva Convention (GC III) prohibits any form of coercion being inflicted on prisoners of war (POWs) in order to obtain information.⁵² Thus, enhancing a prisoner's trust in his or her captors, by, for example, increasing their levels of oxytocin, a hormone tied to social bonding and sometimes referred to as the "cuddle hormone,"⁵³ would fall afoul of the sweeping and categorical prohibition of coercion. Coercion of

50. See discussion *infra* Section IV.D.

51. See generally Jann K. Kleffner, *Friend or Foe? On the Protective Reach of the Law of Armed Conflict*, in ARMED CONFLICT AND INTERNATIONAL LAW: IN SEARCH OF THE HUMAN FACE 285 (Mariëlle Matthee, Brigit Toebes & Marcel Brus eds., 2013) (noting that the protection granted to the wounded, sick and shipwrecked extends to all those who are in need of medical assistance or care, provided they refrain from all acts of hostility).

52. Convention (III) Relative to the Treatment of Prisoners of War art. 17, Aug. 12, 1949, 6 U.S.T. 3316, 75 U.N.T.S. 135 [hereinafter GC III] ("No physical or mental torture, nor any other form of coercion, may be inflicted on prisoners of war to secure from them information of any kind whatsoever. Prisoners of war who refuse to answer may not be threatened, insulted, or exposed to any unpleasant or disadvantageous treatment of any kind.").

53. However, recent developments have also shown that oxytocin may have a dark side. Researchers have shown that negative or stressful social experiences, such as being bullied while certain structures in the brain have been activated by oxytocin, may make memories of that experience last long past the event itself and perhaps trigger fear and anxiety in the future. Lee Bowman, *Oxytocin Studies Show Hormone's Dark Side*, ABC 10 NEWS (July 28, 2013), <http://www.10news.com/lifestyle/health/medical-oxytocin-studies-show-hormones-dark-side-07282013>.

protected persons, e.g., civilian detainees, is similarly prohibited under the Fourth Geneva Convention (GC IV).⁵⁴

2. Experimental Treatments

Second, performing any invasive enhancement technique on detainees will be in breach of the laws regulating the treatment of both POWs and civilian detainees. Explicit treaty law found in GC III and GC IV and customary international law prohibits “[m]utilation, medical or scientific experiments or any other medical procedure not indicated by the state of health of the person concerned and not consistent with generally accepted medical standards.”⁵⁵ Article 11(2) of AP I further develops that prohibition, providing, *inter alia*, that it applies regardless of the consent of the person concerned. Article 5(2)(e) of Additional Protocol II contains broader language prohibiting “any medical procedure . . . not consistent with generally accepted medical standards” with respect to persons detained in non-international conflict; however, no specific wording regarding consent is included. According to the International Committee of the Red Cross, an amalgamation of these conventional rules is also reflective of customary law applicable in both international and non-international armed conflicts.⁵⁶

While the general rule is clear, specific scenarios may be envisaged where the use of enhancement technology raises interesting legal issues. One such issue turns on the experimental nature of the treatment. Whether or not a particular enhancement or treatment is deemed to be experimental has been the subject of review, particularly after the use of anthrax vaccinations by the U.S. armed forces in the 1991 Gulf War.⁵⁷ As a general rule,

54. Convention (IV) Relative to the Protection of Civilian Persons in Time of War art. 31, Aug. 12, 1949, 6 U.S.T. 3516, 75 U.N.T.S. 287 [hereinafter GC IV]. It should be noted that this is not an absolute prohibition and exceptions exist where explicitly provided for in the Convention, for example in Articles 79–135, which regulate the treatment of internees.

55. CIHL, *supra* note 25, r. 92. For specific treaty prohibitions, see Additional Protocol I, *supra* note 13, art. 11; GC III, *supra* note 52, art. 13; GC IV, *supra* note 54, art. 32; Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of Non-international Armed Conflicts art. 5(2)(e), June 8, 1977, 1125 U.N.T.S. 609.

56. CIHL, *supra* note 25, r. 92.

57. Catherine L. Annas & George J. Annas, *Enhancing the Fighting Force: Medical Research on American Soldiers*, 25 JOURNAL OF CONTEMPORARY HEALTH LAW AND POLICY 283

however, if the treatment has been approved by the treating State's standards authority, the procedure or treatment will not be viewed as experimental.⁵⁸

3. Solving Medical Problems through Enhancement

Another scenario raising interesting legal issues occurs when a detainee has a medical problem or injury that can best be resolved by a form of enhancement. One can imagine a situation in which wounded or sick enemy personnel require treatment and the standard treatment provided by the detaining power to its own forces would involve the use of an enhancement technique to block pain, promote rapid healing or enhance the immune system.

The United States' Defense Advanced Research Projects Agency (DARPA) currently has research programs in photobiomodulation to accelerate wound healing, vaccines that block pain within seconds and chemical cascades to stop bleeding within minutes.⁵⁹ In addition to these enhancements designed to address specific issues, DARPA has also been seeking nanoplatfoms that can be introduced into the body for medical diagnostics, as well as being used to monitor and treat a broad range of diseases.⁶⁰ Although these programs are primarily focused on treatment rather than enhancement, the technologies described can last for a prolonged period of time (the effects of the pain vaccine last for thirty days) or

(2009); Efthimios Parasidis, *Human Enhancement and Experimental Research in the Military*, 44 *CONNECTICUT LAW REVIEW* 1117 (2012).

58. This function is performed for example by the Food and Drug Administration in the United States and Läkemedelsverket in Sweden. Rules relating to experimental treatments and trials are coordinated across the European Union and conducted under EU directives administered by the European Medicines Agency in accordance with standardized internationally recognized "good clinical practice" rules. *See, e.g.*, Commission Directive 2005/28/EC of April 8, 2005, 2005 O.J. (L 91) 13 (laying down principles and detailed guidelines for good clinical practice as regards investigational medicinal products for human use) and incorporated directives.

59. JOEL GARREAU, *RADICAL EVOLUTION: THE PROMISE AND PERIL OF ENHANCING OUR MINDS, OUR BODIES—AND WHAT IT MEANS TO BE HUMAN* 27–29 (2005).

60. DARPA News, *DARPA Effort Targets Illness Faster, Safer and More Effectively*, ASD(R&E) S&T NEWS BULLETIN 6 (June 15, 2012), [http://www.acq.osd.mil/chieftechнологист/publications/docs/ST_NewsBulletin-V2-I24\(15JUN2012\).pdf](http://www.acq.osd.mil/chieftechнологист/publications/docs/ST_NewsBulletin-V2-I24(15JUN2012).pdf); *In Vivo Nanoplatforms (IVN)*, DARPA, <http://www.darpa.mil/program/in-vivo-nanoplatforms> (last visited Mar. 21 2016).

can be used prophylactically (in the case of the diagnostic nanoplatforms), and thus fall within the enhancement paradigm. While these research programs are designed to ensure that U.S. personnel are diagnosed and treated effectively, their utility in maintaining the health of detainees confined in close quarters is immediately apparent.

As noted above, customary international law and Article 11 of AP I, protect any person who is in the power of an adverse party, or who is interned, detained or otherwise deprived of liberty as a result of an armed conflict. It is prohibited to subject such a person “to any medical procedure which is not indicated by the state of health of the person concerned and which is not consistent with generally accepted medical standards which would be applied under similar medical circumstances to persons who are nationals of the party conducting the procedure and who are in no way deprived of their liberty.”⁶¹ What constitutes generally accepted medical practice will be determined by medical ethics and the standards adopted by professional medical bodies, for example, the World Medical Association and the World Health Organization.⁶²

In the case of the enhancement techniques being researched by DARPA, although the particular treatment would be indicated by the medical state of the detainee, intervention would not necessarily conform to generally accepted medical standards owing to its innovative status. However, if national authorities for the detaining State have approved the technology or technique for treatment of its own soldiers and/or citizens as a standard treatment and it conforms to the best medical interests of the patient, it may be argued that in those circumstances its use would be consistent with the law. In the commentary on the Copenhagen Guidelines on the Handling of Detainees in International Military Operations, it is noted that, although medical assistance should, wherever possible, be conducted with the consent of the wounded or sick detainee, medical actions to preserve the health of the detainee may be justified even where the detainee

61. Additional Protocol I, *supra* note 13, art. 11(1).

62. *See, e.g.*, World Medical Association, Declaration of Geneva (1948); World Medical Association, International Code of Medical Ethics (1949); World Medical Association, Regulations in Times of Armed Conflict and Other Situations of Violence (1956). *See also* World Medical Association, Declaration of Helsinki, Ethical Principles for Medical Research Involving Human Subjects (1964) (addressing experimental treatments).

refuses to provide consent.⁶³ It should be noted that this is not the case with surgical interventions, where the person concerned may refuse an operation even if the surgeon considers it essential to the person's survival.⁶⁴

In the case of POWs, nanoplatforms designed for medical diagnosis may not only be permitted, but may also be preferred. Article 31, GC III requires that POWs undergo medical inspections at least once a month, specifically requiring that the most efficient methods available for the detection of contagious diseases, as well as for the supervision of the general health, nutrition and cleanliness of prisoners, be employed.⁶⁵ With technology costs inevitably decreasing over time, nanoplatforms may well become the most efficient way of monitoring the health of detainees.

4. Detaining Enhanced Personnel

A third scenario emerges when personnel who have previously been enhanced are detained. For example, if a detainee is reliant on periodic ingestion of a particular substance to maintain their enhancement, management of the withdrawal of the individual from that substance may be problematic. What legal consequences may flow from such a situation?

Under GC III, parties are required to repatriate seriously wounded or sick POWs to their own country.⁶⁶ This applies in particular to those whose mental or physical fitness seems to have been gravely diminished; those who are incurable; those who have recovered, but whose mental or physical fitness seems to have been gravely or permanently diminished; and

63. THE COPENHAGEN PROCESS ON THE HANDLING OF DETAINEES IN INTERNATIONAL MILITARY OPERATIONS, THE COPENHAGEN PROCESS: PRINCIPLES & GUIDELINES 14–15 (2012), <http://um.dk/en/~media/UM/English-site/Documents/Politics-and-diplomacy/Copenhagen%20Process%20Principles%20and%20Guidelines.pdf>.

64. Additional Protocol I, *supra* note 13, art. 11(5).

65. GC III, *supra* note 52. Article 31 provides:

Medical inspections of prisoners of war shall be held at least once a month. They shall include the checking and the recording of the weight of each prisoner of war. Their purpose shall be, in particular, to supervise the general state of health, nutrition and cleanliness of prisoners and to detect contagious diseases, especially tuberculosis, malaria and venereal disease. For this purpose the most efficient methods available shall be employed, e.g. periodic mass miniature radiography for the early detection of tuberculosis.

66. *Id.*, art. 109.

those who require treatment and are unlikely to recover within a year.⁶⁷ Prisoners who enter detention while enhanced, and subsequently lose their enhanced capabilities, may appear to have a permanent diminishment in their physical or mental capabilities. For detaining forces with no knowledge of an individual soldier's baseline levels (i.e., the standard unenhanced level of whatever capability or function is being measured for that particular individual), forming an opinion about the difference between an enhanced soldier and their unenhanced state will necessarily be based on generalities. However, the purpose of the provisions is to facilitate the timely repatriation of gravely sick or wounded soldiers who can no longer return to active service. If the enhancement technology is such that without their drugs or other means soldiers will return to a normal baseline state of an unenhanced but otherwise fit-for-duty soldier, they would not qualify for repatriation. However should the enhancement be such that lack of maintenance would result in grave and permanent damage to the baseline status of the prisoner and the detaining power is unable to provide the appropriate treatment in its detention facilities, the prisoner must be transferred to a military or civilian medical facility where the appropriate treatment can be provided.⁶⁸

III. HUMAN RIGHTS OF ENHANCED HUMANS

At the outset of this section, it is pertinent to make a point about the subject of *human* rights. Despite the enhanced status of members of the military or any other person who is the subject of an enhancement (whether pharmacological, cybernetic, genetic or otherwise), they remain, at their core, fundamentally human. The preamble of all the universal human rights instruments refer to "all members of the human family" and in their opening articles address the rights contained therein to "all human beings."⁶⁹ Like the universal instruments, regional human rights instruments also use

67. *Id.*, art. 110.

68. *Id.*, art. 30.

69. *See, e.g.*, Universal Declaration of Human Rights, G.A. Res. 217 (III) A, U.N. Doc. A/RES/3/217(III) (Dec. 10, 1948) [hereinafter UDHR]; International Covenant on Civil and Political Rights, Dec. 16, 1966, 999 U.N.T.S. 171 [hereinafter ICCPR]; International Covenant on Economic, Social and Cultural Rights, Dec. 16, 1966, 993 U.N.T.S. 3 [hereinafter ICESCR].

inclusive language encompassing all persons or every human being,⁷⁰ or in the case of the European Convention on Human Rights (ECHR) secure rights to “everyone.”⁷¹ 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.⁷²

In determining the contours of human rights for members of the armed forces, the approach of the Inter-American human rights bodies,⁷³ the European Union and the ECtHR has been to view them as citizens in uniform. The jurisprudence of the latter court is particularly rich in this respect, recognizing that human rights law applies in principle to members of the armed forces, but also acknowledging in a 1976 judgment that when interpreting and applying the ECHR “the Court must bear in mind the particular characteristics of military life and its effects on the situation of individual members of the armed forces.”⁷⁴ The principle has been applied in subsequent cases, with the ECtHR observing that the extent of protection given to members of the armed forces must take into account the characteristics of military life, the nature of the activities they are required

70. *See, e.g.*, American Convention on Human Rights, Nov. 22, 1969, 1144 U.N.T.S. 123 [hereinafter ACHR]; African Charter on Human and Peoples’ Rights, June 27, 1981, 1520 U.N.T.S. 217 [hereinafter ACHPR].

71. Convention for the Protection of Human Rights and Fundamental Freedoms art. 1, Nov. 4, 1950, 213 U.N.T.S. 222 [hereinafter ECHR].

72. For example, the following European cases all feature complaints in which the subjects of the rights discussed are still regarded as rights holders. *X v. United Kingdom*, App. No. 8416/79, 19 Eur. Comm’n H.R. Dec. & Rep. 244 (1980) (observing that application of certain rights prenatally cannot be excluded); *H.L. v. United Kingdom*, 2004-IX Eur. Ct. H.R. 197 (complainant with severe autism and learning difficulties); *Zarzycki v. Poland*, App. No. 15351/03 (2013) (ECtHR), <http://hudoc.echr.coe.int/eng?i=001-117210> (complainant with forearm prostheses); *Tešić v. Serbia*, App. Nos. 4678/07, 50591/12 (2014) (ECtHR), <http://hudoc.echr.coe.int/eng?i=001-140771> (complainant with a pacemaker).

73. *See, e.g.*, J.S.C.H. & M.G.S., Case 12.689, Inter-Am. Comm’n on H.R., Report No. 80/15, OEA/Ser.L./V/II.156, doc. 33 (2015).

74. *Engel and Others v. Netherlands*, 22 Eur. Ct. H.R. (ser. A) (1976).

to perform and the risk arising from those activities.⁷⁵ This approach has led the ECtHR to provide the State with a considerable degree of latitude to restrict the human rights of the members of its armed forces during war or other public emergency threatening the life of the nation.⁷⁶ The Supreme Court of the United Kingdom, on reviewing the approach of the ECtHR to members of armed forces, observed:

These comments, however brief, do seem to make it clear that it would not be compatible with the characteristics of military life to expect the same standard of protection as would be afforded by article 2(1) [of the ECHR] to civilians who had not undertaken the obligations and risks associated with life in the military. That is plainly so in the context of the exercise of military discipline over members of the armed forces when they are on active service. It is hard to see why servicemen and women should not, as a general rule, be given the same protection against the risk of death or injury by the provision of appropriate training and equipment as members of the police, fire and other emergency services. But it is different when the serviceman or woman moves from recruitment and training to operations on active service, whether at home or overseas. It is here that the national interest requires that the law should accord the widest measure of appreciation to commanders on the ground who have the responsibility of planning for and conducting operations there.⁷⁷

From a practical standpoint, it should be noted that armed forces composed of volunteers, as opposed to conscript armies, face additional pressure to respect the human rights of their members in order to attract and retain the desired level and quality of recruits. Although an adult volunteer can be taken to have consented to certain aspects of military life and the resulting curtailment of particular rights by the very act of enlistment, the consent does not amount to a *carte blanche* waiver of all aspects of the human rights applicable to the individual.⁷⁸

International human rights fall into four basic categories: non-derogable rights, rights which may be derogated from in war or public emergency threatening the life of the nation, absolute rights and qualified

75. *See, e.g.*, *Grigoriades v. Greece*, 1997-VII Eur. Ct. H.R.

76. PETER J. ROWE, *THE IMPACT OF HUMAN RIGHTS LAW ON ARMED FORCES* 59 (2006).

77. *Smith and Others v. Ministry of Defence* [2013] UKSC 41, ¶ 71.

78. ROWE, *supra* note 76, at 9–13.

rights. Qualified rights are rights which may be limited by law in certain specified circumstances. Both derogable rights and qualified rights may be significantly curtailed in respect of members of the armed forces. This is particularly the case in times of armed conflict as many of the limitation clauses contained in the relevant treaties specifically provide for limitations and restrictions for reasons of national security and/or public safety. Absolute rights (such as the prohibition against torture or cruel, inhuman or degrading treatment) remain in full force at all times, unaffected by membership in an armed force or the existence of an ongoing armed conflict or other situation affecting national security.

With these preliminary observations in mind, we will now address some of the human rights implications that flow from human enhancement technologies.

IV. HUMAN RIGHTS LAW IMPLICATIONS FOR HUMAN ENHANCEMENT TECHNOLOGIES

It is clear that different enhancement technologies will impact the human rights of individual soldiers in different ways. This section briefly examines the impact of these technologies on some of the substantive rights set out in international human rights instruments.

A. The Right to Life

The right to life applies to soldiers both in peacetime and during armed conflict, although in the latter case the application is substantially curtailed by both jurisdictional and contextual matters. While members of the armed forces fall within the jurisdiction of their own State—whether serving at home or abroad—incidents involving third parties who are subjected to the actions of enhanced personnel deployed outside their own country will be governed by the rules on the extraterritorial application of human rights law, which in turn depend on whether an individual is subject to a State's jurisdiction.⁷⁹

79. Jurisdiction in the context of human rights law carries a special meaning, on which the jurisprudence of the ECtHR is still evolving. At present, for individuals to fall within the jurisdiction of a State, either the territory in which they are located, or the individuals themselves, must be under that State's effective control. Case law establishes that individuals held in detention by a State's armed forces are within the effective control of that

The right to life is a non-derogable right, except in respect of deaths resulting from lawful acts of war.⁸⁰ However, as Rowe points out, “[t]he concept of lawful acts of war is concerned with the obligations a State owes to those (normally non-nationals) against whom it is engaged in an international armed conflict and not its own soldiers.”⁸¹ The right to life not only prohibits States from taking a life without justification, but also implies a duty on the part of the State to establish a framework of laws and procedures to protect life to the greatest extent reasonably possible under the circumstances.⁸² It is in this obligation that the contextual restrictions on the right to life for members of the armed forces become pertinent. Soldiers are expected (and expect) to risk—and even sacrifice—their lives if necessary in the course of an armed conflict; however, this expectation does not entirely preclude liability on the part of the State with respect to the right to life of its own soldiers.

The UK Supreme Court had occasion to consider whether, and to what extent, the right to life in Article 2 of the ECHR imposes positive obligations on the government to prevent the deaths of its own soldiers.⁸³ The Court concluded that, while it must avoid imposing positive obligations on

State. *Al-Skeini v. United Kingdom*, 2011-IV Eur. Ct. H.R. 99. As a general proposition, the United States does not consider that human rights law applies extraterritorially: *See, e.g.*, United States of America, Fourth Periodic Report of the United States to the U.N. Human Rights Committee, U.N. Doc. CCPR/C/USA/4, at 142 (May 22, 2012). That understanding has been reviewed by the United States in recent years and it now acknowledges the Torture Convention “applies to certain areas beyond” its sovereign territory, and more specifically to “all places that the State party controls as a governmental authority.” U.N. Committee Against Torture, *Concluding Observations on the Combined Third to Fifth Periodic Reports of the United States of America*, U.N. Doc. CAT/C/USA/CO/3-5, at 3 (Dec. 19, 2014).

80. *See* ICCPR, *supra* note 69, arts. 4, 6; ECHR, *supra* note 71, arts. 2, 15; ACHR, *supra* note 70, arts. 4, 27. The ECHR specifically exempts lawful acts of war under the derogations provision of Article 15(2). In contrast, both the ICCPR and ACHR are expressed in terms of a prohibition of arbitrary deprivation of life; death arising from lawful acts of war are generally not considered arbitrary and therefore would not violate the right in the first place, rather than requiring a derogation.

81. ROWE, *supra* note 76, at 137. It should be noted that this is not exclusively the case.

82. The duty to take positive measures to protect the right to life derives both from specific statements in the articles of the relevant international treaties that the right should be protected by law and the general duty of States to ensure the rights recognized in the various instruments.

83. *Smith and Others*, *supra* note 77.

the State which are unrealistic or disproportionate in connection with the planning or conduct of military operations during armed conflict, it must give effect to those obligations where it would be reasonable to expect the individual to be afforded the protection of Article 2.⁸⁴ The Court then excluded from the ambit of the Article decisions taken at a high level of command that are closely linked to the exercise of political judgment and issues of policy, as well as decisions taken by those actively engaged in direct contact with the enemy. However, the Court was prepared to find there was room for claims to be brought in the middle ground, while acknowledging a wide margin of appreciation was to be granted to authorities and to those actively engaged in armed conflict.⁸⁵ The Court concluded no hard and fast rules could be established; that each case would require an exercise of judgment based on its facts.⁸⁶

The ECtHR itself has yet to consider a case based on the use of experimental technologies by the military, or indeed the extent to which the right to life in Article 2(1) offers any protection to armed forces members actively engaged in armed conflicts. However, it has been generally recognized that the right to life must be balanced against the public interest of the State in conserving the fighting force. In the operational context, the State possesses a wide margin of appreciation in respect of its determination of the national interest. As noted above, the margin is significantly curtailed when personnel are engaged in training, as opposed to active warfighting.⁸⁷

84. *Id.* ¶ 76.

85. The concept or doctrine of the “margin of appreciation” describes the amount of latitude that the court will grant to States before disallowing measures put in place by the State that interfere with an individual’s rights. The doctrine encapsulates the Court’s recognition that the measures that a State may consider necessary to interfere with an individual’s human rights may differ from State to State even within democratic societies. It also recognizes that national governments are best placed to determine what is necessary for that State rather than an international court. Although primarily a function of the jurisprudence of the ECtHR, the rationale underlying the doctrine has been applied by other international human rights bodies such as the Inter-American Court of Human Rights and the Human Rights Committee. *See, e.g.*, Proposed Amendments to the Naturalizations Provisions of the Constitution of Costa Rica, Advisory Opinion OC-4184, Inter-Am. Ct. H.R. (ser. A) No. 4, ¶ 62 (Jan. 19, 1984); U.N. Human Rights Committee, Hertzberg et al. v. Finland, Communication No. R.14/61, U.N. Doc. A/37/40, at 161, ¶ 10.3 (Apr. 2, 1982).

86. *Smith and Others*, *supra* note 77, ¶ 76.

87. *See, e.g., id.* ¶¶ 67–76 (setting out the relevant case law of the Court).

In relation to enhancement technologies, the right to life may be infringed where the use of a particular technology poses a risk to the individual soldier that results in his or her death. For example, fatal side effects of experimental enhancement technologies may involve an infringement of this right. Military experimentation, that is, the use of armed forces personnel as human test subjects, is replete with examples of horrific experiments conducted on often unknowing and/or objecting personnel.⁸⁸

The right to life may also be impacted indirectly by enhanced soldiers who cause the wrongful death of others while under the influence of their enhancement, whether occurring during training or while engaged in military operations. For example, in 2002, in what has become known as the Tarnack Farms friendly-fire incident, a U.S. Air Force F-16 pilot dropped a bomb on Canadian troops conducting a firing exercise, believing them to be Taliban fighters.⁸⁹ The pilots were returning to base following a ten-hour night patrol when they reported what they believed to be surface-to-air fire. In the incident that followed, a combination of reckless behavior, bad communication and the fog of war led to one of the pilots dropping a five-hundred pound laser-guided bomb on the Canadian troops, killing four and wounding eight others. During the subsequent investigation and disciplinary proceeding, the pilots raised as part of their defense the fact that they had been told by superiors to use amphetamines during their mission and had taken dextroamphetamine prior to the incident. Although the defense was not accepted and the two pilots involved were held responsible for not following standard operating procedures and the rules of engagement, a number of medically qualified commentators have noted that the use of amphetamines for longer missions required of pilots by the Air Force is likely to have led to the pilots' failure to wait for confirmation of the targets' identity and to believe they needed to act in self-defense.⁹⁰ Not only are States responsible for the acts of their armed forces, but they also

88. See generally Annas & Annas, *supra* note 57; Parasidis, *supra* note 57; George J. Annas, *Protecting Soldiers from Friendly Fire: The Consent Requirement for Using Investigational Drugs and Vaccines in Combat*, 24 AMERICAN JOURNAL OF LAW & MEDICINE 245 (1998).

89. For a summary of the incident, see Annas & Annas, *supra* note 57, at 293–97. As this only indirectly impacts the right to life, no further discussion will be included here.

90. See, e.g., *id.* at 296. Note, however, that others maintain that it should have improved the pilots' performance. Thom Shanker & Mary Duenwald, *Bombing Error in Afghanistan Puts a Spotlight on Pilots' Pills*, NEW YORK TIMES (Jan. 19, 2003), <http://www.nytimes.com/2003/01/19/national/19SPEE.html>.

have an obligation where they know of a risk to the lives of those under their jurisdiction.⁹¹

It should be noted that, as with any other possible breach of the right to life, the right may also be infringed by a State's failure to investigate effectively.⁹² Investigations must be independent, thorough and prompt, with a sufficient element of public scrutiny of the investigation or its results to ensure accountability.⁹³ These obligations are unchanged with respect to deaths that involve human enhancement technologies.

B. Bodily Integrity, Torture, and Inhuman or Degrading Treatment

The right of bodily integrity refers to the collection of rights (including the right to life) concerned with the inviolability of the human body and right of the person to determine what may be done to it. Referred to in slightly different terms under different treaty regimes, these rights incorporate security of the person,⁹⁴ the right to humane treatment,⁹⁵ the prohibition against slavery,⁹⁶ and the prohibition against torture and inhuman or degrading treatment,⁹⁷ as well as the prohibition against medical and scientific experimentation without freely given consent.⁹⁸ The prohibitions against slavery, and torture and inhuman or degrading treatment are absolute rights; States may not, under any circumstances, have recourse to such treatment or condone it.⁹⁹ States must, therefore, also take measures to

91. *See, e.g.*, *Osman v United Kingdom*, 1998-VIII Eur. Ct. H.R. ¶¶ 115–22; *Gonzalez (“Cotton Field”) v. Mexico*, Merits, Reparations and Costs, Judgment, Inter-Am. Ct. H.R. (ser. C) No. 205 (Nov. 16, 2009) (García-Sayan, J., concurring, ¶¶ 3–15).

92. *See* Human Rights Committee, General Comment No. 6: (Right to Life), U.N. Doc. HRI/GEN/1/Rev.7, at 129, ¶ 4 (2004).

93. *See generally Al-Skeini*, *supra* note 79 (holding that deaths must be investigated effectively and impartially); *Velásquez Rodríguez v. Honduras*, Merits, Judgment, Inter-Am. Ct. H.R. (Ser. C) No. 4, ¶¶ 172–77 (July 29, 1988) (holding that States have the duty to investigate the right to life irrespective of the identity of the perpetrator).

94. UDHR, *supra* note 69, art. 3.

95. ACHR, *supra* note 70, art. 5.

96. UDHR, *supra* note 69, art. 4; ICCPR, *supra* note 69, art. 8; ECHR, *supra* note 71, art. 4; ACHR, *supra* note 70, art. 6.

97. ICCPR, *supra* note 69, art. 7; ECHR, *supra* note 71, art. 3; ACHR, *supra* note 70, art. 5(2).

98. ICCPR, *supra* note 69, art. 7.

99. With respect to the obligation not to condone, see, e.g., Articles 4–8 of the Convention against Torture, which require States to make torture a crime under national laws

protect its service personnel against such treatment.¹⁰⁰ These prohibitions, as well as the prohibition against medical and scientific experimentation without free consent, are also non-derogable rights under both the International Covenant on Civil and Political Rights (ICCPR) and the ECHR.¹⁰¹

Enhancement of military personnel raises interesting questions with respect to the right of bodily integrity on two different levels. The first is the right of the soldier to consent to or refuse the enhancement and, second, what effects the enhancement may have on the permissible treatment of the soldier once enhanced.

The issue regarding the right to refuse an enhancement will largely depend on the nature and status of the technology involved. While approved medicines may become part of the standard pre-deployment medical regime in the same manner as conventional vaccines, more experimental technologies may raise legitimate concerns for the personnel involved. Indeed, many of the issues raised by the use of experimental technologies have been previously raised and debated with respect to the mandatory administration of anthrax vaccines which had not yet been approved by the States' drug approval agencies.¹⁰² Whether a member of the armed forces has the right to refuse such vaccines will depend on the extent of his or her right to bodily integrity. The soldier who refuses the vaccine may be prevented from deploying with his or her unit as a potential risk to military efficiency, the lack of inoculation making him or her unfit for military service in a particular region. For example, in 2003 approximately forty Australian servicemen and women who were deploying to the Middle East were ordered to return to Australia after refusing anthrax inoculations en route.¹⁰³ No disciplinary measures were taken in that case; however, in

and extradite or prosecute anyone present on their territory that is suspected of having committed an act of torture. States have a duty to investigate allegations of torture promptly, impartially and effectively (Articles 12 and 13) and where substantial evidence is found, perpetrators of torture must be punished. Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, Dec. 10, 1984, 1465 U.N.T.S. 85.

100. Committee of Ministers, *Human Rights of Members of the Armed Forces*, Recommendation CM/Rec(2010)4 (Feb. 24, 2010), <https://wcd.coe.int/ViewDoc.jsp?id=1590149&Site=CM>.

101. ICCPR, *supra* note 69, art. 4(2); ECHR, *supra* note 71, art. 15.

102. *See, e.g.*, ROWE, *supra* note 76, at 47.

103. *Anthrax Jab Side-Effects Withheld*, BBC NEWS (Feb. 21, 2004), <http://news.bbc.co.uk/2/hi/asia-pacific/3509037.stm>.

some States refusal has resulted in disciplinary action being taken against the soldier involved.¹⁰⁴

Certainly where the enhancement remains experimental, the soldier will retain more rights to refuse the enhancement than if it has been approved for use by the appropriate State authority.¹⁰⁵ Regardless of the legal issues involved, medical ethics require informed consent of the subject for any experimental treatment. However, serious concerns have been raised by some authors who argue that true informed consent has been impossible to achieve in situations involving the military hierarchy,¹⁰⁶ citing examples where pressure (either real or perceived) from senior ranking officers for soldiers to comply with requests or, in some cases, direct orders to subject themselves to medical treatment, have removed any genuine ability to refuse.¹⁰⁷

The right to bodily integrity is also often expressed as a function of the right to privacy. The jurisprudence of the ECtHR has provided leading judgments on the scope and contours of the right. The right to privacy requires that a State respect everyone's "private and family life, their home and correspondence."¹⁰⁸ The Court has noted that the term "private life" includes the physical and psychological integrity of a person, as well as "aspects of an individual's physical and social identity."¹⁰⁹ Courts in other ju-

104. See, e.g., *Court-Martial for Refusing Anthrax Shot*, NEW YORK TIMES (Apr. 5, 2003), <http://www.nytimes.com/2003/04/05/nyregion/court-martial-for-refusing-anthrax-shot.html>.

105. Such approval is granted in the United States by the Food and Drug Administration, the Medicines and Healthcare Products Regulatory Agency in the United Kingdom and the Läkemedelsverket (Medical Products Agency) in Sweden.

106. See Jo Bird & Greta Bird, *Human Rights and the Military: The "Chemical Soldier,"* 30 ALTERNATIVE LAW JOURNAL 81, 81–85 (2005); Annas, *supra* note 88, at 253 n.42 (In the accompanying text the author points out that, although in principle the soldiers had the right to refuse a botulinum toxin vaccination, the right was not communicated to them in the field.)

107. For example, the informed consent form used by the U.S. Air Force specifically states that although taking Dexedrine is voluntary, refusal to take the amphetamines may result in a pilot being grounded. Such an outcome would have a major impact on a pilot's career. See Naval Strike and Air Warfare Center, NAVMED P-6410, Performance Maintenance during Continuous Flight Operations: A Guide for Flight Surgeons 21 (NAVMED P-6410), Naval Strike and Air Warfare Center, 1 Jan 2000).

108. ECHR, *supra* note 71, art. 8. See also ICCPR, *supra* note 69, art. 17; ACHR, *supra* note 70, art. 11; Charter of Fundamental Rights of the European Union arts. 7–9, Dec. 18, 2000, 2000 O.J. (C 364).

109. *Pretty v. United Kingdom*, 2002-III Eur. Ct. H.R. 154, ¶ 61.

risdictions have also viewed the right to refuse medical treatment as a function of the right to privacy.¹¹⁰ Given that the right to privacy also concerns the physical integrity of a person, the right may be implicated where the armed forces require members to undergo enhancements as a requirement for deployment or to otherwise carry out their duties. Issues have arisen in the past where the State has required its soldiers deployed in an area in which it is suspected that the enemy may use chemical or biological weapons to take medically prescribed tablets or inoculations to protect them against the effects of such weapons.¹¹¹ The right to privacy has also been implicated in cases dealing with physical intrusions into the body, for example, in the anthrax medication cases discussed above.¹¹²

The right is not absolute either for civilians or members of the armed forces. For example, under the ECHR, States are permitted to restrict the right of privacy provided that the restriction is in accordance with the law, pursues a legitimate aim (for example, national security) and is necessary in a democratic society.¹¹³

As to the permissible treatment of individual soldiers once enhanced, the subject of sleep deprivation provides an interesting example of the type of issue raised. Sleep deprivation has been denounced on multiple occasions by U.N. human rights bodies,¹¹⁴ including the Committee against Torture, judicially recognized by the ECtHR as a form of inhuman and

110. See, e.g., *In re Quinlan*, 70 N.J. 10, 40, 355 A.2d 647, 663 (1976) (basing a decision to terminate treatment, *inter alia*, on a constitutional right to privacy).

111. ROWE, *supra* note 76, at 47.

112. *Id.*

113. ECHR, *supra* note 71, art. 8(2) (“There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic wellbeing of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.”). Note that the jurisprudence of the court has also established that any interference with individual rights must also be proportionate to the legitimate aim sought to be realized. For an overview of the principle of proportionality as applied by human rights treaty bodies, see Yutaka Arai-Takahashi, *Proportionality*, in THE OXFORD HANDBOOK OF INTERNATIONAL HUMAN RIGHTS LAW 446–68 (Dinah Shelton ed., 2013).

114. See, e.g., Theo van Boven (Special Rapporteur on Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment), *Sixth Report pursuant to General Assembly Resolution 58/164 and Human Rights Commission Resolution 2004/41*, U.N. Doc. A/59/324 (Sept. 1, 2004); U.N. Committee against Torture, Report of the Committee against Torture, ¶¶ 56, 257, U.N. Doc. A/52/44 (Supp.) (Sept. 10, 1997).

degrading treatment,¹¹⁵ and prohibited as a method of interrogation by the Supreme Court of Israel,¹¹⁶ among others.¹¹⁷ In the case of the ECtHR, the Court recognized that sleep deprivation caused “intense physical and mental suffering,”¹¹⁸ which surpassed the minimum level of severity to fall within the scope of inhuman treatment under Article 3 of the ECHR. However, the assessment of the minimum level of severity is relative and depends on all the circumstances of a case, such as the nature and context of the treatment, the manner and method of its execution, its duration, its physical and mental effects, and, in some cases, the gender, age and state of health of the victim.¹¹⁹ Enhancement techniques which reduce the need for sleep or counteract the harmful effects of sleep deprivation in military personnel are seen as the holy grail of many defense-funded research projects. Should a technique be developed which allows personnel to require less sleep, or drugs developed which counteract the deleterious effects of sleep deprivation—lack of cognitive ability, mental agility etc.—it may call into question the accepted categorization of sleep deprivation as a prohibited technique constituting inhuman treatment or in some cases torture, at least in terms of the prolongation and levels of deprivation for soldiers who are so enhanced.

C. *Privacy, Thought and Expression*

Human enhancement technologies which mediate and/or manipulate information between the outside world and the brain (such as cybernetic implants or optical prosthetics) or which inhibit the brain’s ability to make free choices (such as moral engineering) will also impact the human rights of those using them. In particular, the rights to privacy and freedom of thought, conscience, religion and expression find new challenges in these emerging technologies.

115. *Ireland v. United Kingdom*, 25 Eur. Ct. H.R. (ser. A) at 58, ¶ 167 (1978).

116. HCJ 5100/94 Public Committee Against Torture in Israel v. State of Israel 53(4) PD 817, ¶¶ 31–32 (1999) (Isr.), reprinted in 38 INTERNATIONAL LEGAL MATERIALS 1471 (stating that where sleep deprivation amounts to an end in itself for the purposes of breaking the suspect, rather than a side effect, it is prohibited).

117. See, e.g., *R (on the application of Binyam Mohamed) v. Secretary of State for Foreign and Commonwealth Affairs*, [2010] EWCA (Civ) 65, [2011] Q.B. 218 (Eng.).

118. *Ireland v. United Kingdom*, *supra* note 115, ¶ 167.

119. *Id.* ¶ 162; *Soering v. United Kingdom*, 161 Eur. Ct. H.R. (ser. A) at 32, ¶ 100 (1989).

In the fields of cybernetics and prosthetics, privacy issues may also be raised by ocular implants or any other monitoring device which is connected to a system that has a data recording capability or provides for upload to a network or the cloud. While external devices such as helmet cameras or the dual-use Google Glass and its competitors can be removed by the user, implant technology cannot and would therefore have the capacity for 24/7 image capture or recording. Strict policies will need to be in place in developing the implant technology and interface and in its use to protect the privacy of both the user and those with whom they come in contact. Clearly, the recording and outside observation of private family moments will breach the soldier's right to a private family life.¹²⁰

The Universal Declaration of Human Rights (UDHR), ICCPR and some regional human rights treaties provide everyone (including members of the armed forces) the "freedom of thought, conscience and religion."¹²¹ While it has thus far been exclusively used in cases dealing with freedom of religion and the associated right to express that religion, in *Kokkinakis v. Greece* the ECtHR noted "it is also a precious asset for atheists, agnostics, sceptics and the unconcerned."¹²² Although specific limitations may be placed on the external manifestation of this right within the context of military life,¹²³ the protection in relation to the internal dimension of freedom of thought—the *forum internum*—is absolute and not subject to State interference. Indeed, Article 18(2) of the ICCPR specifically provides that "[n]o

120. Although privacy is a qualified, rather than absolute, right and therefore subject to the normal requirements of limitations on interferences with rights (lawful, necessary in a democratic society to achieve a legitimate aim and proportionate to that aim), it is difficult to see what legitimate aim might be served that would make routine outside observation of intimate family moments necessary or proportionate.

121. UDHR, *supra* note 69, art. 18; ICCPR, *supra* note 69, art. 18; ECHR, *supra* note 71, art. 9. Other regional human rights instruments refer solely to freedom of conscience and religion. Although it should be noted that while the ACHR deals solely with conscience and religion in Article 12, freedom of thought is included with freedom of expression in the Article 13. ACHR, *supra* note 70. The ECHR provides that "[e]veryone has the right to freedom of thought, conscience and religion; this right includes freedom to change his religion or belief and freedom, either alone or in community with others and in public or private, to manifest his religion or belief, in worship, teaching, practice and observance." ECHR, *supra*, art. 9.

122. *Kokkinakis v. Greece*, 260 Eur. Ct. H.R. (ser. A) at 12, ¶ 31 (1993).

123. As long as the restrictions comply with the requirements of, for example, Article 9(2), ECHR that they are properly prescribed by law, pursue a legitimate aim (e.g., national security) and are necessary in a democratic society.

one shall be subject to coercion which would impair his freedom to have or to adopt a religion or belief of his choice.” At first blush this right does not appear to impact enhancement technologies; however, the advent of brain-machine interfaces and the suggestion of moral enhancement raise the possibility of quite literally affecting a person’s ability to think freely. Persson and Savulescu’s controversial argument for moral enhancement of human beings goes directly to the very heart of the values protected by this right.¹²⁴ “At its most basic, . . . the right seeks to prevent state indoctrination of individuals by permitting the holding, development, and refinement and ultimately change of personal thought, conscience and religion.”¹²⁵ If personnel are prevented from freely making moral judgments because of a drug administered to them by State authorities, their fundamental freedoms may well be violated.

While the current iteration of the problem sounds futuristic, the ECtHR has in fact had occasion to address the problem of thought control in the past. In the *Kokkinakis* judgment, the Court appeared to suggest that a breach of the right to freedom of thought, conscience and religion could occur in cases of severe spiritual coercion or brainwashing, although the Court suggested that it would also consider such acts to be in breach of Article 3 (prohibiting torture, inhuman or degrading treatment) of the ECHR.¹²⁶ The ECtHR has also recognized the particular vulnerability of

124. PERSSON & SAVULESCU, *supra* note 45. As noted above, Persson and Savulescu make the claim in relation to environmental damage and climate change (although they also mention the threat of nuclear war), but there is the potential for application to the military in the moral enhancement of soldiers, particularly, although not exclusively, with those involved in detention after the scandals arising in the Iraq and Afghanistan conflicts. While abuse of detainees offers the best and most obvious example of immoral behavior, there are potentially many others which could affect the way soldiers operate, such as in targeting. However, enhancement of empathy could, in fact, make targeting decisions, particularly assessment of proportionality, harder on soldiers since it would be much more difficult for soldiers to accept and live with *any* collateral damage.

125. JIM MURDOCH, PROTECTING THE RIGHT TO FREEDOM OF THOUGHT, CONSCIENCE AND RELIGION UNDER THE EUROPEAN CONVENTION ON HUMAN RIGHTS 18 (Counsel of Europe Handbooks, 2012), http://www.coe.int/t/dgi/hr-natimplement/Source/documentation/hb09_rightfreedom_en.pdf.

126. *Kokkinakis*, *supra* note 122.

military personnel to be influenced by senior officers by virtue of the military's hierarchical structure.¹²⁷

Closely linked to the right of freedom of thought is the right to freedom of expression. For example, Article 10 of the ECHR provides: "Everyone has the right to freedom of expression. This right shall include freedom to hold opinions and to *receive and impart information and ideas without interference by public authority* and regardless of frontiers. . . ."¹²⁸ Other international and regional human rights instruments contain similar or broader wording.¹²⁹ Under the American Convention on Human Rights (ACHR), where freedom of thought and expression are contained in the same article, the Inter-American Court of Human Rights has recognized the closely linked "dual aspect" of the right,¹³⁰ and interpreted it more broadly as a right of substantive access to information, rather than mere prevention of interference.¹³¹ Needless to say, in respect of its application to members of the armed forces this right is often qualified.¹³² Although none of the human rights instruments specifically mention the armed forces per se, most provide that the right may be restricted for reasons (among others) of national security.¹³³ The exception is most commonly used in the military context for such things as preventing publication of information (usually books or papers) by members of the armed forces that may compromise national security.¹³⁴ However, where soldiers are equipped with cybernetic implants (brain-machine interfaces) which mediate between an information source and the brain, the right to "receive and impart information without interference from a public authority" gains a new dimension.

127. *Larissis and Others v. Greece*, 1998-I Eur. Ct. H.R. 362. See also FRANCISCO FORREST MARTIN ET AL., *INTERNATIONAL HUMAN RIGHTS AND HUMANITARIAN LAW: TREATIES, CASES AND ANALYSIS* 747 (2006).

128. Emphasis added.

129. See, e.g., UDHR, *supra* note 69, art. 19; ICCPR, *supra* note 69, art. 19; ACHR, *supra* note 70, art. 13; ACHPR, *supra* note 70, art. 9.

130. *Compulsory Membership in an Association Prescribed by Law for the Practice of Journalism* (Arts. 13 and 29 American Convention on Human Rights), Advisory Opinion OC-5/85, Inter-Amer. Ct. H.R. (ser. A) No. 5, ¶ 30 (Nov. 13, 1985).

131. *Rayes v. Chile, Merits, Reparations, and Costs, Judgment*, Inter-Amer. Ct. H.R. (ser. C) No. 151, ¶¶ 61–103 (Sept. 19, 2006).

132. ROWE, *supra* note 76, at 55–58.

133. Interestingly, this limitation does not occur in the ACHPR. ROWE, *supra* note 76, at 56. Additional limitations include that such restrictions must be prescribed by law and necessary in a democratic society.

134. ROWE, *supra* note 76, at 57–58.

There are many technologies which provide additional information to armed forces personnel, e.g., heads-up displays for fighter pilots and the Q-warrior augmented reality helmets from BAE Systems,¹³⁵ which are unlikely to impact this right. However, there are technologies in development which are intended to filter data in order to prevent information overload.¹³⁶ This may be particularly relevant where the implant or prosthetic removes visual information from view, or is designed to provide targeting information to the soldier. According to reports, software has been devised in Germany which allows for the deletion of visual information by smart glass or contact lens.¹³⁷ As one futurist was quoted as saying, “[s]o if you decide you don’t like homeless people in your city, and you use this software and implant it in your contact lenses, then you won’t see them at all.”¹³⁸ One can imagine that States may be tempted to remove “extraneous” information from their already information-overloaded troops to enable them to concentrate on the task at hand.

While it is likely that the interference with this right will be governed by the national security exception (where available), law and policy makers should be aware of the impact of the technology on freedom of expression to ensure that a balance between the two is preserved. In particular, there should be a recognition that this type of technology will impact not only on the human rights of the personnel involved, but also the ability of those personnel to comply with such law of armed conflict principles as precautions in attack and proportionality.

135. See Allen Mcouffee, *At Last, a Google Glass for the Battlefield*, WIRED (Feb. 24, 2014), <http://www.wired.com/2014/02/battlefield-glass/>.

136. See, e.g., the DARPA-initiated augmented cognition program. COMMITTEE ON OPPORTUNITIES IN NEUROSCIENCE FOR FUTURE ARMY APPLICATIONS, OPPORTUNITIES IN NEUROSCIENCE FOR FUTURE ARMY APPLICATIONS 117 (2009), <http://www.ncbi.nlm.nih.gov/books/NBK207983/>.

137. Evgeny Morozov, *The Perils of Perfection*, NEW YORK TIMES, Mar. 3, 2013, at SR1, http://www.nytimes.com/2013/03/03/opinion/sunday/the-perils-of-perfection.html?_r=0; Edward Champion, *Thirty-five Arguments against Google Glass*, RELUCTANT HABITS (Mar. 14, 2013), <http://www.edrants.com/thirty-five-arguments-against-google-glass/>.

138. Parag Khanna & Ayesha Khanna, *The Pleasure and Danger of Augmented Reality*, BIG THINK, <http://bigthink.com/hybrid-reality/the-pleasure-and-danger-of-augmented-reality> (last visited Feb. 15, 2016).

Fair Trial Rights

The right of everyone, including members of the armed forces, to a fair trial is provided by, *inter alia*, Articles 10 and 11(1) of the UDHR, Article 9 of the ICCPR, Articles 5 and 6 of the ECHR, Articles 8 and 25 of the ACHR, and Article 7 of the African Charter on Human and Peoples' Rights. These guarantees provide that in the determination of their civil rights and obligations, or of a criminal charge against them, everyone is entitled to a fair and public hearing within a reasonable time by an independent and impartial tribunal established by law. In addition to the specific rights enumerated in the text of the articles, additional guarantees have been developed through the jurisprudence of courts and tribunals.¹³⁹ Additional rights are also found elsewhere in the conventions: no punishment without law (Article 7, ECHR; Article 9, ACHR) and the right not to be tried or punished twice for the same offense (*ne bis in idem*) (Article 4, Protocol 7 to the ECHR¹⁴⁰).

Military justice is a complex field in which a great variety of national systems operate.¹⁴¹ States vary in the way they differentiate between military disciplinary matters and criminal offenses, in the type and composition of the courts dealing with military offenses, and in the putative independence of the staff investigating, prosecuting or reviewing cases vis-à-vis the chain of command. Each type of system raises different challenges for the human rights of armed forces members; however, the impact of human enhancement technologies on fair trial rights guaranteed under the various human rights treaties is the same regardless of the military or civilian status of the court. That said, there are certain technologies which may have an impact

139. For example, under the European system these include the right to have access to a court, the right to remain silent and not incriminate oneself, the right to equality of arms and the right to an adversarial proceeding. *See generally* Human Rights Committee, General Comment 32, Article 14: Right to Equality before Courts and Tribunals and to a Fair Trial, U.N. Doc. CCPR/C/GC/32 (Aug. 23, 2007).

140. Protocol 7 to the European Convention for the Protection of Human Rights and Fundamental Freedoms, Nov. 22, 1984, E.T.S. 117.

141. For a description of different types of military justice systems and the human rights of the armed forces in the States participating in the Organization for Security and Co-operation in Europe, see OFFICE FOR DEMOCRATIC INSTITUTIONS AND HUMAN RIGHTS, ORGANIZATION FOR SECURITY AND CO-OPERATION IN EUROPE, HANDBOOK ON HUMAN RIGHTS AND FUNDAMENTAL FREEDOMS OF ARMED FORCES PERSONNEL (2008).

on fair trial rights that are more likely to be initially implemented by the military.

Articles 14(3)(g) of the ICCPR and 8(2)(g) of the ACHR contain an express right not to be compelled to testify against oneself or to confess guilt. Within the European system the right to silence and the privilege against self-incrimination are not found in the text of the ECHR, but have been developed through the case law of the ECtHR.¹⁴² The Court has noted that “the . . . right to silence and the right not to incriminate oneself are generally recognized international standards which lie at the heart of a fair procedure under Article 6.”¹⁴³ As always, it will depend on the nature of the technology involved; however, it is foreseeable that certain brain-machine interfaces and implants (such as ocular implants) may impact on this right for military personnel. For example, if an ocular implant is recording and transmitting everything that a soldier sees, a question arises over whether this will impact the privilege against self-incrimination in any subsequent proceeding regarding incidents portrayed in the footage. Generally speaking, the privilege against self-incrimination can operate to prevent the use of compelled information in subsequent criminal proceedings.¹⁴⁴ Objective evidence such as video footage (for example, from a helmet or body camera) does not fall within this right, as it is not communicative evidence and can be compelled to be provided by the user for a legitimate purpose. Arguably, however, one might draw a distinction between those implants that require some form of cognitive processing of the data by the individual and those which are merely a direct video feed and operate in much the same way as a helmet camera.

More traditional protections of this right, namely against the use of more directly coercive practices by the government to extract self-incriminatory evidence, will also adapt to the new technologies involved. Evidence obtained through the use of biochemical enhancers, such as oxytocin and other chemicals intended to make detainees more cooperative, will raise the same legal issues from a human rights perspective as the use

142. *See, e.g.*, *K v. Austria*, App. No. 16002/90, (ECtHR), <http://hudoc.echr.coe.int/eng?i=001-57830> (noting the ECHR’s right against self-incrimination).

143. *Heaney and McGuinness v. Ireland*, 2000-XII Eur. Ct. H.R. 419, ¶ 40.

144. Note that the exercise of this privilege differs across jurisdictions. In respect of the ICC, see Rome Statute of the International Criminal Court arts. 67(1)(g), 69(7), July 17, 1998, 2187 U.N.T.S. 90. For an account of the English domestic legal tradition, see PAUL ROBERTS & ADRIAN ZUCKERMAN, *CRIMINAL EVIDENCE* ch. 4 (2004).

of truth serums has in the past.¹⁴⁵ They are also likely to be open to the same criticisms, i.e., they make a person more susceptible to outside suggestion, thereby increasing the likelihood that the person would recall false memories and thus falsely incriminate themselves (or others). Use of biochemical enhancers would be specifically prohibited by the fundamental rights and freedoms contained in the Swedish Instrument of Government, which specifically provides protection against any “medical influence aimed at extorting or suppressing statements.”¹⁴⁶ While the Swedish approach is generally considered to be reflective of customary law,¹⁴⁷ it is interesting to note that in March, 2013, a judge in the United States approved the use of “truth serum” on James Holmes, the defendant in the Aurora, Colorado mass shooting incident.¹⁴⁸

Other enhancements which affect memory recall will also create issues for fair trial rights. For example, research is ongoing into the use of beta-blockers and other pharmaceuticals to reduce the impact of traumatic memory formation.¹⁴⁹ Other proof-of-concept research is currently being carried out involving the manipulation of mouse memories to add emotional content.¹⁵⁰ Both projects have potential military application in the

145. See, e.g., John M. MacDonald, *Truth Serum*, 46 JOURNAL OF CRIMINAL LAW, CRIMINOLOGY, AND POLICE SCIENCE 259 (1955) (on the effectiveness of “truth” serums generally); *The Legal Prohibition against Torture*, HRW (last updated June 1, 2004), <https://www.hrw.org/news/2003/03/11/legal-prohibition-against-torture#serums>. See generally *Jaliloh v. Germany*, 2006-IX Eur. Ct. H. R. 281, ¶¶ 103–23 (ruling that the use of a drug to compel evidence—in this case an emetic—violated the right to a fair trial).

146. REGERINGSFORMEN [RF] [CONSTITUTION] 2, 5 (Swed.), reprinted in *The Instrument of Government*, SVERIGES RIKSSDAG, <https://www.riksdagen.se/en/How-the-Riksdag-works/Democracy/The-Constitution/The-Instrument-of-Government/> (then follow “The Instrument of Government” hyperlink) (last visited Feb. 10, 2016).

147. See, e.g., the broad wording of Article 55(1)(b) of the Rome Statute, which is considered reflective of customary international law and provides that a person “shall not be subjected to *any form* of coercion, duress or threat, to torture or to any other form of cruel, inhuman or degrading treatment or punishment” (emphasis added).

148. Ed Pilkington, *Judge Approves Use of “Truth Serum” on Accused Aurora Shooter James Holmes*, THE GUARDIAN (Mar. 12, 2013), <http://www.theguardian.com/world/2013/mar/12/judge-approves-truth-serum-james-holmes>. Truth serum was approved for the purposes of determining the insanity or otherwise of the accused in the event that he claimed an insanity defense.

149. Jim Giles, *Beta-blockers Tackle Memories of Horror*, NATURE, 436, 448–49 (28 July 2005).

150. Nick Bilton, *Computer-Brain Interfaces Making Big Leaps*, NEW YORK TIMES, Aug. 4, 2013, at B4, <http://bits.blogs.nytimes.com/2013/08/04/disruptions-rather-than-time-co>

reduction of incidents of post-traumatic stress disorder in military personnel returning from combat tours. However, the fact that a soldier has undergone any form of memory manipulation will create doubt as to their reliability as a witness, either in their own defense or against another in a court action.

V. HUMAN RIGHTS ASPECTS OF REINTEGRATING ENHANCED SOLDIERS INTO CIVILIAN SOCIETY

Once enhanced soldiers have completed their service and seek to return to civilian life, attention will have to be given to both the rights of the soldiers returning and to the wider societal impact of the presence of enhanced veterans in the population.

A. *Removal of Enhancements*

One of the major issues to be addressed will be what happens to the enhancements of enhanced soldiers once they leave the armed forces. Lin and his co-authors have raised the question of whether soldiers should be required to have any enhancements removed before integration back into civilian society so as not to give enhanced personnel an unfair advantage in the civilian workplace.¹⁵¹ However, the legal situation regarding removal of enhancements is far from certain. For example, the ownership of medical devices (and even of the data received from them) differs across jurisdictions. From an ownership perspective, there may be a difference between implantable technology and prosthetics (albeit intimately connected ones). While some technologies may rightly be considered materiel of the armed forces and be required to be relinquished on exit from the armed forces—perhaps to be replaced by a more civilian-appropriate version, for example, in the case of a forearm prosthesis—other technologies may more properly be viewed as having become the property of the individual soldier.¹⁵²

mputers-might-become-panacea-to-hurt/ (reporting that the scientists were able to add negative emotion to a neutral memory and make a mouse believe that it had been given an electric shock at a different location from that where the shock had actually occurred).

151. LIN, MEHLMAN & ABNEY, *supra* note 22, at 71. This issue is discussed in more detail in Section V.B *infra*.

152. To take a current example, pacemakers and implantable defibrillators become the property of the patient.

Careful research will be required to establish the physiological effects of the removal of any enhancements embedded within the body. For example, any cybernetic or brain-machine interface implanted in the brain may disrupt the normal functioning of neural pathways as the brain adapts to the new technology.¹⁵³ It is possible that subsequent removal of the implant may cause neurological damage if the brain is unable to reestablish its previous pathways or otherwise compensate for the loss of the technology. Thus, the removal of the enhancement could potentially violate the soldier's rights to bodily integrity and an adequate standard of healthcare,¹⁵⁴ or in severe cases amount to inhuman or degrading treatment.

In addition to any physiological harm, close attention must also be paid to the psychological effects of removing enhancements. Depending on the type of enhancement and the length of time the soldier has been using it, enhanced abilities may become part of the soldier's personal identity such that removal of them would be unduly traumatic. Any removal may impact the rights to bodily integrity and privacy (in respect of the soldier's psychological identity), and in some cases cruel, inhuman or degrading treatment. Thus, care must be taken even when replacing a militarily-optimized enhancement for a more civilian-appropriate one to ensure similar functionality is provided. For example, a cutting-edge, mind-controlled forearm prosthetic, which has the ability to relate sensation back to the brain, should not be replaced with an inert mechanical claw.

B. Societal Rights and Discrimination

The concern about the impact of reintegrating military veterans into civilian society extends also to their treatment by mainstream society. If enhanced veterans were to present a significant threat to unenhanced workers in terms, for example, of lost job opportunities, the societal tendency to

153. Functional plasticity, that is the brain's (limited) ability to adapt and form new neural pathways, is well documented, particularly in instances of traumatic stress. Given that members of the armed forces are routinely deployed into situations which expose them to high levels of traumatic stress, this is of increased importance to military patients.

154. UDHR, *supra* note 69, art. 25; ICESCR, *supra* note 69, art. 12. *See also* European Social Charter art. 13(1), Feb. 26, 1965, 529 U.N.T.S. 89 (ensuring a right to healthcare). Healthcare is understood to include the preservation of mental and physical health through medical services. *See also* DIRECTORATE GENERAL OF HUMAN RIGHTS AND LEGAL AFFAIRS, COUNCIL OF EUROPE, HUMAN RIGHTS OF MEMBERS OF THE ARMED FORCES 61, CM/Rec, at 4 (2010).

discriminate against perceived outsiders is likely to emerge. Of course, such a reaction will be based in part on the level of penetration of the particular technology from the military into the civilian society; those enhancements which began as civilian technologies and were subsequently adopted by the military may be better accepted.

States have a duty to secure to their citizens (including members of the armed forces) their rights and freedoms without discrimination. For example, the UDHR provides for “equal protection against any discrimination in violation of this Declaration.”¹⁵⁵ Article 26 of the ICCPR provides, “the law shall prohibit any discrimination and guarantee to all persons equal and effective protection against discrimination on any ground such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status.” The ECHR contains almost identical wording with the addition of “association with a national minority” as a protected class.¹⁵⁶ The ACHR refers to “other social condition” rather than status.¹⁵⁷

Discriminating against an enhanced veteran would not necessarily constitute prohibited grounds for discrimination under any of the applicable human rights instruments. However, while enhancement does not fall within any of the named categories, none of the lists of grounds for discrimination in the conventions are exhaustive.¹⁵⁸ In *Kjeldsen, Busk Madsen and Pedersen v. Denmark* the ECtHR suggested that “status” referred to “a personal characteristic by which persons or groups of persons are distinguishable from each other.”¹⁵⁹ Although it may be dependent on the particular technology involved, enhancements may well come within that definition and fall into the “or other status” category set out in the conventions. It should

155. UDHR, *supra* note 69, art. 7. *See also* Protocol No. 12 to the Convention for the Protection of Human Rights and Fundamental Freedoms art. 1, Nov. 4, 2000, E.T.S. No. 177 (creating a “free-standing” non-discrimination provision).

156. ECHR, *supra* note 71, art. 14.

157. ACHR, *supra* note 70, art. 1(1).

158. *See, e.g.*, Committee on Economic, Social and Cultural Rights, General Comment No. 20: Non-Discrimination in Economic, Social and Cultural Rights (art. 2, para. 2, of the International Covenant on Economic, Social and Cultural Rights), U.N. Doc. E/C.12/GC/20, ¶¶ 15, 20–35 (July 2, 2009) (discussing the need for a flexible approach to “other status” and further examples of prohibited grounds of discrimination including, *inter alia*, disability, nationality, age and health status).

159. *Kjeldsen, Busk Madsen and Pedersen v. Denmark*, 23 Eur. Ct. H.R. (ser. A) at 24–25, ¶ 56 (1976).

be noted that the principle of non-discrimination is not an absolute right. For example, it will not be violated if the distinction between individuals in analogous situations has an objective and reasonable justification, which must be assessed in relation to the aim and effects of the measures taken.¹⁶⁰ The aim must be legitimate and the measures proportionate to that aim. Thus, for example, a person denied employment because of an optical implant capable of image recording may not have a claim he or she has been discriminated against if the job involves working with sensitive or classified information. Preventing the risk that the implant may provide access to information to third parties is likely to be considered a legitimate objective and the decision to employ a person without such an enhancement is likely to be considered an appropriate and proportionate solution.

VI. ACCOUNTABILITY AND INDIVIDUAL CRIMINAL RESPONSIBILITY

A. State Responsibility

A State considering the use of enhanced soldiers must also consider its responsibility for the acts of its organs under the doctrine of State responsibility.¹⁶¹ The State remains responsible for acts carried out by State organs (including individuals) in their official capacity regardless of whether that State organ was acting *ultra vires* or contrary to instructions, or if the State knew of its actions.¹⁶² The same rules apply to persons and entities that are empowered to exercise elements of governmental authority, but who are not State organs (for example, State contractors, such as prison guards, who are engaged to provide services).¹⁶³

160. HUMAN RIGHTS OF MEMBERS OF THE ARMED FORCES, *supra* note 154.

161. While this article deals primarily with the impact of enhancement of the armed forces, the issues addressed apply equally to members of the intelligence services and other State organs. To cite a fictional example, the main characters in the Bourne series of movies (played by Matt Damon & Jeremy Renner) featuring enhanced individuals have both worked in different programs run by the intelligence services of the United States.

162. Draft Articles on Responsibility of States for Internationally Wrongful Acts art. 7, Report of the International Law Commission, 53d Sess., Apr. 23–June 1, July 2–Aug. 10, 2001, U.N. Doc. A/56/10, GAOR 56th Sess., Supp. No. 10 (2001), *reprinted in* [2001] 2 YEARBOOK OF THE INTERNATIONAL LAW COMMISSION 32, U.N. Doc. A/CN.4/SER.A/2001/Add.1 (Part 2).

163. *Id.*, arts. 5, 7.

The rules of State responsibility deal with the responsibility of States for internationally wrongful acts attributable to them. It thus involves two elements: first, that the act is attributable to the State and, second, that the act constitutes a breach of an international obligation of the State.¹⁶⁴ Human enhancement technologies may play a role in determining whether or not this obligation has been breached. That is, an illegal act committed by an enhanced soldier might not be an internationally wrongful act because of the circumstances of his or her enhancement.

As a matter of general public international law, the law of State responsibility does not concern itself with subjective criteria such as the mental element, but is premised on the idea of objective liability.¹⁶⁵ It is the act or omission of the State which matters, regardless of any intent or fault. However, whether or not there has been a breach of a primary rule may depend on the intention or knowledge of the relevant State organs or agents.¹⁶⁶ For example, the crime of genocide requires the specified acts to be committed with the intent to destroy, in whole or in part, a particular group.¹⁶⁷ If the enhancement technology under consideration has destroyed the individuals' capacity to form the requisite intent,¹⁶⁸ it will not be possible to establish that the breach of an international obligation by the State has occurred.¹⁶⁹

Likewise with primary obligations containing a knowledge requirement; in the *Corfu Channel* case, Albania was held responsible to the United Kingdom for damage to two Royal Navy warships which struck mines laid in its territorial waters, because it knew or ought to have known of the mines' presence and failed to warn other States.¹⁷⁰ When dealing with the subject

164. *Id.*, art. 2.

165. See generally JAMES CRAWFORD, STATE RESPONSIBILITY: THE GENERAL PART 60–61 (2013).

166. JAMES CRAWFORD, THE INTERNATIONAL LAW COMMISSION'S ARTICLES ON STATE RESPONSIBILITY: INTRODUCTION, TEXT, AND COMMENTARIES 81–82 (2002).

167. Convention on the Prevention and Punishment of the Crime of Genocide art. 2, Dec. 9, 1948, 102 Stat. 3045, 78 U.N.T.S. 277.

168. See Section VI.B *infra* for a discussion of individual responsibility.

169. On the question of the need, or lack thereof, to attribute intent in the context of State responsibility for genocide, see Marko Milanovic, *State Responsibility for Genocide*, 17 EUROPEAN JOURNAL OF INTERNATIONAL LAW 553, 553–604, 567–69 (2006); Andre Nollkaemper, *Concurrence between Individual Responsibility and State Responsibility in International Law*, 52 INTERNATIONAL AND COMPARATIVE LAW QUARTERLY 615, 633 (2003).

170. *Corfu Channel* (U.K. v. Alb.), Judgment, 1949 I.C.J. 4 (Apr. 9).

of human enhancement, and particularly with cybernetics, it must be asked what it means to know something.

Similar questions arise with a State that provides aid or assistance or direction and control in the commission of an internationally wrongful act by another State.¹⁷¹ For the providing State to be held responsible, the aid, assistance, direction or control must be provided with knowledge of the unlawfulness of the subsequent act by the second State. For example, in the Bosnian *Genocide* case, the ICJ found that while there was little doubt that the atrocities committed in Srebrenica were committed with resources possessed as a result of the “general policy of aid and assistance” by Serbia and Montenegro, it was not established that Serbia was aware that the “perpetrators had the specific intent characterizing genocide.”¹⁷² The standard required by Article 16 (with respect to aiding and assisting) of the Draft Articles on State Responsibility of States is that the assisting State had specific knowledge, crucially, of an internationally wrongful act with a high degree of particularity,¹⁷³ and that it intended to facilitate the wrongful conduct through its aid or assistance. Therefore, if a State supplies enhancement technologies to another State for the purposes of enhancing their armed forces in such a manner that renders the soldiers incapable of determining the wrongfulness of their conduct, any subsequent breach of an international obligation by the receiving State would not engage the responsibility of the assisting State unless at the time the assistance was provided it had specific knowledge of the particular abuses or wrongful acts that would be committed.

B. Individual Responsibility

Questions of responsibility and autonomy may also be asked at the individual level. For example, if a soldier’s fear or remorse for their past actions is removed or diminished through pharmacological enhancement, what does that mean for the autonomy of the individual combatant? An essential

171. See Draft Articles on Responsibility of States, *supra* note 141, arts. 16, 17.

172. Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosn. & Herz. v. Serb. and Montenegro), Judgment, 2007 I.C.J. 43, ¶ 422 (Feb. 26).

173. *Id.* ¶¶ 423–24. See also Christian Dominicé, *Attribution of Conduct to Multiple States and the Implication of a State in the Act of Another State*, in THE LAW OF INTERNATIONAL RESPONSIBILITY 286 (James Crawford, Alain Pellet & Simon Olleson eds., 2010).

and related question is how does that impact the individual's responsibility for any breaches of the law of armed conflict on the battlefield while so enhanced?

1. Free Will

At the extreme end of enhancement technology lays the risk that certain enhancements could interfere with the free will of the individual being enhanced. Such a determination would interfere with the individual's capacity to form the *mens rea* necessary to be held responsible for his or her actions under international criminal law. Article 30 of the Rome Statute of the International Criminal Court (ICC) sets out the customary law standard for the mental element required when no specific rules regulate the *mens rea*,¹⁷⁴ indicating a person will only be held criminally liable for their acts where they are committed with intent and knowledge. The intent requirement can be divided into two parts. First, the person must intend to perform the specific act, i.e., they "mean to engage in the conduct" described in the crime.¹⁷⁵ Second, if the definition of the crime requires that a particular consequence results from the act (for example, the death of a person), the perpetrator must either "mean to cause that consequence" or at least be "aware that it will occur in the ordinary course of events."¹⁷⁶

The use of human enhancement technologies may affect these requirements in a number of ways. For example, where prosthetics are controlled by cybernetic implants, such as an advanced military exoskeleton, the implant may be subject to interference either by the soldier's State or through a third party hacking the device. This would provide a defense similar to that of automatism, which occurs when the person involved proves it was an involuntary action over which he or she had no control.¹⁷⁷

It is not just the control of prosthetics which may be compromised. Research conducted at the University of Washington on human-to-human interfaces enabled a researcher to control the hand movements of a col-

174. Rome Statute, *supra* note 143, art. 30. *See also* GERHARD WERLE, PRINCIPLES OF INTERNATIONAL CRIMINAL LAW 104–6 (2d ed. 2005).

175. Rome Statute, *supra* note 143.

176. *Id.*

177. *See generally* WERLE, *supra* note 153, at 105 (noting that automatism prevents criminal responsibility for crimes under international law).

league across campus.¹⁷⁸ As the experiment routed the control commands via the Internet, the controlled subject could have been geographically situated anywhere in the world, including a war zone. Control over the finger by the researcher involved in the study might equally be control over a soldier's finger on a weapon's triggering mechanism. This would negate the intention of the soldier not to perform the specific act, provided the will of the controller to move the finger can overrule the will of the soldier not to move it.

Likewise, moral enhancement, even if done for allegedly virtuous purposes, may well be seen as interfering with the free will of an individual to make their own choice by making the thought of acting in a contrary manner to what has been determined to be moral repugnant to them. The potential for abuse is obvious. Whether or not military personnel who have undergone such enhancement remain individually responsible for their actions will necessarily need to be determined on the basis of the enhancement technology and its capacity to interfere with their capability to appreciate the unlawfulness of their actions. In the case of specific instances of interference, forensic psychologists who deal with matters of free will in criminal cases not involving enhancements will need to be augmented by those with particular knowledge of the technologies concerned.

It is possible that enhancement technology may also impact on the knowledge requirement of individual responsibility. Where a crime requires the existence of certain circumstances, it is normally sufficient in establishing liability to prove that the perpetrator was aware that those circumstances existed.¹⁷⁹ For example, attacking a person in the knowledge that they are *hors de combat* requires merely an awareness of that person's inability to continue to participate in combat, rather than a correct legal assessment of their legal status. Where a crime requires knowledge of a descriptive material fact, sensory perception is all that is required. Naturally, enhancement techniques may either enhance or filter sensory perception, and will thus need to be taken into account when determining the individual's knowledge of the material facts, particularly where the relevant enhancement allows the user to interface directly with vast amounts of raw data.

178. Doree Armstrong & Michelle Ma, *Researcher Controls Colleague's Motions in 1st Human Brain-to-Brain Interface*, UW TODAY (Aug. 27, 2013), <http://www.washington.edu/news/2013/08/27/researcher-controls-colleagues-motions-in-1st-human-brain-to-brain-interface/>.

179. Rome Statute, *supra* note 143, art. 30. *See also* WERLE, *supra* note 153, at 105.

Where the material fact in question is normative in nature, i.e., it requires a value judgment, it is sufficient if the perpetrator knows the fundamental factual circumstances and comprehends the significance or social relevance of the incriminating conduct.¹⁸⁰ It is possible that enhancement technologies such as moral enhancement may interfere with the ability of the individual to comprehend the social relevance of the facts; however, it seems likely that any such enhancement technique would be banned for that very reason before ever being fielded.

One final point to note is that many crimes contain a required specific mental element. For example, “*intentionally* directing attacks against the civilian population,”¹⁸¹ “*willful* killing,”¹⁸² and “*willfully* causing great suffering”¹⁸³ under the Rome Statute. Likewise, its Elements of Crimes contain references to the mental element such as “*knew* or should have known”¹⁸⁴ and “was *aware of*,”¹⁸⁵ *inter alia*, which may be affected by the use of human enhancement technologies. Each of these mental elements will need to be assessed on a case-by-case basis in light of the impact of the particular technology on the individual’s ability to meet those requirements.

2. Excused and Diminished Responsibility

The Rome Statute excludes a defendant from criminal responsibility where that person suffers from a “mental defect” or “was in a state of intoxication that destroys that person’s capacity to appreciate the unlawfulness or nature of his or her conduct, or to control his or her conduct to conform to the requirements of the law.”¹⁸⁶ The intoxication defense does not pre-

180. For example, those elements of crime involving value judgements such as “inhumane” or “severe.” See WERLE, *supra* note 153, at 105–6; COMMENTARY ON THE ROME STATUTE OF THE INTERNATIONAL CRIMINAL COURT 902 (Otto Triffterer ed., 2d ed. 2008).

181. Rome Statute, *supra* note 143, art. 8(2)(b)(i) (emphasis added).

182. *Id.*, art. 8(2)(a)(i) (emphasis added).

183. *Id.*, art. 8(2)(a)(iii) (emphasis added).

184. International Criminal Court, Elements of Crimes art. 8(2)(b)(vii), U.N. Doc. PCNICC/2000/1/Add.2 (Nov. 2, 2000) (emphasis added).

185. *Id.*, art. 7(1)(e) (emphasis added). See WERLE, *supra* note 153, at 106–9.

186. Rome Statute, *supra* note 143, art. 31(1)(b) (But excepting situations when “the person has become voluntarily intoxicated under such circumstances that the person knew, or disregarded the risk, that, as a result of the intoxication, he or she was likely to engage in conduct constituting a crime within the jurisdiction of the Court.”).

suppose a specific substance (for example, both drink and drugs are covered); however, it is intended to apply only to external substances introduced into the body.¹⁸⁷ The use of pharmaceutical enhancements may fall within this category, as by analogy may other enhancements such as brain-machine interfaces where they have the same effect as that necessary for a mental defect or intoxication to provide a defense to a criminal charge. However, any enhancement which acts on the body's own functions, for example by adjusting body chemistry or genetics to create an ability within an individual to trigger increased levels of adrenaline or other neurochemicals at a later time, would not give rise to the defense of intoxication as the intoxicating agent would be a naturally formed (endogenic) substance.¹⁸⁸

The defense of intoxication is not available in circumstances where the individual was voluntarily intoxicated when they either knew or disregarded the risk that they would likely engage in conduct constituting a crime.¹⁸⁹ There is a very real question to be considered on whether the taking of an enhancement drug which can mean success or failure of the mission—and in some cases literally the difference between life and death—can ever be considered truly voluntary in a hierarchical military system. This echoes the arguments about true informed consent in the military setting.¹⁹⁰ There is certainly evidence of the pressure on U.S. troops to take drugs (both for performance enhancement in the case of Air Force pilots and prophylactically in the case of anthrax vaccines for ground troops in Iraq), indicating that the voluntary nature of such enhancements could be called into question.¹⁹¹ Even if the defense is available, then clearly the question of whether

187. COMMENTARY ON THE ROME STATUTE, *supra* note 159, at 876–77.

188. *Id.* For an historical example, see the Viking berserker's legendary fighting frenzy which appeared to leave them impervious to pain and with heightened physical ability on the battlefield. There are different theories about its origins. Ingestion of fly agaric mushrooms or the bog myrtle plant would speak to the availability of the intoxication defense (albeit negated by its voluntary consumption), however, a self-induced frenzy or hysteria (another of the theories) would not.

189. Rome Statute, *supra* note 175, art. 31(1)(b).

190. Not only are the stakes much higher in terms of mission success, but the lives at stake are not only those of the individuals taking the drugs. LIN, MEHLMAN & ABNEY, *supra* note 22; Michael L. Gross, *Military Medical Ethics: A Review of the Literature and a Call to Arms*, 22 CAMBRIDGE QUARTERLY OF HEALTHCARE ETHICS 92 (2013).

191. The consent form for U.S. Air Force pilots using dexedrine states that pilots may be grounded for “safety reasons” in the event that they refuse to carry the pills. See *supra* note 106 and accompanying text. The two pilots in the Tarnak farms incident also stated

the enhancement (whether pharmaceutical, implant or otherwise) affected the soldiers capacity or control to a sufficient degree such as to relieve them of criminal responsibility is a factual question that would have to be assessed on a case-by-case basis depending on the particular enhancement involved and the individual's reaction to it.

In either event, it is not sufficient that the defect or intoxication merely diminishes the person's capacity of appreciation or control; it must destroy the person's ability to realize that he or she is acting unlawfully or, if the person is aware of the unlawfulness of the conduct, lacks the ability to control it according to the requirements of the law.¹⁹²

A more likely outcome in criminal trials where the use of enhancement technology by military personnel is implicated is the argument that the use of the enhancement diminishes, rather than negates, the responsibility of the personnel involved. The "special defense" of diminished responsibility is provided for in the Rules of Procedure and Evidence of the ICC,¹⁹³ and the rules of both the International Criminal Tribunal for the former Yugoslavia (ICTY) and the International Criminal Tribunal for Rwanda (ICTR).¹⁹⁴ It provides for a plea of "substantially diminished mental capacity" as a mitigating circumstance in determining a sentence. As the ICTY Appeals Chamber in *Čelebići* noted, unlike the insanity defense that requires destruction of the defendant's mental capacity, the mere impairment of

that they felt pressure to take the pills, citing fear that they would be "scrubbed from the mission" if they did not do so. Shanker & Duenwald, *supra* note 90.

192. COMMENTARY ON THE ROME STATUTE, *supra* note 159, at 547.

193. International Criminal Court, Rules of Procedure and Evidence r. 145(2), ICC-ASP/1/3 (part II-A) (2002) ("In addition to the factors mentioned above, the Court shall take into account, as appropriate: (a) Mitigating circumstances such as: (i) The circumstances falling short of constituting grounds for exclusion of criminal responsibility, such as substantially diminished mental capacity or duress . . ."). *See also* Rome Statute, *supra* note 175, art. 78(1).

194. Rule 67(a)(ii)(b) of the rules of procedure and evidence for both the ICTY and ICTR provide, "Within the time-limit prescribed by the Trial Chamber or by the pre-trial Judge appointed pursuant to Rule 65 *ter*: (i) the defence shall notify the Prosecutor of its intent to offer: (b) any special defence, including that of diminished or lack of mental responsibility." *See* respectively International Tribunal for the Prosecutions of Persons Responsible for Serious Violations of International Humanitarian Law Committed in the Territory of the Former Yugoslavia, Rules of Procedure and Evidence, U.N. Doc. IT/32/Rev. 50 (July 8, 2015) (as amended, originally adopted Feb 11, 1994); International Criminal Tribunal for Rwanda, Rules of Procedure and Evidence, (May 13, 2015) (as amended, originally adopted June 29, 1995).

that capacity does not provide a complete defense to the charge leading to an acquittal.¹⁹⁵

VII. CONCLUSION

Human enhancement techniques offer a tantalizing prospect for counteracting human frailty on the battlefield. For example, soldiers who need less sleep, can see clearly in the dark without bulky headwear or can run over rocky terrain for miles without getting fatigued, all offer measurable military advantages for the fighting force. However, the utilization of the more ambitious of these technologies also risks removing one of the real strengths of armed forces personnel—their humanity. The law of armed conflict allows soldiers to kill an enemy at one moment and obliges them to offer compassion and humane treatment in the next when that same enemy is not killed but is wounded or captured. Technologies which interfere with the ability to make that switch must be treated cautiously, taking into regard all the possible ramifications of their use. At the same time, there are not only risks associated with human enhancement techniques as far as compliance with the law of armed conflict is concerned, but also potential benefits. Techniques that would allow for the suppression or control of sentiments such as fear and revenge may also promote compliance. As with many other military technologies, the implications of human enhancement techniques for the law of armed conflict are not inherent in the development and fielding of the technology itself, but rather will depend on how they are designed and used. An equally serious legal issue to consider is that of the human rights implications of enhancement techniques for soldiers who are required or requested to undergo such enhancement, not only during their service in the armed forces, but also in their reintegration into society as they return to civilian life.

195. *Prosecutor v Delalić et al.*, (“Čelebići Case”), Case No. IT-96-21-A, Appeal Judgement, ¶ 590 (Int’l Crim. Trib. for the former Yugoslavia Feb. 20, 2001).