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### Are Enhanced Warfighters Weapons, Means, or Methods of Warfare?

*Rain Liivoja and Luke Chircop*

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## I. INTRODUCTION

Armed forces have an understandable interest in improving the physical and cognitive performance of warfighters. Throughout the history of warfare, militaries have achieved this aim with training and equipment. But advances in science and technology have opened the possibility of improving the capabilities of warfighters directly through biomedical interventions, such as the administration of drugs, the implantation of devices, or the magnetic stimulation of the brain.

The question arises, however, whether biomedical human enhancement, when undertaken in the armed forces, entails some “thingification” of warfighters whereby they become mere resources or instruments of warfare to be upgraded like some computer processor. At bottom, this is a philosophical or anthropological problem. One anthropologist, who has studied the U.S. military’s extensive battle against the ill effects of sleep deprivation, suggests that the “perverse” shift from the word “soldier” to “warfighter” in this context is itself an indication of dehumanization.<sup>1</sup> He finds that for the soldiers of the future, “there will no longer be a need for the auxiliary social aspects of soldiering, only the brute force of war itself.”<sup>2</sup> Of course, there are less sinister explanations for preferring the word warfighter: it is a neutral term that covers soldiers, sailors, marines, and airmen/airwomen—and avoids the specific legal connotations of the term “combatant.”<sup>3</sup> That said, we do not dispute that human enhancement can blur the thus far reasonably clear line between warfighters and military technology.

Terminology aside, perhaps a more pertinent question is whether the human body, or some body part, could be a weapon for legal purposes. This question is not as outlandish as it might initially seem. Courts in the United States, for example, have frequently been called upon to determine whether

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1. MATTHEW J. WOLF-MEYER, *THE SLUMBERING MASSES: SLEEP, MEDICINE, AND MODERN AMERICAN LIFE* 228 (2012).

2. *Id.*

3. Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts art. 43(2), June 8, 1977, 1125 U.N.T.S. 3 [hereinafter Additional Protocol I] (“Members of the armed forces of a Party to a conflict (other than medical personnel and chaplains covered by Article 33 of the Third [Geneva] Convention) are combatants, that is to say, they have the right to participate directly in hostilities.”).

fists or teeth might constitute weapons.<sup>4</sup> The significance of this question lies in the fact that in many jurisdictions brandishing a deadly or dangerous weapon while engaged in an assault aggravates the offense.

The gradation between the severity of acts of violence that criminal law seeks to establish is largely irrelevant for the law of armed conflict as this body of law tolerates a range of violent acts against lawful military objectives. However, whether something (or someone) is a weapon has import for other reasons. First, the law of armed conflict prohibits weapons that cannot be used in a manner consistent with the law, in particular weapons that are inherently indiscriminate<sup>5</sup> or of a nature to cause superfluous injury.<sup>6</sup> Second, international law further prohibits the use, retention, and acquisition of particular categories of weapons, such as biological weapons<sup>7</sup> and chemical weapons.<sup>8</sup> Third, Additional Protocol I imposes an obligation on its parties to review all new weapons for compliance with the law.<sup>9</sup>

The problem of whether biomedically tweaking the human body turns a person into a weapon has been raised in academic literature, but it has been

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4. *See, e.g.*, *People v. Pennese*, 830 P.2d 1085 (Colo. App. 1991) (finding that in some circumstances, fists may be considered a deadly weapon); *In re D.T.*, 977 A.2d 346 (App. D.C. 2009) (holding that teeth can constitute a deadly or dangerous weapon if used in a manner likely to cause death or great bodily injury); *People v. Van Diver*, 263 N.W.2d 370, 372–73 (Mich. Ct. App. 1977) (finding that the term “dangerous weapon” cannot be construed to include the bare hand); *McMillian v. State*, 58 So. 3d 849, 853 (Ala. Crim. App. 2010) (holding that the use of teeth to cause serious injury does not, “without more,” constitute the use of a deadly weapon). For a more extensive overview and discussion, see Michael R. Romeo, *A Puncher’s Chance: Assessing the Classification of Martial Artists’ Hands as Deadly Weapons*, 24 JEFFREY S. MOORAD SPORTS LAW JOURNAL 23 (2017).

5. Additional Protocol I, *supra* note 3, art. 52(4)(b).

6. Convention No. IV Respecting the Laws and Customs of War on Land and Its Annex: Regulations Concerning the Laws and Customs of War on Land art. 23(e), Oct. 18, 1907, 36 Stat. 2227, T.S. No. 539; Additional Protocol I, *supra* note 3, art. 35(2). States parties to Additional Protocol I are also prohibited from using weapons that cause environmental damage above a certain threshold. *Id.* art. 35(3).

7. Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Apr. 10, 1972, 26 U.S.T. 583, 1015 U.N.T.S. 163 [hereinafter BWC].

8. 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 [hereinafter CWC].

9. Additional Protocol I, *supra* note 3, art. 36.

discussed superficially and with contradictory results.<sup>10</sup> In this article, we undertake a more in-depth inquiry. However, such an inquiry cannot be strictly limited to weapons. In many respects, the law of armed conflict places the same restrictions on the use and choice of weapons as it does on the use and choice of means and methods of warfare, thus largely regulating means and methods of warfare identically to weapons.<sup>11</sup> In some instances, the law treats weapons as a category of means of warfare, such as when Additional Protocol I requires belligerents to choose means and methods of warfare to avoid or minimize collateral damage.<sup>12</sup> We therefore consider whether enhanced warfighters, the enhancements themselves, or the reliance upon them, could be deemed weapons (Part III), means of warfare (Part IV), or methods of warfare (Part V). Before that analysis, we address the more specific proposition that enhanced warfighters constitute biological weapons (Part II).

## II. BIOLOGICAL WEAPONS

In 2013, Patrick Lin, Max Mehlman, and Keith Abney published a report that provided the first comprehensive overview of the prospects of human enhancement in the armed forces, along with an analysis of the ethical and legal issues involved.<sup>13</sup> Among other things, they argued that bioenhanced

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10. Compare PATRICK LIN, MAXWELL J. MEHLMAN & KEITH ABNEY, ENHANCED WARFIGHTERS: RISK, ETHICS, AND POLICY 28–35 (2013) (arguing that “in a broader sense, the warfighter is not only a weapon but perhaps a military’s best and oldest weapon”) to Heather A. Harrison Dinniss & Jann K. Kleffner, *Soldier 2.0: Military Human Enhancement and International Law*, 92 INTERNATIONAL LAW STUDIES 432, 436–39 (2016) (arguing that “the enhanced human soldier, per se, is not to be considered a weapon”).

11. See especially Additional Protocol I, *supra* note 3, arts. 35, 36. But note that the language of Additional Protocol I is highly inconsistent. It uses “methods and means of warfare” in the title to Part III and in the Section I subheading within this Part, “methods or means of warfare” in Articles 35(1), 35(3), and 55(1), “weapons, projectiles and material and methods of warfare” in Article 35(2), “weapon, means or method of warfare” in Article 36, “a method or means of combat” in Article 51(4), “methods or means” in Article 51(5), and “means or methods of attack” in Article 57(2)(a)(ii). Nonetheless, weapons, means of warfare, and methods of warfare represent the three most commonly used categories. On this terminology, see Natalia Jevglevskaja, *States’ Weapons Review Obligations under Article 36 of the 1977 Additional Protocol I to the Geneva Conventions and Beyond*, ch. 4 (Aug. 2018) (unpublished Ph.D. dissertation, University of Melbourne) (on file with the authors).

12. Additional Protocol I, *supra* note 3, art. 57(2)(a)(ii).

13. LIN, MEHLMAN & ABNEY, *supra* note 10.

warfighters and some biological enhancements amount to weapons prohibited by the Biological Weapons Convention (BWC).<sup>14</sup> Lin went on to promote this view in an essay in the popular press.<sup>15</sup> Other pundits were quick to develop the argument further by suggesting that the use of enhanced warfighters amounts to a war crime.<sup>16</sup>

These are serious claims. The BWC is one of the most widely ratified arms control treaties in the world, with 181 States parties as of August 2018.<sup>17</sup> It comprehensively prohibits the development, production, stockpiling, acquisition, or retention of a particular class of weapons.<sup>18</sup> While the treaty does not expressly address the use of such weapons, States parties have formally recognized that the use of biological weapons would be contrary to its purpose.<sup>19</sup> There is no serious doubt that the ban on biological weapons forms part of customary international law.<sup>20</sup> Thus, accepting the arguments advanced by Lin and his colleagues would seriously limit the possibility of engaging in the enhancement of warfighters.

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14. *Id.* at 31–32.

15. Patrick Lin, *Could Human Enhancement Turn Soldiers into Weapons that Violate International Law? Yes*, THE ATLANTIC (Jan. 4, 2013), <http://www.theatlantic.com/technology/archive/2013/01/could-human-enhancement-turn-soldiers-into-weapons-that-violate-international-law-yes/266732/>.

16. George Dvorsky, *It Could Be a War Crime to Use Biologically Enhanced Soldiers*, IO9 (Jan. 22, 2013), <http://io9.com/5977986/would-it-be-a-war-crime-to-use-biologically-enhanced-soldiers>.

17. *Membership of the Biological Weapons Convention*, UNOG, [https://www.unog.ch/80256EE600585943/\(httpPages\)/7BE6CBBEA0477B52C12571860035FD5C?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/7BE6CBBEA0477B52C12571860035FD5C?OpenDocument) (last visited Aug. 28, 2018). Six states (most notably Syria and Egypt) have signed the treaty but not ratified it. Eleven states (most notably Israel) have not signed, ratified, or acceded to the treaty. *Id.*

18. BWC, *supra* note 7, art. I.

19. Fourth Review Conference of the Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Final Declaration, U.N. Doc. BWC/Conf.IV/9 (1996), at 15.

20. See International Committee of the Red Cross, *Practice Relating to Rule 73: Biological Weapons*, IHL DATABASE: CUSTOMARY IHL, [https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2\\_rul\\_rule73](https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2_rul_rule73) (last visited Aug. 28, 2018); Steven Haines, *Weapons, Means and Methods of Warfare*, in PERSPECTIVES ON THE ICRC STUDY ON CUSTOMARY INTERNATIONAL HUMANITARIAN LAW 258, 268 (Elizabeth Wilmshurst & Susan Breau eds., 2007).

*A. Defining Biological Agents*

Lin, Mehlman, and Abney rely on alleged uncertainties in the text of the BWC to advance their arguments. Article I, which establishes the principal obligation under the treaty, is particularly important regarding the authors' argument of textual uncertainty. In full, Article I states:

Each State Party to this Convention undertakes never in any circumstances to develop, produce, stockpile or otherwise acquire or retain:

1. microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes;
2. weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict.<sup>21</sup>

The main interpretational challenge (or opportunity) is the term biological agent, which the treaty leaves undefined. Lin and his colleagues acknowledge “[t]he usual assumption . . . that these ‘agents’ are both limited to roughly being microbial in size and to biological substances that are directed at adversaries, not directed to the enhancement of one’s own military personnel.”<sup>22</sup> However, they suggest that neither aspect of this assumption—the size and direction against adversaries—is “explicit enough” in the BWC, thus leaving the possibility of the BWC applying to enhancement technologies.<sup>23</sup> Following this logic, there are two ways in which the ban on biological weapons can become relevant to enhancement—either the enhanced warfighters themselves are biological agents or the enhancements used upon them are biological agents. We consider these options separately below.

*B. Enhanced Warfighters as Biological Agents*

Challenging the requirement that biological agents must be of microbial size creates an opening for arguing that humans might be included. Lin, Mehlman, and Abney suggest that the word biological is used in the BWC to distinguish the weapons covered by the treaty from weapons that have

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21. BWC, *supra* note 7, art. I.

22. LIN, MEHLMAN & ABNEY, *supra* note 10, at 31.

23. *Id.*

chemical or mechanical effects, and that the term agent can include a person.<sup>24</sup> We dispute neither of these claims taken individually. Rather, we reject the disintegration of the term biological agent. This phrase has a well-established meaning in the military context. For example, the *NATO Glossary of Terms and Definitions* defines a biological agent as a “micro-organism which causes disease in man, plants, or animals or causes the deterioration of materiel.”<sup>25</sup> Likewise, the U.S. Department of Defense’s *Dictionary of Military and Associated Terms* defines a biological agent as “[a] microorganism (or a toxin derived from it) that causes disease in personnel, plants, or animals or causes the deterioration of materiel.”<sup>26</sup> These definitions make clear that the phrase biological agent has an ordinary meaning, which is to be preferred pursuant to the general rule of treaty interpretation.<sup>27</sup> This ordinary meaning is restricted to microorganisms and toxins, and does not include humans or, for that matter, other macroorganisms.

A contextual reading also supports this interpretation. The preamble of the BWC refers to the “importance and urgency of eliminating from the arsenals of States, through effective measures, such dangerous weapons of mass destruction as those using chemical or bacteriological (biological) agents.”<sup>28</sup> In other words, the object and purpose of the treaty, which clearly emerges from the preamble, is the eradication of a particular class of weapons of mass destruction. Enhanced warfighters cannot easily be seen as weapons of mass destruction.

In this respect, Lin and his colleagues point out that the BWC also deals with toxins, which are not typical weapons of mass destruction in that they can be used quite discriminately;<sup>29</sup> thus the treaty has broader significance and should not be restricted to weapons of mass destruction. The inclusion of toxins in the BWC is slightly anomalous, but has a historical explanation.

24. *Id.*

25. North Atlantic Treaty Organization, AAP-06: Edition 2013, NATO Glossary of Terms and Definitions (English and French), at 2-B-4 (2013), [http://www.jcs.mil/Portals/36/Documents/Doctrine/Other\\_Pubs/aap6.pdf](http://www.jcs.mil/Portals/36/Documents/Doctrine/Other_Pubs/aap6.pdf).

26. U.S. Department of Defense, DOD Dictionary of Military and Associated Terms (as of March 2018), at 28, <http://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/dictionary.pdf>.

27. Vienna Convention on the Law of Treaties art. 31(1), May 22, 1969, 1155 U.N.T.S. 331 (“A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose.”).

28. BWC, *supra* note 7, pmbl., para. 7.

29. LIN, MEHLMAN & ABNEY, *supra* note 10, at 33.

The prohibition of toxins constitutes an aspect of the age-old prohibition of the use of poison in armed conflict. Toxins were defined in a 1969 expert report commissioned by the UN Secretary-General as “biologically produced chemical substances which are very highly toxic.”<sup>30</sup> Similarly, the U.S. defined toxins during the BWC negotiations as “poisonous substances produced by biological organisms, including microbes, animals, and plants.”<sup>31</sup> In short, a toxin is a biologically produced poison. Poison can be used in a highly discriminating fashion, in other words without endangering the civilian population, and its prohibition is likely associated with medieval conceptions of honorable warfare.<sup>32</sup> That said, poison also served as one of the first weapons of mass destruction, as examples of poisoning the water supply date back thousands of years.<sup>33</sup> Thus, the BWC reaffirms the preexisting prohibition of poisons of a biological origin (toxins) and extends that prohibition to the use of other biological matter as weapons of mass destruction. The prohibition of toxins should therefore be looked upon in its historical context and somewhat separately from the main purpose of the BWC.

If the textual and contextual reading of Article I of the BWC still leaves doubts as to its proper construction, the concern of the BWC specifically with microorganisms and toxins can be confirmed by reference to the preparatory materials of the treaty. A 1968 working paper tabled by the United Kingdom at the Eighteen-Nation Committee on Disarmament proposed a treaty to prohibit “microbiological methods of warfare.”<sup>34</sup> Likewise, the UN Secretary-General’s report explained that “[b]acteriological (biological) agents of warfare are living organisms, whatever their nature, or infective material derived from them, which are intended to cause disease or death in man, animals or plants, and which depend for their effects on their ability to

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30. U.N. Secretary-General, *Chemical and Bacteriological (Biological) Weapons and the Effects of Their Possible Use*, ¶ 44, U.N. Doc. A/7575/Rev.1–S/9292/Rev.1, U.N. Sales No. E.69.I.24 (1969).

31. United States of America, *Policy on Toxins: Working Paper Submitted to the Conference of the Committee on Disarmament*, ¶ 2, U.N. Doc. CCD/286 (Apr. 21, 1970).

32. See Rain Liivoja, *Chivalry without a Horse: Military Honour and the Modern Law of Armed Conflict*, in *THE LAW OF ARMED CONFLICT: HISTORICAL AND CONTEMPORARY PERSPECTIVES* 75, 84–85 (Rain Liivoja & Andres Saumets eds., 2011).

33. Harry Salem et al., *Chemical Warfare Agent Threat to Drinking Water*, in *CHEMICAL WARFARE AGENTS: CHEMISTRY, PHARMACOLOGY, TOXICOLOGY, AND THERAPEUTICS* 51 (James A. Romano, Jr., Brian Lukey & Harry Salem eds., 2d ed. 2007).

34. United Kingdom of Great Britain and Northern Ireland, *Working Paper on Microbiological Warfare* (Aug. 6, 1968), in *DISARMAMENT COMMISSION, OFFICIAL RECORDS SUPPLEMENT FOR 1967 AND 1968*, at 43 (1969).

multiply in the person, animal or plant attacked.”<sup>35</sup> This definition was picked up by a draft treaty that the United Kingdom put forward later the same year.<sup>36</sup> For its part, the General Assembly welcomed the Secretary-General’s report “as an authoritative statement on chemical and bacteriological (biological) weapons and the effects of their possible use.”<sup>37</sup> In addition, the General Assembly used the above definition when declaring the use of “[a]ny biological agents of warfare” to be “contrary to the generally recognized rules of international law.”<sup>38</sup>

These statements leave no doubt as to the “mischief” that States sought to address. States plainly were concerned with the use in warfare of pathogenic microorganisms, that is, bacteria, viruses, and fungi.<sup>39</sup> Furthermore, any interpretation that does not confine the term biological agent to microorganisms leads to strange results that are inconsistent with the practice of States. The principal problem is that such an interpretation would cover the entire gamut of macroorganisms.

In some respects, this outcome would not be problematic. For example, the hostile release of fleas carrying plague-causing bacteria<sup>40</sup> would plainly constitute the use of a biological weapon. However, the breeding and use of such fleas would be prohibited, not because the fleas are biological agents, but because they are a means of delivery of a biological agent, in this instance the microorganism known as *Yersinia pestis*. A similar logic would apply to other animals carrying a hazardous microbial or biological agent or a toxin.

In contrast, a broad reading of the term biological agent would mean that dogs (trained to neutralize adversaries) or birds (trained to capture small unmanned aerial vehicles)<sup>41</sup> would constitute biological agents and that their development would be in breach of the BWC. State practice (and common

35. U.N. Secretary-General, *supra* note 30, ¶ 17.

36. United Kingdom of Great Britain and Northern Ireland, Revised Draft Convention for the Prohibition of Biological Methods of Warfare and Accompanying Draft Security Council Resolution (Aug. 1, 1969), *in* DISARMAMENT COMMISSION, OFFICIAL RECORDS: SUPPLEMENT FOR 1969, at 30 (1971).

37. G.A. Res. 2603 (XXIV) B, ¶ 1 (Dec. 16, 1969).

38. G.A. Res. 2603 (XXIV) A (Dec. 16, 1969).

39. U.N. Secretary-General, *supra* note 30, ¶ 57.

40. During World War II, Japan employed this tactic against China. *See* Jeffrey A Lockwood, SIX-LEGGED SOLDIERS: USING INSECTS AS WEAPONS OF WAR, ch. 10 (2008).

41. Evan Ackerman, *Dutch Police Training Eagles to Take Down Drones*, IEEE SPECTRUM (Feb. 1, 2016), <https://spectrum.ieee.org/automaton/robotics/drones/dutch-police-training-eagles-to-take-down-drones>; Tyler Essary, *These Drone-Hunting Eagles Aren't Missing Around*, TIME (Feb. 18, 2017), <http://time.com/4675164/drone-hunting-eagles/>.

sense) does not support the conclusion that any use of non-human animals would be prohibited under the BWC. There may well be other legal problems with the use of animals to launch attacks, in particular the difficulty in ensuring compliance with the principle of distinction, but not because the animals are biological agents.

Finally, the expansive interpretation of the term biological agent leads not only to results that are inconsistent with State practice, but that are manifestly absurd. In particular, it remains unclear why, following Lin and his colleagues' thinking, the human animal would need to be enhanced to become a biological agent. Indeed, the implication of their reasoning is that all humans are biological agents. On this logic, any use of flesh-and-blood warfighters would be inconsistent with the BWC.

In sum, an interpretation of the BWC that would regard humans as biological agents, thus subject to the restriction of the treaty, fails to persuade. That said, there is one scenario in which a human could conceivably fall within the scope of Article I, but that has nothing to do with enhancement. This would occur when a person is infected with a biological agent with a view to spreading the infection or, for example, when smeared with a toxin with the purpose of poisoning another person by contact. This scenario is similar to that of the flea carrying *Y. pestis*: the person does not fall under Article I(a), which is concerned with biological warfare agents, but rather Article I(b), which is concerned with other parts of a biological weapon system, namely "weapons, equipment or means of delivery."<sup>42</sup> A human being would not be equipment and it is doubtful, as will be addressed more fully below, that they could be a weapon.<sup>43</sup> However, a person could plausibly be the means of delivery for a biological agent within the meaning of Article I(b). On this reading, the BWC would prohibit making a human the carrier of a biological agent for hostile purposes, an interpretive outcome entirely consistent with the object and purpose of the treaty.

### C. *Enhancements as Biological Agents*

The second argument relies on the uncertainty about who biological agents must act upon to fall under the BWC. According to Lin and his fellow authors, "insofar as the [BWC] does not specify that biological agents must be

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42. BWC, *supra* note 7, art. I(b).

43. *See infra* Part III.

of the kind that directly harms adversaries, then some human enhancements—such as anabolic steroids for increased strength—would seem to count as biological agents: they are substances employed for some effect and are biological in nature.”<sup>44</sup> Boothby agrees that the term biological agent in the BWC is “not explicitly limited to substances directed at an adversary.”<sup>45</sup>

Anabolic-androgenic steroids (AAS) are not the best example to explore this issue. AAS do not constitute biological agents because, as discussed earlier, they are not microorganisms, nor are they microbial agents. Thus, the only way AAS could fall within the scope of the BWC is if they are toxins.

There are multiple complications with that suggestion. First, the Secretary-General’s report only classified as toxins substances that are “biologically produced.”<sup>46</sup> The AAS consumed to boost muscle growth are generally synthetic variants of naturally occurring hormones. This is not fatal to the argument, however, as the synthetic nature of a substance does not necessarily exclude it from the reach of the BWC. States party to the treaty have agreed that, under the BWC, toxins mean substances “of a microbial, animal or vegetable nature,” as well as “their synthetically produced analogues.”<sup>47</sup>

Second, hormones are not toxins strictly speaking, because they are not harmful as such. They are bioregulators, that is, substances that regulate various biological processes. Nevertheless, the World Health Organization has taken the view that bioregulators could amount to toxins for the purposes of the BWC where they “have toxic effects if administered in large enough quantity.”<sup>48</sup> The prolonged use of AAS at high quantities certainly has harmful effects. But AAS are also used to manage certain medical conditions with relative safety. In other words, AAS are capable of being used so that toxicity would not become a major issue. Accordingly, if AAS were used for performance enhancement in doses comparable to those used therapeutically, they could scarcely be considered toxins and therefore biological weapons.

Leaving the specific example of AAS aside, there is a valid broader issue here: some human capabilities could conceivably be improved by means of

44. LIN, MEHLMAN & ABNEY, *supra* note 10, at 32.

45. WILLIAM H. BOOTHBY, WEAPONS AND THE LAW OF ARMED CONFLICT 125 n.133 (2d ed. 2016).

46. U.N. Secretary-General, *supra* note 30, ¶ 44.

47. Second Review Conference of the Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons, Final Declaration art. I, U.N. Doc. BWC/CONF.II/13/II (1986).

48. WORLD HEALTH ORGANIZATION, PUBLIC HEALTH RESPONSE TO BIOLOGICAL AND CHEMICAL WEAPONS: WHO GUIDANCE 216 (2d ed. 2004).

microorganisms or toxins. For example, vaccines make use of biological material and would potentially fall under the prohibition in the BWC if they were not expressly excluded by the Article I(1) clause “in quantities that have no justification for prophylactic, protective or other peaceful purposes.”<sup>49</sup> The same applies to animal-derived toxins (venoms) or viruses used therapeutically. Many therapeutic interventions have the potential to be used as an enhancement of healthy individuals. Thus, there is the distinct possibility that microorganisms or toxins covered by the BWC could be used not only to restore health but also to enhance healthy warfighters.

While the text of the BWC does not distinguish between the use of biological agents or toxins directly against an adversary or as performance enhancing substances, applying it to the latter is difficult to sustain on a contextual, purposive, and historical reading of the treaty. The BWC was fundamentally intended to address the weaponization of microorganisms and toxins. This is clear from its title and preamble. This is also clear from the ordinary meaning of the term biological agent, which, as already noted, refers to biological substances intended to cause morbidity or death. In addition, the BWC, as has been pointed out, does not specify against whom biological agents should not be used, but if the microorganisms or toxins are not used to cause disease they are difficult to classify as biological weapons.

#### *D. Enhancements as Chemical Weapons*

Similar to the BWC, the Chemical Weapons Convention (CWC) also appears inapplicable to human enhancement.<sup>50</sup> Article II(1) of the CWC defines chemical weapons as “[t]oxic chemicals and their precursors, except where intended for purposes not prohibited under this convention, as long as the types and quantities are consistent with such purposes.”<sup>51</sup> According to Article II(2), a toxic chemical in turn is “[a]ny chemical which through its chemical action on life processes can cause death, temporary incapacitation or permanent harm to humans or animals.”<sup>52</sup>

Many pharmaceutical agents that can be used for enhancement also meet the definition of toxic chemicals under the CWC. For example, amphet-

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49. BWC, *supra* note 7, art I(1).

50. CWC, *supra* note 8.

51. *Id.* art. II(1)(a).

52. *Id.* art. II(2).

mines have been used for decades to overcome the effects of sleep deprivation, a practice that amounts to enhancement.<sup>53</sup> In high enough quantities, however, amphetamines can undoubtedly incapacitate or even kill a person. Amphetamines stockpiled and used for enhancement, where the types and quantities of the drug are comparable to use of the drug for clinical purposes, do not appear to qualify as a chemical weapon. This is due to a circular logic, where, under the terms of the CWC, when used for performance enhancement, amphetamines are not considered a chemical weapon and therefore do not violate Article II(1), which excludes chemicals “intended for purposes not prohibited under this Convention.”<sup>54</sup> In short, because the CWC only prohibits the use of toxic chemicals in a weaponized manner, performance-enhancing substances (even if under certain conditions toxic) would not violate the treaty.

### III. WEAPONS

Even if enhanced warfighters do not constitute biological weapons for purposes of the BWC, there are outstanding and important normative questions prompted by the preceding discussion. Accordingly, the remainder of this article explores whether enhanced warfighters, or the enhancements themselves, constitute weapons, means of warfare, or methods of warfare under the law of armed conflict.

#### A. Defining Weapons

While the word weapon is used extensively in treaties on the law of armed conflict,<sup>55</sup> no existing international law instrument defines its meaning. Further, as dictionary definitions vary widely, the ordinary meaning of the word

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53. For a discussion of this issue, see Rain Liivoja, *Biomedical Enhancement of Warfighters and the Legal Protection of Military Medical Personnel in Armed Conflict*, 26 *MEDICAL LAW REVIEW* 421 (2018).

54. BWC, *supra* note 7, art. II(1).

55. *See, e.g.*, Geneva Convention (III) Relative to the Treatment of Prisoners of War art. 42, Aug. 12, 1949, 6 U.S.T. 3316, 75 U.N.T.S. 135; Additional Protocol I, *supra* note 3, arts. 35(2), 36; BWC, *supra* note 7, arts. I–IV; 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 art. 8, Oct. 10, 1980, 1342 U.N.T.S. 137 [hereinafter CCW].

is difficult to distil.<sup>56</sup> For instance, the *Oxford English Dictionary* defines a weapon as “[a]n instrument of any kind used in warfare or in combat to attack and overcome an enemy.”<sup>57</sup> Oddly, this definition does not account for the use of weapons in contexts other than warfare, such as hunting or law enforcement. The *Macquarie Dictionary* defines a weapon as “any instrument for use in attack or defence in combat, fighting, or war, as a sword, rifle, cannon, bomb, etc.” or “anything serving as an instrument for making or repelling an attack.”<sup>58</sup> The *Merriam-Webster Dictionary* offers the most open-ended of these definitions, suggesting that a weapon is “something (as a club, knife, or gun) used to injure, defeat, or destroy” or “a means of contending against another.”<sup>59</sup> At most, these definitions reveal that a weapon is an instrument or thing used for a combative or hostile purpose. Yet, given the variance in these definitions, and the ability to use the word in both literal and various non-literal senses, an ordinary meaning approach to defining the word is of limited utility.

Some of the bio- and neuroethical literature on military technology has endorsed the broad conceptualization of weapon—“means of contending against another”—as found in the *Miriam-Webster Dictionary*.<sup>60</sup> However, such a definition would result in the term engulfing, and rendering redundant, the ostensibly distinct legal categories of means of warfare and methods of warfare.<sup>61</sup> A more succinct and influential definition arises from the literature on the law of armed conflict. In particular, Justin McClelland posits that a “reasonable” and “relatively straightforward” interpretation of “weapon” is “an offensive capability that can be applied to a military object or enemy combatant.”<sup>62</sup> Subsequent literature endorses and echoes this definition.<sup>63</sup>

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56. The ordinary meaning of a term, read in context, is of primary importance for its interpretation. Vienna Convention on the Law of Treaties, *supra* note 27, art. 31(1).

57. *Weapon*, OXFORD ENGLISH DICTIONARY, <http://www.oed.com/view/Entry/226597> (last visited Aug. 28, 2018).

58. *Weapon*, MACQUARIE DICTIONARY, <https://www.macquariedictionary.com.au/> (last visited Aug. 28, 2018).

59. *Weapon*, MERRIAM-WEBSTER DICTIONARY, <https://www.merriam-webster.com/dictionary/weapon> (last visited Aug. 28, 2018).

60. See, e.g., James Giordano & Rachel Wurzman, *Neurotechnologies as Weapons in National Intelligence and Defense: An Overview*, 2 SYNESIS T55, T56 (2011).

61. See *infra* Part IV (discussing means of warfare) and Part V (discussing methods of warfare).

62. 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).

63. See, e.g., Duncan Blake & Joseph S. Imburgia, “Bloodless Weapons”? *The Need to Conduct Legal Reviews of Certain Capabilities and the Implications of Defining Them as “Weapons,”* 66 AIR

While we generally accept McClelland's definition of weapon, three observations must be made before proceeding. First, while McClelland refers solely to offensive capabilities, others have suggested that the term weapon encompasses both offensive and defensive capabilities.<sup>64</sup> This expansion of the definition should not be accepted. At its most basic, an offensive capability is the ability to inflict a harmful effect on an adversary.<sup>65</sup> Understood as such, weapons that might be considered defensive in nature, such as anti-aircraft missiles, entail the use of an offensive capability to a defensive end. These instruments can properly be called weapons. However, a purely defensive capability, for example the ability to repel harm by means of protective armor, cannot constitute a weapon in the relevant sense.

Second, it is unnecessary to include in the definition a reference to military objects or enemy combatants as targets.<sup>66</sup> Clearly, under the law of armed conflict, there are limitations on the uses to which weapons can be put, as attacks may only be directed against military objectives.<sup>67</sup> However, whether an instrument is used, or can be used, in a manner consistent with the law of armed conflict does not change its nature.<sup>68</sup> A weapon used to harm to civilians might contravene the law, but is a weapon nonetheless.

Third, the emphasis in McClelland's definition on capabilities is overstated. A capability refers to the ability to do something, whereas a weapon is an instrument or a thing. Weapons are instruments that *give rise* to offensive capabilities. To illustrate, implements, devices, and equipment, such as blades and projectiles, are weapons when they can be used to cause injury,

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FORCE LAW REVIEW 157, 172 (2010); Steven Haines, *The Developing Law of Weapons: Humanity, Distinction, and Precautions in Attack*, in THE OXFORD HANDBOOK OF INTERNATIONAL LAW IN ARMED CONFLICT 273 (Andrew Clapham & Paola Gaeta eds., 2014); BOOTHBY, *supra* note 45, at 4–5.

64. Blake & Imburgia, *supra* note 63, at 172 (“The term should connote any capability, offensive or defensive, which can be applied against a military object or enemy combatant.”).

65. Stephan Fruhling, *Offense and Defense in Strategy*, 28 COMPARATIVE STRATEGY 463, 465 (2009).

66. *See, e.g.*, Blake & Imburgia, *supra* note 63, at 172.

67. Additional Protocol I, *supra* note 3, arts. 48, 52(2).

68. *See also* Haines, *supra* note 63, at 277 (noting that “any weapon . . . will have the potential to be used for an unlawful purpose”).

death, damage, or destruction.<sup>69</sup> Likewise, substances, such as toxic chemicals, are weapons when they can be used to the same or similar effect.<sup>70</sup> Insofar as malware can be used to the same or similar effect, it too can be classified as a weapon (or cyberweapon).<sup>71</sup> Importantly, in each instance, it is the object, substance, or malware that constitutes the weapon, rather than the offensive capability it creates.<sup>72</sup>

With these qualifications in mind, for purposes of this analysis a weapon is defined as an instrument through which an offensive capability manifests and by which it can be applied.

### B. Enhanced Warfighters as Weapons

A warfighter will only constitute a weapon when used as an instrument to cause injury, death, damage, or destruction. To give a simplistic example, a person launched as a human cannonball would become a projectile, and thus a weapon. Some have argued, however, that humans can constitute weapons in far broader ways. For instance, Lin, Mehlman, and Abney contend that the warfighter is the military's "best and oldest weapon."<sup>73</sup> They posit that because other organisms "employed in the service of war," such as dogs, elephants, and rhinoceroses, could plausibly be considered weapons, so too could humans.<sup>74</sup> Further, they argue that if robots can be regulated as weapons, it must be possible to identify the point on the enhanced human-robot spectrum at which a human becomes a robot and therefore a weapon. In

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69. See PROGRAM ON HUMANITARIAN POLICY AND CONFLICT RESEARCH, MANUAL ON INTERNATIONAL LAW APPLICABLE TO AIR AND MISSILE WARFARE r. 1(ff) (2009) [hereinafter HPCR MANUAL] ("Weapon' means a means of warfare used in combat operations, including a gun, missile, bomb or other munitions, that is capable of causing either [i] injury to, or death of, persons; or [ii] damage to, or destruction of, objects."); U.S. Department of the Air Force, AFI51-402, Legal Reviews of Weapons and Cyber Capabilities att. 1 (2011) ("Weapons are devices designed to kill, injure, disable or temporarily incapacitate people, or destroy, damage or temporarily incapacitate property or materiel.").

70. BOOTHBY, *supra* note 45, at 4–5 (noting that a "substance" can qualify as a weapon).

71. TALLINN MANUAL 2.0 ON THE INTERNATIONAL LAW APPLICABLE TO CYBER OPERATIONS r. 103, at 452–53 (Michael N. Schmitt ed., 2017).

72. BOOTHBY, *supra* note 45, at 4–5

The means whereby this is achieved will involve a device, system, munition, implement, substance, object, or piece of equipment that is used, that it is intended to use, or that has been designed for use to apply the offensive capability, usually causing injury or damage to an adverse party to an armed conflict. It is that device, etc. that is generally referred to as a weapon.

73. LIN, MEHLMAN & ABNEY, *supra* note 10, at 31–32.

74. *Id.*

their view, the inability to draw such a line demonstrates that a simpler solution is to accept that humans are weapons at every point along the spectrum.<sup>75</sup>

Pharmaceutical enhancements are the most common type of enhancement presently utilized by armed forces to improve the performance of warfighters. A human under the influence of, for example, a central nervous system stimulant clearly remains a human. This is because a warfighter enhanced by a pharmaceutical does not become a mere instrument as in the case of the human cannonball. Thus, as long as a warfighter possesses human agency, that is, as long as the enhancement does not remove the ability to exercise free will, the warfighter does not become a weapon. Only if the enhancement erased human agency, turning the warfighter into a mere automaton or a remotely controlled biological avatar, would it be possible to speak of warfighters as weapons.<sup>76</sup> Furthermore, it cannot be said that the pharmacological enhancement itself is a weapon. While a given drug might be considered an instrument or object, it is not through the drug alone that an offensive capacity manifests.<sup>77</sup> Rather, it is the effect of the drug on an already offensively capable warfighter that results in the improved ability to cause injury, death, damage, or destruction.

Robotic enhancements present a more difficult example. But even if a warfighter were to have a robotic device substituted for a body part, the warfighter would not become a weapon. This is because (and presuming) the robotic body part would not inherently change the human into an instrument or thing.<sup>78</sup> While further technological developments might make the distinction between the enhanced human and robot more difficult, we have not yet arrived at that crossroad.<sup>79</sup> It is foreseeable, however, that a robotic enhancement itself might constitute a weapon. For instance, consider a warfighter equipped with an artificial body part integrated with a lethal capability, such as a robotic hand with a built-in firearm. Such an enhancement would be an instrument, and in its own right, the means by which an offensive ability to cause injury, death, damage, or destruction would manifest. Under the law

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75. *Id.* at 29–30.

76. This reasoning also works the other way around. An animal trained for some military purpose, or a weapon system with a degree of autonomy in its combat functions, would be an instrument, rather than a person, because both lack human agency and are not the bearers of legal rights and obligations. We are grateful to Group Captain Ian Henderson for raising this issue with us.

77. Dinniss & Kleffner, *supra* note 10, at 438.

78. *Id.*

79. *Id.*

of armed conflict, the robotic hand would be indistinguishable from a traditional firearm. As such, it could properly be classified as a weapon.

#### IV. MEANS OF WARFARE

##### A. Defining Means of Warfare

Means of warfare is another phrase used in international law that lacks an authoritative definition.<sup>80</sup> Confusion concerning its meaning has resulted from competing efforts to distinguish means of warfare from weapons. Some scholars consider any distinction between the two terms to be illusory,<sup>81</sup> while others regard means of warfare to be similar to, but something more specific than, weapons.<sup>82</sup> These two approaches represent minority views and, according to the prevailing approach, the term means of warfare has a *broader* meaning than the word weapon. It encompasses not only weapons, but also all weapon systems, weapon platforms, and associated equipment used to project and deliver force during hostilities.<sup>83</sup> We adopt that definition for purposes of this discussion.

To provide further clarity, weapon systems and weapon platforms must also be defined. A weapon system is a weapon as defined above,<sup>84</sup> along with

80. See, e.g., Additional Protocol I, *supra* note 3, arts. 35–36, 55; CCW, *supra* note 55, pmb.

81. See, e.g., Isabelle Daoust, Robin Coupland & Rikke Ishoey, *New Wars, New Weapons? The Obligation of States to Assess the Legality of Means and Methods of Warfare*, 84 INTERNATIONAL REVIEW OF THE RED CROSS 345, 351–52 (2002); see also GEOFFREY S. CORN ET AL., *THE LAW OF ARMED CONFLICT: AN OPERATIONAL APPROACH*, ch. 7 (2012) (using the terms weapon and means of warfare interchangeably).

82. See, e.g., Haines, *supra* note 63, at 276; see also Stuart Casey-Maslen, Neil Corney & Abi Dymond-Bass, *The Review of Weapons under International Humanitarian Law and Human Rights Law*, in *WEAPONS UNDER INTERNATIONAL HUMAN RIGHTS LAW* 411, 416 (Stuart Casey-Maslen ed., 2014).

83. BOOTHBY, *supra* note 45, at 5; 1 MARCO SASSÒLI, ANTOINE A. BOUVIER & ANNE QUINTIN, *HOW DOES LAW PROTECT IN WAR? CASES, DOCUMENTS AND TEACHING MATERIALS ON CONTEMPORARY PRACTICE IN INTERNATIONAL HUMANITARIAN LAW* 280 (3d ed. 2011); Michael N. Schmitt & Jeffrey S. Thurnher, “Out of the Loop”: *Autonomous Weapon Systems and the Law of Armed Conflict*, 4 HARVARD NATIONAL SECURITY JOURNAL 231 (2013); Henri Meyrowitz, *The Principle of Superfluous Injury or Unnecessary Suffering: From the Declaration of St. Petersburg of 1868 to Additional Protocol I of 1977*, 299 INTERNATIONAL REVIEW OF THE RED CROSS 98, 103 (1994); FRANÇOISE BOUCHET-SAULNIER, *THE PRACTICAL GUIDE TO HUMANITARIAN LAW* 444 (Laura Brav & Camille Michel eds. & trans., 3d ed. 2014); HPCR MANUAL, *supra* note 69, r. 1(t).

84. See *supra* Part III.

any associated technology necessary for its operation. In modern warfare, weapon systems are pervasive and important. It is not simply the employment of a weapon that produces a combat outcome, but its use incorporated with often far more complex technology, equipment, or machinery.<sup>85</sup> For example, as Schmitt has observed, “in an air-to-ground engagement against a fleeting target, the intelligence assets that allow the target to be identified and the communications, command, and control networks that make rapid attack possible are as essential to mission success as the aircraft and the bomb it drops.”<sup>86</sup> A weapon platform refers to anything onto which a weapon can be mounted for transport and deployment, such as a land vehicle, a watercraft, or an aircraft.

*B. Enhanced Warfighters as Means of Warfare*

The circumstances in which an enhanced warfighter, or an enhancement, might constitute a weapon have been addressed previously.<sup>87</sup> If weapons are understood as a subset of means of warfare, any enhanced warfighter or enhancement that constitutes a weapon under that analysis also constitutes a means of warfare. Clearly though, as means of warfare also encompass weapon systems and weapon platforms, further consideration to determine whether enhancements might fall into this broader category is necessary.

Pharmacologically enhanced warfighters are no more likely to constitute a means of warfare than they are to constitute a weapon. *Prima facie*, a weapon system cannot exist unless it includes a weapon.<sup>88</sup> As such, given that warfighters are not weapons, a pharmaceutical product that strategically improves the attributes of a warfighter would not form part of a weapon system. Admittedly, the use of a pharmaceutical might allow a warfighter to operate a weapon or weapon system with greater proficiency or for a longer period. However, in such a scenario, the weapon or weapon system exists and operates independently of the drug. The effect of the enhancement on the weapon system is ancillary and incidental.

While robotically enhanced warfighters might not constitute weapons, in some instances they could certainly constitute means of warfare. In the straightforward case of a warfighter enhanced by a robotic replacement of a

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85. Michael N. Schmitt, *War, Technology, and the Law of Armed Conflict*, 82 INTERNATIONAL LAW STUDIES 137, 142 (2006).

86. *Id.* at 142.

87. *See supra* Section III.B.

88. Schmitt, *supra* note 85, at 142.

body part, the warfighter would not become a means of warfare. This is because (and assuming) the robotic body part is used only to replicate the movements and ordinary functionality of the human being. Given that warfighters are not weapons, an enhancement that merely substitutes or improves the attributes of a warfighter, without more, would not create a weapon system.

Consider again however, a warfighter enhanced with a robotic hand integrated with a firearm. As the integrated firearm itself constitutes a weapon and the warfighter is a necessary element in its use, the warfighter becomes part of a weapon system. In this way, a robotically enhanced warfighter will constitute a means of warfare as soon as the warfighter is, to any extent, integrated with a weapon. This overcomes the conceptual difficulty, which is emphasized by Lin, Mehlman, and Abney, of identifying the point on the human-robot spectrum at which a human becomes a robot.<sup>89</sup> If the robotically enhanced human and the robot are both means of warfare, their treatment will be the same from the perspective of the law of armed conflict.

There are other, perhaps more presently realistic scenarios, in which a warfighter could be interconnected with a weapon such that the warfighter becomes a means of warfare. One example would be the use of a brain-machine interface (BMI) to control a weapon. A BMI is a system that allows a person to control a device (in this example a weapon) by means of neural activity, in other words, by thought alone. Where the BMI does not use external sensors to record neural activity but relies on implanted electrodes, the integration of the warfighter with the weapon system is such that it is difficult to separate the two. In such circumstances, the warfighter becomes part of the weapon system, and thus a component of a means of warfare.

Also, recall the earlier example of a person infected with a harmful pathogen to infect adversaries. In this case, the pathogen itself constitutes a weapon, and the human could be considered either a vessel onto which the weapon is mounted for transport and deployment (a weapon platform) or a necessary component in the weapon's use (a weapon system). While in this case there is no human enhancement, it nevertheless illustrates how a person can become a means of warfare.

While this analysis of enhanced warfighters is far from exhaustive, it allows us to draw an interim conclusion. It is unlikely that an enhanced warfighter would be considered a weapon under the law of armed conflict. Such a warfighter might, however, be considered a means of warfare, particularly

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89. LIN, MEHLMAN & ABNEY, *supra* note 10, at 31–32.

when integrated, with some degree of sophistication, with a device that itself constitutes a weapon.

## V. METHODS OF WARFARE

### A. Defining Methods of Warfare

Method of warfare is another key concept of the law of armed conflict, but one that also is undefined in international legal instruments. Nonetheless, two aspects to the term seem relatively uncontroversial.

The first aspect relates to the juxtaposition of methods of warfare and the notions of weapons and means of warfare. While the latter two, as already discussed, refer to various devices, tools, or instruments of warfare, methods encompass activities or modes of conduct. Thus, the U.S. Department of Defense's *Law of War Manual* explains, “[i]n general, *method of warfare* has referred to how warfare is conducted, while *means of warfare* has referred to weapons or devices used to conduct warfare.”<sup>90</sup> Likewise, the *HPCR Manual* defines methods of warfare as “attacks and other activities designed to adversely affect the enemy’s military operations or military capacity, as distinct from the means of warfare used during military operations, such as weapons.”<sup>91</sup>

The second aspect is the choice of the word method, which implies a certain degree of planning and a measure of consistency in conduct over time or space. Indeed, the *Oxford English Dictionary* defines a method as “a way of doing anything, [especially] according to a defined and regular plan; a mode of procedure in any activity, business, etc.”<sup>92</sup> Thus, an isolated act of hostility or a non-replicated stratagem does not amount to a discrete method of warfare for legal purposes. At the same time, a particular type of action that is incorporated into doctrine or training could be a method of warfare.

Beyond these basic observations, there is plenty of room for debate as to what kinds of activities constitute methods. There are two principal approaches to defining methods of warfare—one narrow and one broad. The narrow definition considers methods of warfare to be the way, mode, or

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90. OFFICE OF THE GENERAL COUNSEL, U.S. DEPARTMENT OF DEFENSE, LAW OF WAR MANUAL § 5.1.1 (rev. ed., Dec. 2016).

91. HPCR MANUAL, *supra* note 69, r. 1(v).

92. *Method*, OXFORD ENGLISH DICTIONARY, <http://www.oed.com/view/Entry/117560> (last visited Aug. 28, 2018).

manner in which means of warfare (especially weapons) are used.<sup>93</sup> On this reading, a method of warfare is always associated with a particular type of weapon or means of warfare. McClelland, for example, argues that “[i]t is important to distinguish . . . between equipment and its use and the tactics, techniques and procedures adopted by armed forces. Such aspects cover a wide range of areas not all concerned with the employment of weapons or methods or means of warfare.”<sup>94</sup>

In contrast, the broader approach to defining methods does away with the distinction between ways of using a weapon and tactics more generally. On this view, methods of warfare cover tactics and operations.<sup>95</sup> Admittedly, some of the examples provided ostensibly in support of this position, such as bombardment or high altitude bombing, can also be seen as ways of using a particular weapon.<sup>96</sup> But, making a stronger argument for this position, Boothby cites blockades and sieges as examples of methods of warfare that are not necessarily linked to particular means of warfare.<sup>97</sup>

The narrow approach can draw some support from the fact that the term method of warfare almost invariably appears in conjunction with the term

93. Daoust, Coupland & Ishoey, *supra* note 81, at 352 (“The expression ‘methods of warfare’ is usually understood to mean the way in which weapons are used.”); Meyrowitz, *supra* note 83, at 103 (“‘[M]ethods of warfare’ is to be understood as the mode of use of means of warfare in accordance with a certain military concept or tactic.”); SASSÒLI, BOUVIER & QUINTIN, *supra* note 83, at 280 (“Traditionally, with regard to weapons, . . . ‘methods’ designates the way or manner in which the weapons are used.”).

94. McClelland, *supra* note 62, at 405.

95. HPCR MANUAL, *supra* note 69, r. 1(v)

Methods of warfare’ mean attacks and other activities designed to adversely affect the enemy’s military operations or military capacity . . . . In military terms, methods of warfare consist of the various general categories of operations, such as bombing, as well as the specific tactics used for attack, such as high altitude bombing.

SASSÒLI, BOUVIER & QUINTIN, *supra* note 83, at 280

[T]he concept of method of warfare also comprises any specific, tactical or strategic, ways of conducting hostilities that are not particularly related to weapons and that are intended to overwhelm and weaken the adversary, such as bombing, as well as the specific tactics used for attack, such as high altitude bombing.

BOOTHBY, *supra* note 45, at 5 (“‘Methods of warfare’ . . . are taken to mean the general categories of operations, such as bombardment or blockade, and can refer to particular tactics, such as high-altitude bombing or siege.”); EMILY CRAWFORD & ALISON PERT, INTERNATIONAL HUMANITARIAN LAW 195 (2015) (adopting the definition of Sassòli, Bouvier, and Quintin).

96. HPCR MANUAL, *supra* note 69, r. 1(v); BOOTHBY, *supra* note 45, at 5; SASSÒLI, BOUVIER & QUINTIN, *supra* note 83, at 280.

97. BOOTHBY, *supra* note 45, at 5.

means of warfare. Indeed, the phrase means and methods of warfare arguably should be interpreted as a whole to cover various equipment and the modalities of their use. Thus, according to the *Commentary* to Additional Protocol I, “[t]he words ‘methods and means’ include weapons in the widest sense, as well as the way in which they are used.”<sup>98</sup> However, the text of Additional Protocol I appears to support a broader notion of method, as it expressly prohibits the “[s]tarvation of civilians as a method of warfare.”<sup>99</sup> Starving civilians does not require the use of any weapon or means of warfare. Thus, we are inclined to adopt the broader approach.

One potential danger with this approach, however, is that almost everything the armed forces do in an organized manner during an armed conflict could be construed as a method of warfare. This overly broad result is illogical, and again the context in which the term is used in Additional Protocol I is significant. Additional Protocol I regulates means and methods of warfare insofar as they are used to engage in attacks, that is, to perpetrate acts of violence against the adversary.<sup>100</sup> This is evident from the prohibition of means and methods of a nature to cause superfluous injury, of a nature to cause indiscriminate damage, or to cause damage to the environment.<sup>101</sup> Thus, methods of warfare for purposes of the law of armed conflict should only include such tactics and operations that are capable of causing harm to persons or objects, or, at the very least, “adversely affect the enemy’s military operations or military capacity.”<sup>102</sup> Thus, sieges and blockades would properly be regarded as methods of warfare. At the same time, the process of digging trenches or tunnels, or training warfighters would not be methods of warfare, even though they would facilitate the conduct of hostilities in a particular manner.

#### B. *Enhanced Warfighters as a Method of Warfare*

The enhanced warfighters themselves are obviously not methods of warfare, as this phrase relates to activities rather than entities or objects. Neither can

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98. 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).

99. Additional Protocol I, *supra* note 3, art. 54(1).

100. Additional Protocol I, *supra* note 3, art. 49(1) (defining attacks as “acts of violence against the adversary, whether in offence or in defence.”).

101. See *supra* notes 5–6 and accompanying text.

102. HPCR MANUAL, *supra* note 69, r. 1(v).

the process of enhancing them be described as a method of warfare. This conclusion would be reached under both the narrow and broad definition of methods of warfare since an enhancement is not a particular way of using a weapon, nor is it in itself a way of adversely affecting the adversary.

In contrast, the deployment of enhanced humans in hostilities could amount to a method of warfare. Based on the narrow approach, utilization of enhanced warfighters would be a method of warfare if closely associated with a specific means of warfare. For example, if a weapon system could only be operated effectively by a warfighter with particular enhancements, then the use of that weapon system by that type of enhanced warfighter would be a discrete method of warfare. Still, the practical significance of this conclusion seems rather limited. Because of the close link between the weapon and the warfighter in these circumstances, a legal review of the weapon would likely encompass the enhancement insofar as it is relevant to the operation of the weapon in a manner consistent with the law of armed conflict. Moreover, if the weapon in question, as used by the enhanced warfighter, failed to comply with basic law of armed conflict requirements, such as discrimination or avoiding superfluous injury, the particular circumstance of using the weapon would be deemed unlawful, regardless of whether it is a discrete method of warfare.

According to the broader approach, the use of human enhancement techniques or the use of enhanced humans in hostilities in an organized and consistent manner would be a method of warfare in a wide range of circumstances. If the particular tactic depended for its success on the enhancement of warfighters, the claim that the tactic is a method of warfare would be stronger than if the enhancement merely improved performance in some way. Thus, the U.S. practice of supplying stimulants to bomber aircrews flying extremely long sorties<sup>103</sup> becomes difficult to characterize. While this practice improves the safety of the aircrew (long-term health considerations notwithstanding), it is doubtful that such missions depend on the enhancement provided by stimulants to such a degree as to qualify the practice as a method of warfare.

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103. See, e.g., Liivoja, *supra* note 53.

## VI. CONCLUSION

This article has presented a skeptical view on treating enhanced warfighters as weapons for legal purposes. The approach to enhancements as biological weapons is attractive because it provides a simple and comprehensive take on human enhancement—by essentially banning all of it. That approach is, as we have endeavored to demonstrate, difficult to reconcile with the BWC when using conventional canons of treaty interpretation. Treating enhanced warfighters as weapons more broadly is not much more promising. Placing human beings who possess moral agency on par with mere instruments of warfare distorts the accepted meaning of the law. Since means of warfare and methods of warfare are more malleable categories, there are at least some hypothetical examples where a person could fit within these categories.

Traditionally, the most legally challenging technological developments in the armed forces have related to new weaponry or weapon platforms; non-weapons technology, such as armor and communication equipment, has not normally given rise to law of armed conflict issues. Thus, it is not entirely surprising that human enhancement, which intuitively seems legally and ethically challenging, would be assessed as if those enhanced were weapons. However, arms control law and weapon-related rules of the law of armed conflict simply are not the most appropriate paradigm for assessing the lawfulness of biomedical enhancement. Enhancement does raise numerous legal issues under the law of armed conflict and human rights law, but these issues are best addressed on their own terms rather than in the weapons mold. In fact, an enhancements-as-weapons paradigm has the danger of masking these other issues of potentially greater significance.