

# THE AMERICAN WAY OF BOMBING

CHANGING ETHICAL AND LEGAL NORMS,  
FROM FLYING FORTRESSES TO DRONES

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## CHAPTER 12

## Banning Autonomous Killing

*The Legal and Ethical Requirement That Humans Make Near-Time Lethal Decisions*

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Long before the computerization of weapons technology, humanity debated the normative acceptability of new weapons.<sup>1</sup> The invention of the long bow, gunpowder, airplanes, weapons of mass destruction, and so on have all raised moral and legal concerns.<sup>2</sup> Unmanned aerial combat vehicles, or drones,<sup>3</sup> became the focus of debate when the United States used a drone to launch a missile attack that killed several people in November 2001 in Afghanistan.<sup>4</sup> It was the first known use of a drone, operated from a great distance, to kill. As the debate over drones grew, another debate, on the legality and morality of autonomous weapons, intensified.<sup>5</sup> In certain respects, autonomous weapons are as old as any weapon if they are defined as weapons that may be triggered by a target rather than by the user of the weapon. A camouflaged pit, a spring gun, a land or maritime mine, or an improvised explosive device can be triggered by the target without the user being in the vicinity. Such weapons have long been the focus of philosophers and legal scholars. The advent of robots with computer programs that can learn has renewed the debate and deepened the concerns. Advances in artificial intelligence mean that once a robot is constructed and programmed, it will be able to make the decision to attack without additional human intervention.<sup>6</sup> Such an attack could occur at great distance from the time and place of the robot's origin.

In response to these developments, discussion is building toward a norm against the use of fully autonomous robotic decisions to deploy lethal force.

This developing norm is reflected in documents of such diverse origin as the United States Department of Defense<sup>7</sup> and Human Rights Watch.<sup>8</sup> While consensus is building toward the norm, consensus does not yet exist about how to move beyond establishing the norm to winning global acceptance of it. While it is possible to find support in existing law for such a norm, the legal case is based on inference and analogy. Such support may be sufficient to gain wide acceptance, but there is really no denying that the norm would be strengthened by preliminary discussion and eventual negotiation of an affirmative treaty ban on fully autonomous killing. The discussion beginning in the context of a new Protocol to the Convention on Certain Conventional Weapons is a promising start.<sup>9</sup>

In April 2013, United Nations Special Rapporteur Christof Heyns called for a moratorium on moving beyond the design stage in the development of fully autonomous weapons pending the formation of a panel of experts to "articulate a policy for the international community on the issue."<sup>10</sup> Wendell Wallach, chair of Yale's technology and ethics study group, also called for a moratorium in 2013 and for the U.S. president to "sign an executive order declaring that a deliberate attack with lethal and nonlethal force by fully autonomous weaponry violates the Law of War."<sup>11</sup> This chapter proposes a treaty that will say much the same as Wallach's executive order. The negotiation of such a treaty will require the expert input and global debate needed to develop a strong express rule requiring that human beings make any decision for the near-time application of offensive lethal force to other human beings and property. Even without the successful conclusion of a treaty, the negotiation alone could go a long way toward creating a principle of customary international law that bans autonomous killing.

The research for this chapter began in 2010. It is likely that as soon as the chapter is published some of the information contained in it will be inaccurate, given the pace of technological development. Nevertheless, the best time to consider the law and morality applicable to new technology is, arguably, before it is fully operational. Once technology is in use, restrictions tend to be more difficult to obtain.<sup>12</sup> On the other hand, regulating technology still under development poses obvious problems. Every attempt will be made here to focus on the most likely future scenarios. The proposal made in the final section, titled "Norm Building," is designed to apply to certain existing weapons systems, as well as future ones. Thus, the proposal should be relevant regardless of what scientists invent next.

The remainder of this chapter is divided into three parts: It will begin with a brief overview of what we know at the time of writing about autonomous weapons. The discussion will move on to the law governing killing,

including the international law regulating lethal weapons. The final part will introduce a proposal for a treaty ban on removing humans too far from any decision to kill. The precise details of such a ban will require international negotiation; this chapter will focus on why such negotiation is imperative.

## Autonomous Weapons Technology

In 2010, the scientific community did not yet have a consensus definition of what constitutes a fully autonomous weapons system.<sup>13</sup> By mid-2013, a common definition had emerged. In November 2012 the United States Department of Defense (DoD) issued a directive titled "Autonomy in Weapons Systems." The purpose of the directive is to establish "DoD policy and assigns [*sic*] responsibilities for the development and use of autonomous and semi-autonomous functions in weapon systems." The directive defines an "autonomous weapons system" as a weapons system that "once activated, can select and engage targets without further interventions by a human operator. This includes human-supervised autonomous weapon systems that are designed to allow human operators to override operation of the weapon system, but can select and engage targets without further human input after activation."<sup>14</sup>

UN Special Rapporteur Christof Heyns refers to "lethal autonomous robotics" as weapons systems "that, once activated, can select and engage targets without further human intervention."<sup>15</sup> Military ethicist Deonna Neal uses a similar definition of a fully autonomous weapon. She calls it a robot "which uses some form of artificial intelligence to guide its decision-making and that is capable of target discrimination and regulating its use of force independently of human 'eyes on target' verification or authorization before it kills someone."<sup>16</sup> The Human Rights Watch definition is also similar: "If a weapon were fully autonomous, it would 'identify targets and . . . trigger itself.'"<sup>17</sup>

These definitions exclude many autonomous weapon systems by specifying that the weapon have the ability to "select and engage targets." The general view is that states do not yet possess fully autonomous weapons systems but are definitely seeking them. Although a few commentators continue to raise doubts about whether scientists can or will develop fully autonomous systems, the weight of opinion indicates it is only a matter of time. How much time is disputed. Current estimates predict that fully autonomous weapons will emerge as early as 2015 or as late as 2050.<sup>18</sup> At a meeting of the International Society of Military Ethics in January 2011, Neal cautioned that "there is disagreement among the engineering community as to whether an autonomous robot . . . can actually be created."<sup>19</sup> Yet a few weeks later

at another meeting, a former U.S. Air Force research scientist expressed his confidence that there is "nothing holding us back. The technology is a 'slam-dunk.'"<sup>20</sup> He argued that the United States is not yet fully automating drones because of "cultural resistance," not because of technological hurdles.<sup>21</sup>

Despite any "cultural resistance," there is no doubt that scientists are hard at work on the relevant technology for fully autonomous systems.<sup>22</sup> The 2012 DoD directive shows the level of U.S. involvement in planning for autonomous weapons systems. In the United States, the Committee on Autonomous Vehicles in Support of Naval Operations wrote in 2005 that "the Navy and Marine Corps should aggressively exploit the considerable war-fighting benefits offered by autonomous vehicles (AVs) by acquiring operational experience with current systems and using lessons learned from that experience to develop future AV technologies, operational requirements, and systems concepts."<sup>23</sup>

At a press briefing in 2007, a spokesperson for the U.S. Department of Defense's Unmanned Aerial Systems Task Force, Dyke Weatherington, spoke of the need to go beyond the remotely controlled technology in existence today that requires human intervention. For example, in "air-to-air combat—there's really no way that a system that's remotely controlled can effectively operate in an offensive or defensive air combat environment. That [requires] . . . a fully autonomous system."<sup>24</sup> Finally, a Human Rights Watch report released just a few days before the DoD directive was released in November 2012 states, "Some military and robotics experts have predicted that 'killer robots'—fully autonomous weapons that could select and engage targets without human intervention—could be developed within 20 to 30 years."<sup>25</sup>

The breakthrough to fully autonomous weapons has either already happened or will occur in the foreseeable future. As will be argued in the section on norm building, the time to clarify the applicable legal and moral principles is now.<sup>26</sup> We already have a variety of semi-autonomous and passive autonomous weapons such as land mines:

Indeed, several military robotic-automation systems already operate at the level where the human is still in charge and responsible for the deployment of lethal force, but not in a directly supervisory manner. Examples include: (i) the Phalanx system for Aegis-class cruisers in the Navy "capable of autonomously performing its own search, detect, evaluation track, engage and kill assessment functions" . . . ; (ii) the MK-60 encapsulated torpedo (CAPTOR) sea mine system—one of the Navy's primary antisubmarine weapons capable of autonomously

firing a torpedo and cruise missiles . . . ; (iii) the Patriot anti-aircraft missile batteries; (iv) "fire and forget" missile systems generally; and (v) anti-personnel mines or alternatively other more discriminating classes of mines (e.g. anti-tank). These devices can each be considered to be robotic by some definitions, as they all are capable of sensing their environment and actuating, in these cases through the application of lethal force.<sup>27</sup>

Efforts to build norms against fully automated killing should begin before the technology is in wide use. A recent UK Ministry of Defense report stated of unmanned aerial vehicles: "Most of the legal issues surrounding the use of existing and planned systems are well understood and are simply a variation of those associated with manned systems."<sup>28</sup> The same could be said of fully automated systems. Yet it is the thesis of this chapter that humanity has not yet taken into account the impact of increasing physical and temporal distance on our legal and moral principles on killing. Development of the capacity to deploy robotic target selection should be accompanied by both an audit of applicable legal and ethical norms and affirmative action toward a central, treaty-based principle to restrict the removal of human beings from the offensive near-time kill decision.

Several arguments already exist against drafting a new rule. One posits that computers will be able to make target selections better than human beings.<sup>29</sup> Another is offered by Schmitt and Thurnher who argue that by definition human beings will not be taken out of actual kill decisions because human beings will build and program robotic weapon systems. Thus, no new rule is needed to ensure that humans are in the loop. They admit that human input could occur long before a robot resorts to lethal force but then they fail to grapple with the implications of this fact.<sup>30</sup> Temporal distance from the kill decision is the critical issue. Most would agree that a computer programmed to kill months or years before an actual operation no longer has meaningful human involvement in the deployment of lethal force. The current law and system of accountability for targeting decisions is built around human involvement, as Schmitt and Thurnher acknowledge.<sup>31</sup> Yet, with no additional evidence, they assert that the system will continue to work adequately even when humans are far removed from the kill decision. It would be irresponsible at best to base legal and moral standards for killing on such an unproven assertion that defies common sense.

Jakob Kellenberger, former president of the International Committee of the Red Cross, has said: "The deployment of such [fully autonomous] systems would reflect a paradigm shift and a major qualitative change in the

conduct of hostilities. . . . It would also raise a range of fundamental legal, ethical and societal issues, which need to be considered before such systems are developed or deployed."<sup>32</sup> Kellenberger may or may not be correct that the deployment of fully autonomous systems will be a paradigm shift over semi-autonomous ones. That issue is not as important, however, as his second point about the fundamental legal and ethical principles we have established over centuries. These principles are premised on a closer association between the decision to use a weapon and the death or destruction resulting from that use than is often the case with today's weapon systems. Without legal intervention, scientists may continue to develop robots that take the kill decision ever farther from the human beings who should bear responsibility for making it.

### Lawful and Ethical Killing

International law prohibits the resort to lethal force except in limited circumstances.<sup>33</sup> In peacetime, international law permits police forces and other government authorities acting under police rules to use lethal force to save lives immediately. No innocent bystanders may be killed in such operations. Governments may resort to military force when challenged by organized armed insurgents on their territory or when attacked with significant force from abroad. The United Nations Security Council may also authorize the use of force by states to restore "international peace and security."

A state's response to a significant attack from beyond its territory is regulated under the international law of self-defense. The law of self-defense is comprised of Article 51 of the United Nations Charter and additional rules found in the law of state responsibility and the general principles of law.<sup>34</sup> The International Court of Justice has identified these additional rules in a number of important decisions, starting with the 1948 *Corfu Channel* case between the United Kingdom and Albania.<sup>35</sup> Military force may be exercised by a state that is the victim of a significant armed attack on the territory of a state responsible for the attack. The exercise of such force must also conform to the general principles of necessity and proportionality.<sup>36</sup> States may, of course, take defensive action in other circumstances, but such action may not include major military force on another state's territory. States may also resort to force when challenged by an organized armed group within the state that is attempting to overthrow the government or to secede. States appear to tolerate outside intervention by states assisting a government in ending insurgent or secessionist military challenges.

Fighting, whether for internal control, in self-defense, or as authorized by the Security Council, amounts to armed conflict if organized armed

groups fight each other with a certain amount of intensity. Missiles and bombs, regardless of how they are deployed, are lawful for use only within the actual fighting of an armed conflict. In other words, missiles and bombs are permissible for use in armed-conflict hostilities only. If a police force were to use bombs or missiles, it would generally be resorting to excessive force. Beyond armed-conflict hostilities, authorities may use only that force necessary to save a human life immediately. Bombs and missiles risk killing bystanders, which means that the current generation of drones deploys too much firepower for lawful use outside of actual armed conflict or in response to a significant armed attack by a state that triggers the right of self-defense under Article 51 of the UN Charter.

This law governing resort to military force is a subfield of international law still referred to as the *jus ad bellum*. The law was reconfirmed by a consensus of all UN members at the 2005 World Summit in New York.<sup>37</sup> The rules on how military force may be used during an armed conflict are found in the Hague Conventions, the Geneva Conventions of 1949 and their Additional Protocols of 1977, customary international law, and, again, general principles (collectively the *jus in bello*.) The rules on conduct of force are the subject of regular review and comment by the International Committee of the Red Cross (ICRC). Also in 2005, the ICRC published a comprehensive review of customary international humanitarian law (IHL) for the two types of armed conflicts for which there are well-developed sets of rules: international armed conflict and non-international armed conflict.<sup>38</sup> It is important to also emphasize that certain human rights principles apply even during an armed conflict.<sup>39</sup> The European Court of Human Rights, the Inter-American Court of Human Rights, and the Inter-American Commission have investigated whether governments have used excessive force and have thus violated the right to life.<sup>40</sup>

These contemporary rules on the resort to and conduct of lethal force, whether in peace or armed conflict, developed most directly from the Just War Theory of Augustine and Aquinas. Augustine drew on Aristotle and Cicero for the concept that peace is the normal state and that violence is justified only to restore peace. Moral philosophers continue to teach that the taking of human life may be justified to protect human life.<sup>41</sup> In other words, the exceptional right to resort to lethal force rests squarely on a justification of necessity. Current law reflects the understanding of what necessity permits as a moral and ethical matter.

Within the *in bello* context, it is becoming increasingly apparent that necessity is the most important guide to regulating the use of force, given the rise of irregular forces. Necessity determines what level of force may be used—military force where enemy combatants may be killed without warning or

police-level force necessary to save a human life. Thus, other battlefield targeting rules—proportionality, distinction, precaution, and humanity—are relevant after a necessity decision is made. In the mid-2000s, the ICRC sought to broaden the category of persons subject to intentional targeting because of their status as persons in a “continuous combat function.” The ICRC insists, however, that such persons may be targeted only when it is necessary to do so. The standard of necessity depends on the circumstances, whether the situation constitutes armed conflict or not. In the words of the ICRC’s Interpretative Guidance on the Notion of Direct Participation in Hostilities under International Humanitarian Law:

In classic large-scale confrontations between well-equipped and organized armed forces or groups, the principles of military necessity and of humanity are unlikely to restrict the use of force against legitimate military targets beyond what is already required by specific provisions of IHL. The practical importance of their restraining function will increase with the ability of a party to the conflict to control the circumstances and area in which its military operations are conducted, may become decisive where armed forces operate against selected individuals in situations comparable to peacetime policing. In practice, such considerations are likely to become particularly relevant where a party to the conflict exercises effective territorial control, most notably in occupied territories and non-international armed conflicts.<sup>42</sup>

This greater emphasis on necessity is, in effect, a new restriction on the use of lethal force under the *in bello* rules. It is consistent with the overriding obligation to respect human rights, which compels that any close case be decided in favor of peacetime standards for the resort to lethal force.

The law in mid-2013 reflects an ever-greater restriction on resort to lethal force, whether by state against state in self-defense or during an armed conflict by combatants against each other. Still, the lawful use of lethal force requires an exercise of conscience. Even where a president or soldier has the legal right to kill, the decision to do so will ultimately be an act of moral judgment. Moreover, legal scholars know that in rare circumstances, individual conscience may compel action in defiance of law. This chapter argues that the ultimate decision to kill must be made, therefore, by a human being at or very near the time of the lethal impact. Even if scientists develop a computer that can replicate the human conscience, the decision must not be given up to a machine that cannot be held accountable.

However, John Aquilla, executive director of the Information Operations Center at the Naval Post Graduate School, has said, “I will stand my artificial intelligence against your human any day of the week and tell you that my A.I.

will pay more attention to the rules of engagement and create fewer ethical lapses than a human force."<sup>43</sup> Similarly, Ronald Arkin, author of "Governing Lethal Behavior in Autonomous Robots," a study funded by the Army Research Office, believes computer software can be developed to incorporate proportionality, recognition of surrender, uncertainty, and other fundamental concepts to lawful conduct on the battlefield.<sup>44</sup> Anderson and Waxman have also argued that robots will make better, more accurate decisions in life-and-death matters, whether the context is health care or war-fighting.<sup>45</sup>

Others insist that scientists will not be capable of designing a computer sophisticated enough to make lethal force judgments reflecting the principle of necessity. They argue that these judgments will always be subjective decisions that only a human being, not a computer, can make.<sup>46</sup> A similar argument was made when computer engineers first began to predict that a computer could defeat a human being at chess. The counterargument was once that a computer would not be able to make the subjective decisions necessary to outwit a human adversary.<sup>47</sup> Today it appears well within the realm of the possible that computers will be programmed to be capable of doing what experienced battlefield lawyers currently do.

What seems unprogrammable is conscience, common sense, intuition, and other essential human qualities. Accountability is another challenge that seems impossible to overcome in the case of autonomous killing.<sup>48</sup> Current systems for holding individuals accountable for killing require a certain *mens rea* (mental intention), something a computer does not have. Without accountability, the importance of norms about the use of force would likely diminish.

It is already proving too easy to kill with robots.<sup>49</sup> Giving up the decision entirely to a computer program will truly lower the barrier and remove, literally, the humanity that should come to bear in all cases of justifiable killing. From the perspective of law, morality, and strategy, it seems essential that a human being who has training and a conscience and who may be held accountable should always make the awesome, ultimate decision to kill.

### Norm Building

Even if consensus is reached that the decision to kill must be made by a human being, the question arises of how such a norm is to be created. Given the history of technological development respecting armaments, it seems unlikely that we can prevent the wide availability of fully autonomous weapons. The more promising approach is indicated by the strategies used to create legal control of weapons that we already have. These include outright bans

on certain types of weapons, restrictions on how and where certain weapons may be used, and limits on who may use certain weapons. Practitioners and scholars are aware of the need to engage the challenges autonomous systems pose to current law on weapons.<sup>50</sup> Much can be found in existing law to guide the development and use of autonomous systems. Nevertheless, the essential, core norm will be a new one: a ban on removing humans too far from the "kill chain."

In international law the most common way new norms are built is through multilateral treaty negotiation. Think only of the new norms that emerged in the course of the law of the sea or International Criminal Court negotiations. This form of norm development is also evident in the area of arms control. Some of the first multinational treaties concerned weapons bans, including the dum-dum bullet and asphyxiating gases. Some of the most recent successful treaties have also concerned weapons, including the Rome Statute of the International Criminal Court, the 1997 Ottawa Convention banning landmines, and the 2008 Dublin Convention banning cluster munitions.

On the other hand, the ICRC has employed a different approach to law development in recent decades, finding and compiling in written form principles of customary international law. In 2005, as mentioned above, the ICRC published its study of customary IHL rules; in 2009, it published its Interpretative Guidance on the Notion of Direct Participation in Hostilities. The Guidance includes the heightened necessity standard discussed in the section above on lawful and ethical killing. Developing a new express norm against autonomous killing is probably best achieved drawing on all categories of international legal norms: treaties and customary international law, as just described, but also general principles, and *jus cogens*.

International arms control agreements such as the conventions on land mines or cluster munitions indicate some of the difficulties that lie ahead in banning fully autonomous weapons. The requirement that a human being make the kill decision within a certain time of the killing is a novel form of arms control. Moreover, the technology of autonomous killing is under development, leaving the design of rules a matter of prediction. Richard Jackson, a civilian Pentagon lawyer, has asserted that it is not possible to develop a treaty on a technology that is not yet in use.<sup>51</sup> In fact, international law does prohibit certain future technologies. The ban on blinding laser weapons was developed before the technology came into use.<sup>52</sup> There are analogous bans, such as the ban on all forms of human cloning, despite the fact that the technology for human cloning did not exist when the ban was adopted.<sup>53</sup> Both of these bans rest on fundamental moral and ethical views of the technology.

Despite the challenge of regulating a developing weapons technology, there are advantages to acting before the technology is widely available. It may be possible, as in the case of blinding laser weapons, to get agreement in part because states do not yet have the technology. Additionally, the norm can be developed from existing principles used to regulate existing near-autonomous weapons systems. An incremental step in law development can enhance the perceived legitimacy of the new rule. Building on current rules overcomes the problem of regulating a hypothetical and may have a positive impact in developing new, more appropriate ethical/legal norms beyond the case of future robotic weapons. For example, land mines are a type of automatic weapon that operates by detonating under certain conditions rather than when a human being presses a button or pulls a trigger. A ban on fully autonomous killing could reinforce the existing legal and moral prohibition on land mines, even leading states not party to the land mines treaty to consider themselves bound. A ban on autonomous killing may also lead us to revisit other weapons technology, such as the intercontinental ballistic missile (ICBM), which apparently has no failsafe to interrupt it after launch. A norm against autonomous killing might necessitate retrofitting ICBMs and similar weapons. Currently a human being makes the decision to launch an ICBM, but after that the missile locks on its target, making it impossible to abort the strike. A norm against autonomous killing could drive the development of new technology that would allow a human being to abort an attack prior to the moment of impact that is now many minutes after the decision to launch.

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## 12. Banning Autonomous Killing

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1. As Yale University ethicist Wendell Wallach writes, “For thousands of years the machines used in warfare have been extensions of human will and intention. Bad design and flawed programming have been the primary dangers posed by much of the computerized weaponry deployed to date, but this is rapidly changing as computer systems with some degree of artificial intelligence become increasingly autonomous and complex.” Wendell Wallach, “Terminating the Terminator: What to Do about Autonomous Weapons,” *Science Progress*, January 29, 2013, <http://scienceprogress.org/2013/01/terminating-the-terminator-what-to-do-about-autonomous-wea>



pons. For one of the first discussions of the ethics of autonomous killing, see, Robert Sparrow, “Killer Robots,” *Journal of Applied Philosophy* 24, no. 1 (2007): 62–77.

2. For a good history of weapons development and legal regulation, see Robert L. O’Connell, *Of Arms and Men: A History of War, Weapons, and Aggression* (Oxford: Oxford University Press, 1989).

3. The terminology may be developing and proliferating faster than the technology it seeks to identify. Unmanned aerial, land, and sea vehicles are being referred to collectively as “unmanned systems,” or UMS. Land-based unmanned vehicles are often referred to as robots, aerial unmanned vehicles as drones. Some prefer the term “remotely piloted aircraft,” or RPAs. See Christof Heyns, “Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions,” UN document A/HRC/23/47, 9 April 2013; Russell Buchan, “Truly Automated Weapons and International Humanitarian Law,” *Cambridge Journal of International and Comparative Law* blog, November 19, 2012, <http://www.cjicl.org.uk/index.php/cjicl-blog/truly-automated-weapons-and-international-humanitarian-law>; and Noel Sharkey, “Automating Warfare: Lessons Learned from the Drones,” *Journal of Law, Information & Science* 21, no. 2 (2011) and accompanying text for terminology related to autonomous systems.

4. For a history of lethal drone operations and a discussion of the law, see Mary Ellen O’Connell, “Unlawful Killing with Combat Drones: A Case History of Pakistan 2004–2009,” in *Shooting to Kill: Socio-Legal Perspectives on the Use of Lethal Force*, ed. Simon Bronitt, Miriam Gani, and Saskia Hufnagel (Oxford: Hart Publishing, 2012), 263.

5. Peter Finn, “A Future for Drones: Automated Killing,” *Washington Post*, September 19, 2011.

6. Peter W. Singer, “In the Loop? Armed Robots and the Future of War,” Brookings Web site, January 28, 2009, [http://www.brookings.edu/articles/2009/0128\\_robots\\_singer.aspx](http://www.brookings.edu/articles/2009/0128_robots_singer.aspx).

7. “Autonomous and semi-autonomous weapon systems shall be designed to allow commanders and operators to exercise appropriate levels of human judgment over the use of force”; United States Department of Defense, *Autonomy in Weapon Systems*, Department of Defense Directive 3000.09, November 21, 2012, 2, <http://www.dtic.mil/whs/directives/corres/pdf/300009p.pdf>.

8. “States should prohibit the creation of weapons that have full autonomy to decide when to apply lethal force”; Human Rights Watch, “Losing Humanity: The Case against Killer Robots,” November 19, 2012, 46, [http://www.hrw.org/sites/default/files/reports/arms1112ForUpload\\_0\\_0.pdf](http://www.hrw.org/sites/default/files/reports/arms1112ForUpload_0_0.pdf).

9. The Campaign to Stop Killer Robots has played a major role in getting agreement for an expert workshop in 2014 with the aim of starting a process that could result in Protocol VI 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, [http://www.icrc.org/eng/assets/files/other/icrc\\_002\\_0811.pdf](http://www.icrc.org/eng/assets/files/other/icrc_002_0811.pdf). E-mail to the author from Noel E. Sharkey, Nov. 18, 2013 (on file with the author.)

10. Heyns, “Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions.”

11. Wallach, “Terminating the Terminator.” Other ethicists and computer scientists have called for such a prohibition prior to 2013, see, e.g., Sparrow, “Killer Robots” and Noel E. Sharkey, “The Evitability of Autonomous Robot Warfare,” *International Review of the Red Cross* 94 (2012), 787.

12. Heyns, “Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions.”

13. These systems are also designated LARs (for “lethal autonomous robotics”). See Heyns, Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions. They have also been called “truly autonomous weapons (TAWs) to distinguish them from semi-automated weapons (SAWs).” See Buchan, “Truly Automated Weapons and International Humanitarian Law.” For more on terminology, see Sharkey, “Automating Warfare.”

14. United States Department of Defense, *Autonomy in Weapon Systems*, 1, 13–14.

15. Heyns, “Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions,” 7.

16. Deonna D. Neal, “In Defense of Humanity: Why Lethal Decision-Making Should Not Be Delegated to Machines,” presentation at the meeting of the International Society for Military Ethics, San Diego, CA, January 26, 2011.

17. Armin Krishnan, *Killer Robots: Legality and Ethicality of Autonomous Weapons* (Surrey, England: Ashgate Publishing, 2009), 4, cited in Human Rights Watch, “Losing Humanity,” 6.

18. Elizabeth Quintana, “The Ethics and Legal Implications of Military Unmanned Vehicles,” Royal United Services Institute for Defence and Security Studies, 2008 5, [http://www.rusi.org/downloads/assets/RUSI\\_ethics.pdf](http://www.rusi.org/downloads/assets/RUSI_ethics.pdf).

19. Neal, “In Defense of Humanity.”

20. See Werner J. A. Dahm, “Remarks,” Arizona State University Symposium on Drones, Remote Targeting and the Promise of Law, Washington, DC, February 24, 2011. Dahm is the director of Security and Defense Systems Initiative.

21. Dahm, “Remarks.”

22. Scott Shane, “Coming Soon: The Drone Arms Race,” *New York Times*, October 9, 2011.

23. Committee on Autonomous Vehicles in Support of Naval Operations National Research Council, *Autonomous Vehicles in Support of Naval Operations* (Washington, DC: National Academies Press, 2001), quoted in Sharkey, “Automating Warfare,” 144.

24. DoD Press Briefing with Mr. Weatherington from the Pentagon Briefing Room, Arlington, VA, December 18, 2007, <http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4108>, quoted in Sharkey, “Automating Warfare,” 144.

25. Human Rights Watch, “Losing Humanity”; see also Jeffrey S. Thurnher, “The Law That Applies to Autonomous Weapons Systems,” *ASIL Insights* 17, no. 4 (2012). Peter W. Singer writes, “Many experts have predicted that autonomous weapon systems will become the norm on the battlefield but the expected timeline for that to happen is about twenty years”; Peter W. Singer, *Wired for War: The Robotics Revolution and Conflict in the 21st Century* (New York: Penguin Press, 2009), 128.

26. Heyns, “Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions.”

27. Gary E. Marchant, “International Governance of Autonomous Military Robots,” *Columbia Science & Technology Law Review* 12 (2011), 276. The Israeli Iron Dome missile defense system is another autonomous system that does not require human intervention but allows for it. See Michael N. Schmitt and Jeffrey S. Thurnher, “Out of the Loop: Autonomous Weapon Systems and the Law of Armed Conflict,” *Harvard National Security Journal* 4, no. 231 (2013).

28. United Kingdom Ministry of Defence, *The UK Approach to Unmanned Aircraft Systems*, JDN 2/11 (London: Ministry of Defence, 2011), 502, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/33711/20110505JDN\\_211\\_UAS\\_v2U.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/33711/20110505JDN_211_UAS_v2U.pdf), citing Tony Gillespie and Robin West, “Requirements for Autonomous Unmanned Air Systems Set by Legal Issues,” *The International C2 Journal* 4, no. 2 (2010), [http://www.dodccrp.org/html4/journal\\_v4n2.html](http://www.dodccrp.org/html4/journal_v4n2.html).

29. See Ken Anderson and Matthew Waxman, “Law and Ethics for Robot Soldiers,” *Policy Review* 176 (2012), [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2046375](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2046375); John Markhoff, “War Machines: Recruiting Robots for Combat,” *New York Times*, November 27, 2010; and Finn, “A Future for Drones.”

30. Schmitt and Thurnher conclude: “Humans are never really ‘out of the loop.’ While autonomous weapon systems will increasingly be capable of solving complex problems, absent dramatic improvements in artificial intelligence, humans will decide when and where to deploy the system and what parameters to embed within it. . . . Although the subjective decisions may sometimes have to be made earlier in the targeting cycle than has traditionally been the case, this neither precludes the lawfulness of the decisions, nor represents an impediment to the lawful deployment of the systems.” “Out of the Loop,” 33.

31. *Ibid.*

32. Finn, “A Future for Drones.”

33. For a general overview of the law applicable to resort to lethal force, see O’Connell, “Unlawful Killing with Combat Drones.”

34. Article 51 provides: “Nothing in the present Charter shall impair the inherent right of individual or collective self-defence if an armed attack occurs against a Member of the United Nations, until the Security Council has taken measures necessary to maintain international peace and security. Measures taken by members in the exercise of this right of self-defence shall be immediately reported to the Security Council and shall not in any way affect the authority and responsibility of the Security Council under the present Charter to take at any time such action as it deems necessary in order to maintain or restore international peace and security.” Charter of the United Nations, Chapter VII, <http://www.un.org/en/documents/charter/chapter7.shtml>.

35. *Corfu Channel (United Kingdom of Great Britain and Northern Ireland v. Albania)*, Judgment, 1949 I.C.J. 4 (July 9), <http://www.icj-cij.org/docket/index.php?p1=3&p2=3&k=cd&case=1&code=cc&p3=4>.

36. Judith Gardam, *Necessity, Proportionality and the Use of Force by States* (Cambridge: Cambridge University Press, 2004); see also Henry Shue, “Proportionality in War,” in *The Encyclopedia of War*, ed. Gordon Martel (Malden, MA: Wiley-Blackwell, 2012).

37. 2005 World Summit Outcome, UN General Assembly document A/60/L.1, 15 September 2005, 22–23. Today all fully sovereign states are members of the United Nations.

38. Jean-Marie Henckaerts and Louise Doswald-Beck, eds., *Customary International Humanitarian Law* (Cambridge: ICRC, 2005), 13. See also two other initiatives sponsored by or associated with the ICRC: International Committee of the Red Cross, “Interpretative Guidance on the Notion of Direct Participation in Hostilities under International Humanitarian Law,” *International Review of the Red Cross* 90, no. 872 (2009); and Program on Humanitarian Policy and Conflict Research at Harvard University, *HPCR Manual on International Law Applicable to Air and Missile Warfare* (May 2009), <http://www.ihlresearch.org/amw/manual/>.

39. “The Court observes that the protection of the International Covenant of Civil and Political Rights does not cease in times of war, except by operation of Article 4 of the Covenant whereby certain provisions may be derogated from in a time of national emergency.” Legality of the Threat or Use of Nuclear Weapons, 1996 I.C.J. 226, para. 25 (Advisory Opinion of July 8), <http://www.icj-cij.org/docket/index.php?p1=3&p2=4&k=e1&p3=4&case=95>. See also Louise Doswald-Beck, *Human Rights in Times of Conflict and Terrorism* (Oxford: Oxford University Press, 2011).

40. See *Isayeva, Yusopova and Bazayeva v. Russia*, nos. 57947/00, 57948/00, and 57949/00, European Court of Human Rights, 24 February 2005, <http://www.humanrights.is/the-human-rights-project/humanrightscasesandmaterials/cases/regionalcases/europeancourtofhumanrights/nr/2615>; and *Juan Carlos Abella v. Argentina*, Case 11.137, Report No. 55/97, Inter-American Court of Human Rights, OEA/Ser.L/V/II.98, Doc. 6, rev. 18 November 1997, paras. 149–51, <http://www1.umn.edu/humanrts/cases/1997/argentina55-97a.html> (distinguishing “internal disturbances” from armed conflict on the basis of the nature and level of violence).

41. See Germain G. Grisez, “Toward a Consistent Natural Law Ethics of Killing,” *American Journal of Jurisprudence* 15 (1970): 76, cited in David Hollenbach, *Nuclear Ethics: A Christian Moral Argument* (Mahwah, NJ: Paulist Press, 1983), 18–19. Hollenbach describes how the just war tradition evolved from Aquinas’s position presuming that war is sinful to one presuming war is just so long as it is waged by legitimate authorities. Hollenbach argues in favor of returning to the presumption that violent warfare is presumed to be morally wrong and that resort to war is justifiable only in exceptional situations. Hollenbach, *Nuclear Ethics*, 14–16. Hollenbach’s position is consistent with current international law on the use of force, as reviewed above. See Jeremy Waldron, “Can Targeted Killing Work as a Neutral Principle?” Public Law Research Paper No. 11–20, NYU School of Law, March 24, 2011, [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1788226](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1788226).

42. International Committee of the Red Cross, “Interpretative Guidance on the Notion of Direct Participation in Hostilities under International Humanitarian Law,” 80–81.

43. Markhoff, “War Machines.”

44. Finn, “A Future for Drones.”

45. Anderson and Waxman, “Law and Ethics for Robot Soldiers.”

46. See Richard Jackson, Assistant to the Army Judge Advocate, “Remarks,” Symposium on Drones, Remote Targeting and the Promise of Law, Washington DC, February 24, 2011, <http://www.ustream.tv/recorded/12911842>.

47. *Ibid.*

48. The problem of accountability was a critical issue that drove the UN Special Rapporteur to call for a moratorium on development of fully autonomous weapons.

Heyns, “Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions.”

49. For the ease of killing with drones, see Mary Ellen O’Connell, “Seductive Drones: Learning from a Decade of Lethal Operations,” *Journal of Law, Information, & Science* 21, no. 2 (2011): 116–39.

50. Justin McClelland, “The Review of Weapons in Accordance with Article 36 of Additional Protocol I,” *International Review of the Red Cross* 85, no. 850 (June 2003): 408, [http://www.icrc.org/eng/assets/files/other/irrc\\_850\\_mcclelland.pdf](http://www.icrc.org/eng/assets/files/other/irrc_850_mcclelland.pdf); Patrick Worsnip, “U.N. Official Calls for Study of Ethics, Legality of Unmanned Weapons,” *Washington Post*, October 24, 2010. See “The Statement of the 2010 Expert Workshop on Limiting Armed Tele-Operated and Autonomous Systems,” International Committee for Robot Arms Control (ICRAC) statement, Berlin, 2010, at <http://icrac.net/statements/>.

51. Jackson, “Remarks.”

52. See Convention on Certain Conventional Weapons, Protocol IV, Blinding Laser Weapons (May 3, 1996).

53. “Member States are called upon to prohibit all forms of human cloning inasmuch as they are incompatible with human dignity and the protection of human life”; United Nations Declaration on Human Cloning, UN General Assembly Resolution 59/280, March 23, 2005.