

NOTES

WHAT WE TALK ABOUT WHEN WE TALK ABOUT KILLER ROBOTS: THE PROSPECTS OF AN AUTONOMOUS WEAPONS TREATY

*Collin M. Douglas**

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* J.D. Candidate, University of Georgia School of Law, 2023; M.A. in International Studies, University of Oklahoma, 2017; B.A. in International Studies, University of Oklahoma, 2015.

I. INTRODUCTION

Artificial intelligence is rapidly advancing and being used in a variety of industries for a variety of purposes.¹ Rightly or wrongly, artificial intelligence has been deployed in sectors as diverse as finance, health care, criminal justice, and transportation.² As with most new technologies, it was only a matter of time until the development of artificial intelligence turned toward the battlefield.³

The development of autonomous weapons led many to warn of the potential dangers of unleashing weapons controlled by artificial intelligence, also known as autonomous weapon systems (AWS).⁴ Most notably, this development led to the creation of the Campaign to Stop Killer Robots (CKR), which intends to do just that. CKR advocates for an international treaty banning the use and development of AWS.⁵ The organization touts the support of more than 200 non-governmental organizations and academic partners, thousands of artificial intelligence experts, and a majority of the public for a treaty banning the use of AWS.⁶

It would be easy to dismiss attempts to regulate AWS as unlikely simply because powerful states do not want to regulate these systems.⁷ While this

¹ Darrell M. West & John R. Allen, *How Artificial Intelligence Is Transforming the World*, BROOKINGS (Apr. 24, 2018), <https://www.brookings.edu/research/how-artificial-intelligence-is-transforming-the-world>.

² *Id.*

³ Stephen Johnson, *Autonomous Killer Robots May Have Already Killed on the Battlefield*, BIG THINK (June 15, 2010), <https://bigthink.com/politics-current-affairs/lethal-autonomous-weapon-systems>.

⁴ Liam McIntyre, *Autonomous Weapons Systems Threaten Peace, Says Vatican Official*, CRUX (Mar. 28, 2019), <https://cruxnow.com/vatican/2019/03/autonomous-weapons-systems-threaten-peace-says-vatican-official> (“On several occasions, the Holy See has warned against the use and development of LAWS or, so-called killer robots, which include military drones, unmanned vehicles and tanks and artificially intelligent missiles.”); Kelsey Piper, *Death by Algorithm: The Age of Killer Robots Is Closer than you Think*, VOX, (June 21, 2019, 8:20 AM), <https://www.vox.com/2019/6/21/18691459/killer-robots-lethal-autonomous-weapons-ai-war>. For a discussion of the terminology associated with autonomous weapons and why this Note uses AWS, see *infra* Part II(A).

⁵ *Negotiating a Treaty on Autonomous Weapons Systems: A Way Forward*, CAMPAIGN TO STOP KILLER ROBOTS, <https://www.stopkillerrobots.org/wp-content/uploads/2022/06/Stop-Killer-Robots-Negotiating-a-Treaty-on-Autonomous-Weapons-Systems-The-Way-Forward.pdf> (last visited Jan. 15, 2023).

⁶ *Our Member Organisations*, CAMPAIGN TO STOP KILLER ROBOTS, <https://www.stopkillerrobots.org/a-global-push/member-organisations> (last visited Jan. 15, 2023).

⁷ KELLEY M. SAYLER, CONG. RSCH. SERV., IF11294, INTERNATIONAL DISCUSSIONS CONCERNING LETHAL AUTONOMOUS WEAPON SYSTEMS (2021) (listing the United States, United Kingdom, France, Russia, Israel, and others as opposing a preemptive ban on lethal autonomous weapon systems).

lack of desire to regulate AWS use may partly explain why a regulatory framework has not come to be, there are subtler, more nuanced forces preventing its creation. A treaty regulating or banning autonomous weapons is unlikely to be created in the near future because of the specific characteristics of autonomous weapons and their contrast with other weapons which have been regulated, how these weapons are perceived by the general public, and how activists talk about them.

This Note will argue that a treaty regulating autonomous weapons systems is unlikely to come into being in the near future, and if one does, it will most likely follow the regulatory path of nuclear weapons by starting with non-proliferation. This Note will compare the conditions which brought about other similar and notable weapons regulations or weapons ban treaties with the current conditions surrounding, and the perception of, autonomous weapons. The analysis will also focus on specific characteristics of AWS and how these are distinguished from successfully regulated technologies. This Note will further discuss how AWS are less likely to be regulated because the subjective factors affecting their perceptions among the general public, activists, and policymakers indicate that there is a high value on their development and use but a low perceived value of their negative characteristics.

The conditions surrounding regulated weapons that will be examined are: (i) whether there is a well-publicized use of that weapon that creates a striking image for the public, (ii) whether there is a legitimate or valuable dual use for the weapon, (iii) the military or strategic value placed on the weapon, (iv) the length of time and extent to which the weapon was deployed before its regulation or ban, (v) the likelihood that the weapon would be used by non-state actors or rogue states, and (vi) the framing and messaging that those supporting a regulation or ban invoke in their campaigns.

This Note will examine factors leading up to and playing a part in the regulation or banning of weapons by the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction;⁸ the Nuclear Nonproliferation Treaty⁹ (and other nuclear weapons treaties generally); and Protocol IV to the Convention on Certain Conventional Weapons, otherwise known as the Protocol on Blinding Laser Weapons.¹⁰ This Note will then argue that specific characteristics of AWS

⁸ Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction, *opened for signature* Dec. 3, 1997, 2056 U.N.T.S. 211 [hereinafter Mine Ban Treaty].

⁹ Treaty on the Non-Proliferation of Nuclear Weapons, *opened for signature* July 1, 1968, 21 U.S.T. 483, 729 U.N.T.S. 161.

¹⁰ Additional Protocol 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, *adopted* Oct. 13, 1995, 2024 U.N.T.S. 163 [hereinafter Treaty on Blinding Laser Weapons].

complicate their road to regulation by examining and comparing the characteristics of AWS with the specific factors which led to the regulation or banning of other weapons, including their inherent features and how the threats posed by these weapons were discussed and perceived leading up to their regulation. By considering how the weapons are discussed by activists, members of the military, politicians, and other powerful and elite groups, this Note will examine the effects on how the weapons are perceived, and therefore, how they are regulated. The second part of this argument focuses on how autonomous weapons match up against those characteristics which led to the regulation or banning of other weapons and explores explanations of why AWS are less likely to be regulated. This comparative analysis provides insight into how to approach regulating AWS specifically, but also how to approach regulating weapons more broadly.

Part II will examine the details of what autonomous weapons are and how they are deployed. Part II will also discuss other treaties regulating or banning weapons, how those treaties came about, how the actors supporting those treaties framed them, and what societal ill the treaty was aimed at. Part III will compare those previous treaties and the weapons they regulate with the proposed autonomous weapons treaty and AWS. Part III will also argue that the factors that led to the regulation of nuclear weapons, anti-personnel mines, and blinding laser weapons do not favor the creation of an autonomous weapons treaty. Part IV will conclude by discussing how a change in the unsettled nature of autonomous weapon systems could affect the likelihood that they are regulated by a treaty.

II. BACKGROUND

A. Use and Regulation of Autonomous Weapons

Autonomous weapons have not yet been widely deployed on the battlefield, but interest in their use and development is rapidly increasing. Increased interest and attention in AWS on the part of militaries is mirrored in the public discourse, where regulation is now a central discussion point.

An important distinction for understanding autonomous weapons is that they are not actually weapons. AWS are systems for controlling weapons. To illustrate this point, imagine a soldier holding a rifle. This image is typical of what someone would associate with the military, and the rifle in the soldier's hand is typical of the image someone would associate with the word weapon. The rifle and the soldier holding the rifle are a weapon and that weapon's operating system, respectively. The soldier is the system that operates the rifle. To automate this system, the rifle does not change, the soldier does. Automating that system turns the soldier into a computer program with the ability to hold, aim, and shoot that weapon without human intervention. This is why

AWS are not technically weapons, but because they are human-less machines that operate weapons, they are themselves referred to as weapons.

The lack of a widely agreed-upon definition of autonomous weapons complicates their discussion.¹¹ The United Nations Institute for Disarmament Research compiled the different ways that states and organizations have proposed to define AWS, which can be broken down into three categories: a technology-centered approach, a human-centered approach, and a function-centered approach.¹²

The technological approach focuses on a detailed, technical definition of autonomous weapons.¹³ This is the type of definition that is typical to arms control treaties, one which deals in “aspects such as technical specifications, range, payload, and intended operating environment.”¹⁴ The most apparent problem with this definition is the fact that “[a]utonomy is a characteristic, not a thing in and of itself. . . . It could be applied to different parts of any system. . . . You might have an adjustable object with an autonomous mode, automatic mode and human-operated mode. It will be difficult to capture the variety of characteristics.”¹⁵ The concept of autonomy could be applied to any number of systems, lethal or non-lethal, for any number of purposes, at any level of sophistication. A technical definition of autonomy would be so convoluted as to be unworkable.

The human-centered approach to defining autonomous weapons systems is the most intuitive. This definition is human-centered in that it focuses on what a human is *not* doing, or in other words, what level of control the human has given over to the machine. The language associated with this definition, whether a human is “in, on, or out of the loop,”¹⁶ conveys whether human judgment remains in the decision-making process of that weapon system. The loop is the process of monitoring for targets, finding a target, and engaging that target.¹⁷ A “human in the loop” system is one that is not fully automated because a human must still act in the targeting or firing stage.¹⁸ A “human out

¹¹ KELLEY M. SAYLER, CONG. RSCH. SERV., IF11294, INTERNATIONAL DISCUSSIONS CONCERNING LETHAL AUTONOMOUS WEAPON SYSTEMS (2021).

¹² U.N. INST. FOR DISARMAMENT RSCH., THE WEAPONIZATION OF INCREASINGLY AUTONOMOUS TECHNOLOGIES: CONCERNS, CHARACTERISTICS AND DEFINITIONAL APPROACHES 19–22 (2017), <https://www.unidir.org/files/publications/pdfs/the-weaponization-of-increasingly-autonomous-technologies-concerns-characteristics-and-definitional-approaches-en-689.pdf>.

¹³ *Id.* at 19.

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ *Id.* at 20.

¹⁷ KELLEY M. SAYLER, CONG. RSCH. SERV., IF11150, DEFENSE PRIMER: U.S. POLICY ON LETHAL AUTONOMOUS WEAPON SYSTEMS (2020) (explaining that these systems would be classified as semi-autonomous systems).

¹⁸ *Id.*

of the loop” system is one that is fully automated because the entire process of target acquisition and engagement is left to the weapon system.¹⁹ A “human on the loop” system is one that does not require human action but is monitored by a human and allows for human intervention in the process.²⁰

The functional definition centers on what tasks are controlled by an autonomous system. Under this definition, an autonomous weapon system would be one in which the “‘critical functions’ of acquiring, tracking, selecting and attacking targets” are controlled autonomously.²¹ This is the definition which was embraced by the International Committee for the Red Cross (ICRC), giving it considerable weight.²² While the ICRC does not explain explicitly why these functions are “critical,” it is likely because these functions are what we think of as the core steps in taking a life in combat. Automation in other functions, like in “‘homing’ munitions that . . . search for and attack preprogrammed categories of targets”²³ is much more commonplace on the battlefield, and any stigma against their use has passed.²⁴ The inherent problem in defining and categorizing AWS is that they are not new weapons; rather, they are a new operating system for existing weapons. They cannot be stockpiled in a warehouse, inventoried, tracked, and destroyed the same way anti-personnel mines and chemical weapons can. A weapon’s autonomy is not readily apparent on the surface.²⁵

The United States Department of Defense has defined an autonomous weapon system as one that “once activated, can select and engage targets without further intervention by a human operator.”²⁶ Other countries, including the United Kingdom, base their definition on the cognitive ability of the system, and whether that level rises to that of a human.²⁷ The most agreed-upon, yet still vague, definition focuses on two characteristics: “full autonomy . . . and the potential to produce lethal effects.”²⁸

¹⁹ *Id.*

²⁰ *Id.*

²¹ Int’l Comm. of the Red Cross, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects*, 7 (Nov. 2014).

²² *Id.*

²³ *Id.* at 14. Auto-pilot is one autonomous feature that is in wide use and commonly known, yet not a critical function in the sense used here. *Id.* at 13, 15.

²⁴ See *id.* at 17 (describing “an increased number of armed robotic systems in use” and suggesting that “defensive anti-materiel autonomous weapon systems might be seen as more acceptable” in current practice).

²⁵ See Frank Sauer, *Stepping Back from the Brink: Why Multilateral Regulation of Autonomy in Weapons Is Difficult, Yet Imperative and Feasible*, 102 INT’L REV. RED CROSS 235 (2020).

²⁶ DEP’T OF DEF., DIRECTIVE NO. 3000.09, AUTONOMY IN WEAPON SYSTEMS 13 (2012), https://irp.fas.org/doddir/dod/d3000_09.pdf.

²⁷ KELLEY M. SAYLER, CONG. RSCH. SERV., IF11294, INTERNATIONAL DISCUSSIONS CONCERNING LETHAL AUTONOMOUS WEAPON SYSTEMS (2021).

²⁸ *Id.*

The problem of the lack of a universal definition is compounded by the fact that there are a variety of acronyms that describe and further categorize autonomous weapons. These acronyms include autonomous weapon systems (AWS),²⁹ lethal autonomous weapon systems (LAWS),³⁰ and fully autonomous weapon systems (FAWS).³¹ While these distinctions are important for the regulation and policy making surrounding autonomous weapons, they are invoked interchangeably, and this Note will use autonomous weapon systems as a catch-all phrase unless specified otherwise.

Autonomous weapons are currently sold and deployed abroad. For example, the Israeli HARPY system is a “loitering munition” marketed as autonomous and works by engaging the target on its own after launch.³² The system is not currently marketed for lethal use but rather for destruction of “radiating targets” like radar and surface-to-air missile installations.³³ However, HARPY relies on a sixteen kilogram warhead to achieve its purpose of destroying radar sites, meaning that autonomous systems, fully capable of taking a human life, are currently marketed and sold abroad, although not explicitly for lethal purposes.³⁴ Additionally, there is at least one report of an AWS killing on the battlefield as part of the Turkish mission in Libya in 2020.³⁵ Despite limited AWS deployment, there is a steady stream of voices calling for a total ban on AWS, which is gaining growing support.³⁶

²⁹ See, e.g., Nathan Leys, *Autonomous Weapon Systems, International Crises, and Anticipatory Self-Defense*, 45 YALE J. INT’L L. 377, 378 (2020).

³⁰ See, e.g., KELLEY M. SAYLER, CONG. RSCH. SERV., IF11294, INTERNATIONAL DISCUSSIONS CONCERNING LETHAL AUTONOMOUS WEAPON SYSTEMS (2021). Lethal autonomous systems and autonomous systems are separated by their uses, in that autonomous weapon systems could be used for a wider variety of purposes than killing combatants.

³¹ See, e.g., John Lewis, Comment, *The Case for Regulating Fully Autonomous Weapons*, 124 YALE L.J. 1309, 1309 (2015).

³² HARPY, IAI, <https://www.iai.co.il/p/harpy> (last visited Jan. 17, 2023).

³³ *Id.*

³⁴ *Id.* Marketing materials do not speak to whether HARPY can detect when a human is in the vicinity of the radiation sources it seeks out. The fact that HARPY detects radiation likely means that it cannot. See *id.*

³⁵ Final Rep. of the Panel of Experts on Libya, transmitted by Letter dated 8 March 2021 from the Coordinator of the Panel of Experts. Established Pursuant to Security Council Resolution 1973 (2011), ¶¶ 63–64, U.N. Doc. S/2021/229 (Mar. 8, 2021) (“Logistics convoys and retreating HAF were subsequently hunted down and remotely engaged by the unmanned combat aerial vehicles or the lethal autonomous weapons systems such as the STM Kargu-2.”); Bryan Walsh, *The Age of Killer Robots May Have Already Begun*, AXIOS (May 29, 2021), <https://www.axios.com/age-killer-robots-begun-8e8813d9-0fa1-4529-baf9-3358c1703bee.html> (“If confirmed, it would likely represent the first-known case of a machine-learning-based autonomous weapon being used to kill.”).

³⁶ *Our Member Organisations*, *supra* note 6.

The development of autonomous weapons technology can only be expected to increase in the near future due to the clear incentives for its continued development.³⁷ There are two major incentives for the continued advancement of AWS: the replacement of human soldiers with non-humans and the possible increased efficiency of automated systems.³⁸ Automated systems could have a direct effect on the exposure of soldiers to combat. AWS could completely take over jobs from human soldiers and eliminate the risk of injury or death.³⁹ There is considerable political capital in replacing human soldiers with automated systems because wars are, and always have been, contentious political issues.⁴⁰ Reducing the exposure of soldiers to dangers by decreasing the number of tasks that must be completed by human soldiers is a desirable option for policymakers.⁴¹ Conversely, reducing exposure to human soldiers—having less skin in the game—decreases political barriers to conflict which could lead to more conflict in general. Obviously, this on-the-ground benefit of AWS would only apply to the side of the conflict which possesses AWS. As for decision-making, humans need to take time to weigh options, consider possibilities, and debate courses of action. Presumably, AWS could do these things in a fraction of the time it would take a human.

B. Calls for an Autonomous Weapons Treaty

The most prominent effort promoting a treaty regulating or banning AWS is the Campaign to Stop Killer Robots. The organization has been active since 2012 and represents many non-governmental organizations in its goal of “build[ing] and strengthen[ing] social norms that reject autonomous killing by machine in warfare, policing, border control and other circumstances.”⁴² CKR makes moral and practical arguments against the use and production of AWS. The moral arguments center on the possibility of taking the human out of the decision-making process of pulling a trigger. CKR argues that “[k]iller robots change the relationship between people and technology by handing over life

³⁷ Rebecca Crootof, *The Killer Robots Are Here: Legal and Policy Implications*, 36 CARDOZO L. REV. 1837, 1865–69 (2015).

³⁸ *Id.* at 1866.

³⁹ *Id.* at 1865–67.

⁴⁰ *Id.* at 1865–66.

⁴¹ *See id.*

⁴² *Our Vision and Values*, CAMPAIGN TO STOP KILLER ROBOTS, <https://www.stopkillerrobots.org/vision-and-values> (last visited Jan. 17, 2023). The organization lists a staggering variety of member organizations from around the world among its supporters, the most prominent being Human Rights Watch and Amnesty International. *Our Member Organisations*, *supra* note 6.

and death decision-making to machines.”⁴³ The moral argument made by CKR also rests on the central tenets of international humanitarian law, proportionality and distinction, by claiming that an AWS would not have “the human judgment necessary to evaluate the proportionality of an attack”⁴⁴ nor would it be able to “distinguish civilian from combatant.”⁴⁵

The practical arguments made by CKR center on the question of accountability for attacks by AWS and the larger political and strategic ramifications of their use. They argue specifically that using machines instead of soldiers would lower the threshold of committing to armed conflict, thereby leading to increased conflict.⁴⁶ Relatedly, they argue that the rapid decision-making of AWS could cause mistakes that might lead to “unanticipated consequences that could inflame tensions.”⁴⁷ More plainly, AWS might decide to target something that a human would know not to target, which could lead to a retaliation that would escalate conflict. This concern would be heightened in a scenario where opposing sides of a conflict both possess AWS, acting against each other.

Other organizations have called for an AWS treaty, including the Future of Life Institute which published an open letter calling for “a ban on offensive autonomous weapons beyond meaningful human control.”⁴⁸ This open letter garnered the support of disparate voices like Stephen Hawking, Elon Musk, Noam Chomsky, Jack Dorsey, and several thousand artificial intelligence researchers.⁴⁹ Elite actors and institutions have been at the forefront of this debate, not the least of which is Secretary-General of the United Nations António Guterres, who clearly laid out his position that “machines that have

⁴³ *Problems with Autonomous Weapons*, CAMPAIGN TO STOP KILLER ROBOTS, <https://www.stopkillerrobots.org/stop-killer-robots/facts-about-autonomous-weapons> (last visited Jan. 15, 2023).

⁴⁴ *Military and Killer Robots*, CAMPAIGN TO STOP KILLER ROBOTS, <https://www.stopkillerrobots.org/military-and-killer-robots> (last visited Jan. 15, 2023). The Campaign has recently tweaked its messaging to focus less on the law itself but uses those principles as a basis for its messaging. See *Problems with Autonomous Weapons*, *supra* note 43.

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *The Problem*, CAMPAIGN TO STOP KILLER ROBOTS, <https://web.archive.org/web/20210908054312/https://www.stopkillerrobots.org/learn> (last visited Jan. 15, 2023).

⁴⁸ *Autonomous Weapons: An Open Letter from AI & Robotics Researchers*, FUTURE OF LIFE INST., <https://futureoflife.org/open-letter-autonomous-weapons> (last visited Jan. 17, 2023).

⁴⁹ *Id.*

the power and the discretion to take human lives are politically unacceptable, are morally repugnant, and should be banned by international law.”⁵⁰

The moral calls for an AWS treaty also carried over into academic literature, which uses a more focused International Humanitarian Law (IHL) analysis, often relying on the concept of human dignity to justify regulation.⁵¹ The IHL critique of AWS centers on the issues of proportionality and distinction, both central tenets of IHL.⁵²

The principle of proportionality was codified in the First Additional Protocol to the 1949 Geneva Convention and generally requires that the civilian collateral damage of any attack not be disproportionate to the military advantage of the attack.⁵³ Specifically, the Protocol bars any “attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.”⁵⁴ The process of weighing potential damage to civilians against potential military gain is a subjective, complex, and abstract decision-making process. When opponents of AWS invoke proportionality, they argue that AWS would never have the capability to weigh these factors and make these determinations in the same way that a human operator could.⁵⁵ This level of judgment and discretion is something only a human could handle, they argue.⁵⁶ Opponents of AWS contend that the standards by which proportionality is judged—the reasonable commander standard, good faith, and common sense—are impossible to translate into software.⁵⁷ The solution, AWS proponents argue, is that AWS may develop in a way that allows them to “select and engage targets when there is little to no chance of collateral damage, but be required to seek out human approval for attacks with a higher likelihood of collateral damage.”⁵⁸

⁵⁰ Press Release, Secretary-General António Guterres, *Machines with Power, Discretion to Take Human Life Politically Unacceptable, Morally Repugnant*, Secretary-General Tells Lisbon ‘Web Summit’, U.N. Press Release SG/SM/19332 (Nov. 5, 2018).

⁵¹ See, e.g., Elvira Rosert & Frank Sauer, *How (Not) to Stop the Killer Robots: A Comparative Analysis of Humanitarian Disarmament Campaign Strategies*, 42 CONTEMP. SEC. POL’Y 4, 6–22 (2021) (“[T]he most straightforward argument against LAWS is not a legal but an ethical one, namely, the argument that delegating life and death decisions to machines infringes upon human dignity.”).

⁵² Lewis, *supra* note 31, at 1311–12.

⁵³ Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I), art. 51(5)(b), *adopted* June 8, 1977, 1125 U.N.T.S. 3 [hereinafter First Additional Protocol].

⁵⁴ *Id.*

⁵⁵ Crotoof, *supra* note 37, at 1876–79.

⁵⁶ *Id.* at 1876–77.

⁵⁷ See Christof Heyns (Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions), *Rep. of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions*, ¶ 72, Hum. Rts. Council, U.N. Doc. A/HRC/23/47 (Apr. 9, 2013).

⁵⁸ Crotoof, *supra* note 37, at 1877.

Users of AWS could deploy it in a way that complies with proportionality by restricting the situations in which they are deploying these systems, the argument goes. Hypothetically, but perhaps unrealistically, a commander could only deploy an AWS for a limited time during which any attack that weapon made would satisfy proportionality.⁵⁹ This approach theoretically could satisfy the proportionality requirement because “although they are autonomously selecting and engaging targets, the limited temporal span between their deployment and potential engagements permits a commander to take responsibility for the proportionality analysis.”⁶⁰ This usage very well could diminish some of the appeal to military commanders of the system. While the current understanding is that AWS are not wholly capable of making proportionality decisions completely autonomously, the deeper capabilities of AWS decision-making capacity on the battlefield are not completely understood. To comply with proportionality requirements, AWS would need to be deployed for a short amount of time and in a relatively “clean” environment where the risk of encountering civilians is low.⁶¹

Distinction, or the ability to distinguish between combatants and non-combatants, is a central tenet of IHL.⁶² Proponents of a treaty argue that an autonomous system does not have the same ability as a human to tell the difference between a combatant and a non-combatant reliably.⁶³ Distinction is difficult even for human operators, but a standard of performance roughly equal to human operators is the most likely standard expected from AWS.⁶⁴ When and if autonomous systems will be able to distinguish between objects in the same way that humans can is not a settled point.⁶⁵ It is possible that AWS might, eventually, be better at distinction due to “the benefit of better sensors and data processing, and [AWS] would be capable of making faster and more complex targeting decisions than humans can.”⁶⁶ One roboticist argued that AWS might even have an edge in decision-making because they do not have a self-preservation instinct, preventing any stress-induced impairments of decision-making.⁶⁷

However, opponents argue that developers of these weapons will never be able to program these systems to comply with international law sufficiently.⁶⁸ They argue that there are simply too many factors and nuances at

⁵⁹ *Id.* at 1878.

⁶⁰ *Id.*

⁶¹ *Id.* at 1879.

⁶² *Id.* at 1873.

⁶³ *Id.*

⁶⁴ *Id.* at 1874.

⁶⁵ *Id.*

⁶⁶ Erica H. Ma, Note, *Autonomous Weapons Systems Under International Law*, 95 N.Y.U. L. REV. 1435, 1444 (2020).

⁶⁷ *Id.* at 1445.

⁶⁸ *Id.* at 1446.

play for an algorithm to ever fully understand the complex situations encountered on the battlefield, especially “the qualitative ability to gauge human intention, which involves interpreting subtle, context-dependent clues, such as tone of voice, facial expressions, or body language.”⁶⁹

Some critics attack AWS because they argue that determining accountability for the actions of an autonomous system is murky at best and impossible at worst.⁷⁰ Determining accountability for actions, especially war crimes, is an important aspect of holding those responsible to account. While states are held responsible for their agent’s violations, individuals can also be held liable for war crimes.⁷¹ Critics of AWS argue that AWS make individual responsibility for actions impossible.⁷² An inability to assign responsibility for an attack could undermine the ability to hold those who commit war crimes accountable for their actions, and the nature of AWS further complicates the process. The process becomes complicated by the fact that traditionally the person who pulled the trigger and the person who gave the order are both complicit in a war crime. But with AWS, the thing pulling the trigger is not a person, and the link between command and action is more diffuse. In response, while admitting that accountability issues arising from the use of AWS are complex, those more hesitant to regulate autonomous weapons argue that “[w]hether a weapon is per se unlawful is not, and has never been, based on whether an individual can be held accountable for violations following from its use.”⁷³ While issues surrounding accountability may support the argument that AWS should be regulated, those issues does not support the argument that they are per se unlawful.⁷⁴

Some have argued that AWS should be banned not because they violate any specific law of war, but because they are violative of human rights and the concept of human dignity.⁷⁵ The application of human rights during armed conflict was a topic of some debate, but the International Court of Justice partly settled this in its *Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons*.⁷⁶ In short, the Court found that human rights apply during armed conflict, but the relevant standard for human rights principles shift

⁶⁹ HUM. RTS. WATCH & INT’L HUM. RTS. CLINIC, HARVARD L. SCH., ADVANCING THE DEBATE ON KILLER ROBOTS: 12 KEY ARGUMENTS FOR A PREEMPTIVE BAN ON FULLY AUTONOMOUS WEAPONS 5 (2014), https://www.hrw.org/sites/default/files/related_material/Advancing%20the%20Debate_8May2014_Final.pdf.

⁷⁰ Ma, *supra* note 66, at 1470–73.

⁷¹ HUM. RTS. WATCH & INT’L HUM. RTS. CLINIC, HARVARD L. SCH., *supra* note 69, at 12.

⁷² Ma, *supra* note 66, at 1472.

⁷³ Crootoof, *supra* note 37, at 1881.

⁷⁴ *Id.*

⁷⁵ Ma, *supra* note 66, at 1461–65.

⁷⁶ Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 226 (July 8).

during war.⁷⁷ Relying on that decision, opponents of AWS have argued that use of an autonomous weapon is inherently violative of human rights, specifically the prohibition of arbitrary deprivations of life.⁷⁸ The prohibition against arbitrary deprivations of life was codified in the International Covenant on Civil and Political Rights.⁷⁹ The use of AWS would be arbitrary because the weapon's use would be insufficiently predictable, would be discriminatory by amplifying existing human biases in their programming, and would lack transparency in the algorithm's decision-making process.⁸⁰

Other important IHL principles are even less applicable to AWS. The customary international law rule which prohibits the use of weapons that cause superfluous injury or unnecessary suffering is not directly applicable to AWS because AWS are not themselves weapons, but they are more akin to operating systems for weapons.⁸¹ The suffering or injury that AWS cause is no more or no less superfluous or unnecessary than the weapon that the autonomous system controls. Other weapons, namely nuclear weapons, anti-personnel mines, and blinding lasers share common characteristics with AWS and have been the subject of similar debates about their compliance with the law.

C. Nuclear Weapons

The comparison of nuclear weapons and AWS is apt for one important reason. Both weapons, while drastically different in scope and deployment, have been framed as potentially catastrophic weapons for humankind if unleashed on the world. Nuclear weapons are regulated by a series of treaties, rather than a single treaty, unlike many other regulated weapons.⁸² It is impossible to discuss the regulation of nuclear weapons without discussing the full picture of nuclear weapon regulation, including all treaties. Proposals existed to regulate and abolish nuclear weapons within a year of their first use

⁷⁷ Ma, *supra* note 66, at 1455–56.

⁷⁸ *Id.* at 1461.

⁷⁹ International Covenant on Civil and Political Rights art. 6, *adopted* Dec. 16, 1966, 999 U.N.T.S. 171.

⁸⁰ Ma, *supra* note 66, at 1467–70.

⁸¹ See *Rule 70. Weapons of a Nature to Cause Superfluous Injury or Unnecessary Suffering*, INT'L COMM. RED CROSS, http://www.icrc.org/customary-ihl/eng/docs/v1_rule70 (last visited Jan. 17, 2023).

⁸² See *infra* Parts II(D) and II(E) for discussions of the Anti-Personnel Mine Treaty and the Blinding Laser Weapons Treaty, respectively, which banned a weapon type with a single treaty.

in war,⁸³ but the first treaty regulating their development and use was not concluded until 1968.⁸⁴

The use of nuclear weapons in Hiroshima and Nagasaki had a varied impact on public consciousness, but regardless of the opinions, the graphic depictions of the events were striking. The full picture of the destruction and power of nuclear weapons was brought to light with John Hersey's *Hiroshima*.⁸⁵ Images from the blast sites demonstrated the sheer destructive power of this new kind of weapon.⁸⁶

The preamble to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) invokes the "devastation that would be visited upon all mankind by a nuclear war" and the need "to take measures to safeguard the security of peoples."⁸⁷ The wording of this preamble references the potential worldwide and catastrophic effects of nuclear war and the inherent danger to all of humanity involved. The use of nuclear weapons in Hiroshima and Nagasaki in 1945 demonstrated to the world the enormous destructive power of nuclear weapons, and this destructive power was on the minds of the international community in the immediate efforts to regulate nuclear weapons, eventually leading to the first regulation by the NPT.⁸⁸ This sentiment was summed in a comprehensive study of nuclear disarmament conducted by the Group of Experts, which described "[t]he destruction of Hiroshima and Nagasaki, both in terms of immediate as well as long-term horror" as "the most tragic demonstration

⁸³ Jill M. Sheldon, *Nuclear Weapons and the Laws of War: Does Customary International Law Prohibit the Use of Nuclear Weapons in All Circumstances?*, 20 FORDHAM INT'L L.J. 181, 228–29 (1996) ("In 1946, the U.S. representative to the U.N. Commission on Atomic Energy, Bernard Baruch, presented a U.S. State Department plan . . . Under the Baruch Plan, the United States proposed placing the world's atomic resources under the control of an international atomic development authority . . . The Baruch Plan required the removal of nuclear weapons from existing arsenals and the cessation of nuclear weapons production, but only after the implementation of the international authority.").

⁸⁴ Treaty on the Non-Proliferation of Nuclear Weapons, *supra* note 9.

⁸⁵ JOHN HERSEY, *HIROSHIMA* (1946); John Rash, *How 'Hiroshima' Made the World Understand Hiroshima*, STAR TRIB. (July 30, 2021, 5:30 PM), <https://www.startribune.com/how-hiroshima-made-the-world-understand-hiroshima/600083402> ("Most people [before Hersey's work], not just in America but around the world, had not really comprehended the true implications of entering into the Atomic Age, largely because there wasn't that much known about the experimental weapons and their radioactive fallout and aftermath, and how the bomb keeps killing after detonation, and how it really only took one bomb at this point to destroy an entire city.").

⁸⁶ Daryl G. Kimball, *Reality Check: The Atomic Bombings of Hiroshima & Nagasaki*, ARMS CONTROL ASS'N, <https://www.armscontrol.org/pressroom/2020-07/reality-check-atomic-bombings-hiroshima-nagasaki> (last visited Jan. 17, 2023) (describing, and showing through the embedded video, the total ruin in Hiroshima, as well as the effects on victims).

⁸⁷ Treaty on the Non-Proliferation of Nuclear Weapons, *supra* note 9, at pmbl.

⁸⁸ Sheldon, *supra* note 83, at 187.

of what is, by today's standards, not even considered a 'minimum nuclear destructive capability.'"⁸⁹

The significant potential civilian uses for nuclear research between the first use of nuclear weapons and their first regulation under a multilateral treaty likely led to the culmination of that treaty, the Nuclear Test Ban Treaty. Nuclear technology posed an enormous technological opportunity in the mid-twentieth century, large enough to result in the period being deemed the Atomic Age.⁹⁰ Nuclear weapons were so strategically valuable to their owners that they ushered in a multi-decade cold war which dominated global politics.⁹¹ The civilian uses of nuclear technology were largely inseparable from their military uses, due to the fact that “[e]xactly the same machines that produce nuclear fuel can produce weapons material.”⁹² The military and strategic value of nuclear weapons, or at least the value in the eyes of contemporary decision makers, was immense.

Proliferation of nuclear weapons has been a prime concern of states since their inception, although the emphasis of that concern has changed throughout time from other, rivalrous states acquiring these weapons, to rogue states and non-state actors acquiring them. The beginning of this process focused on stopping proliferation to other states, in an effort to prevent the cold war from destabilizing.⁹³ The NPT itself was partly a response to French tests of nuclear weapons which inflamed tensions and forecasted a period of widespread proliferation.⁹⁴ Later proliferation concerns centered on terrorism and the devastating and unpredictable effects of a nuclear terrorist attack.⁹⁵ The early years

⁸⁹ U.N. Secretary General, *General and Complete Disarmament: Comprehensive Study on Nuclear Weapons*, ¶ 490, U.N. Doc. A/35/392 (Sept. 12, 1980).

⁹⁰ Artemis Spyrou & Wolfgang Mittag, *Atomic Age Began 75 Years Ago with the First Controlled Nuclear Chain Reaction*, SCI. AM. (Dec. 3, 2017), <https://www.scientificamerican.com/article/atomic-age-began-75-years-ago-with-the-first-controlled-nuclear-chain-reaction>.

⁹¹ ENCYC. BRITANNICA, COLD WAR (2021).

⁹² Ivanka Barzashka, *Converting a Civilian Enrichment Plant into a Nuclear Weapons Material Facility*, BULL. ATOMIC SCI. (Oct. 31, 2013), <https://thebulletin.org/2013/10/converting-a-civilian-enrichment-plant-into-a-nuclear-weapons-material-facility>.

⁹³ See *The Nuclear Non-Proliferation Treaty (NPT), 1968*, OFF. OF THE HIST., FOREIGN SERV. INST., U.S. DEP'T OF STATE, <https://history.state.gov/milestones/1961-1968/npt> (last visited Jan. 15, 2023) (offering the U.S. view of the motivations for the Treaty).

⁹⁴ Daryl Kimball, *Nuclear Testing and Comprehensive Test Ban Treaty (CTBT) Timeline*, ARMS CONTROL ASS'N (Sept. 2022), <https://www.armscontrol.org/factsheets/NuclearTestingTimeline> (explaining that France tested its first nuclear weapon in 1960, continued throughout the 1960s and beyond, and was one of the first nations to have tested nuclear weapons to ratify the CTBT).

⁹⁵ Convention on the Physical Protection of Nuclear Material, *opened for signature* Mar. 3, 1980, 1456 U.N.T.S. 101; International Convention for the Suppression of Acts of Nuclear Terrorism pmbl., *adopted* Apr. 13, 2005, 2445 U.N.T.S. 89 (“Noting that acts of

of the War on Terror saw an increased concern with nuclear terrorism, leading to the creation of the Global Initiative to Combat Nuclear Terrorism, a partnership between the United States and Russia to strengthen protections against nuclear terrorism.⁹⁶ The fears of terrorists gaining access to nuclear material and unleashing a “dirty bomb” on a crowded city led to large investments into the security of nuclear weapons and facilities by Russia and the United States.⁹⁷

The strategic value, civilian use, and concerns with the proliferation of nuclear weapons have led to their thorough regulation. There are more treaties regulating placement and use of nuclear weapons than any other weapon discussed in this Note.⁹⁸ There are treaties which regulate how nuclear weapons may be tested, like the Comprehensive Test-Ban Treaty, which prevents states from conducting any testing or exploding of nuclear weapons.⁹⁹ The Limited Test Ban Treaty banned testing in certain highly sensitive environments—the atmosphere, outer space, and underwater.¹⁰⁰ The use of nuclear weapons on the seabed and in outer space are further regulated by their own respective treaties.¹⁰¹ There are also entire regions which have been deemed off-limits to

nuclear terrorism may result in the gravest consequences and may pose a threat to international peace and security.”).

⁹⁶ *The Global Initiative to Combat Nuclear Terrorism*, ARMS CONTROL ASS'N, <https://www.armscontrol.org/specialprojects/nnpm/GICNT> (last visited Jan. 17, 2023). Ironically enough, the Russian state is arguably the world's most prominent nuclear terrorist. See Daniel M. Gerstein, *Troubling Truth Beneath Litvinenko Headlines*, RAND CORP.: THE RAND BLOG (Jan. 21, 2016), <https://www.rand.org/blog/2016/01/troubling-truth-beneath-litvinenko-headlines.html> (discussing the numerous incidents of Russia using radioactive and chemical weapons and other countries who have supported the proliferation of chemical weapons).

⁹⁷ *Fact Sheet: Nuclear Terrorism: A Clear and Present Danger*, CTR. FOR ARMS CONTROL & NON-PROLIFERATION (Mar. 2021), <https://armscontrolcenter.org/nuclear-terrorism-a-clear-and-present-danger>.

⁹⁸ See Dakota S. Rudesill, *Regulating Tactical Nuclear Weapons*, 102 GEO. L.J. 99, 122–23 (2013) (listing thoroughly the many treaties regulating nuclear weapons).

⁹⁹ Comprehensive Nuclear-Test-Ban Treaty, *adopted* Sept. 10, 1996, S. TREATY DOC. NO. 105-28, 35 I.L.M. 1439.

¹⁰⁰ Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, Aug. 5, 1963, 480 U.N.T.S. 43 [hereinafter Limited Test Ban Treaty].

¹⁰¹ Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-bed and the Ocean Floor and in the Subsoil Thereof, Feb. 11, 1971, 955 U.N.T.S. 115; Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *opened for signature* Jan. 27, 1967, 610 U.N.T.S. 205.

nuclear weapons by treaty, including the entire continent of Africa,¹⁰² the South Pacific,¹⁰³ and Antarctica.¹⁰⁴

The nuclear weapon regulation regime was recently capped off by the Treaty on the Prohibition of Nuclear Weapons, concluded in 2017.¹⁰⁵ The Treaty calls for the total prohibition of the manufacture and possession of nuclear weapons.¹⁰⁶ Those campaigning for the regulation of nuclear weapons invoke the full range of principles which support weapons regulations, made clear by the Preamble to the Treaty on the Prohibition of Nuclear Weapons which refers to “the rule of distinction, the prohibition against indiscriminate attacks, the rules on proportionality and precautions in attack, the prohibition on the use of weapons of a nature to cause superfluous injury or unnecessary suffering, and the rules for the protection of the natural environment.”¹⁰⁷ While the Preamble of the Treaty invokes the principles of international law which the Treaty rests on, the campaign for the Treaty used a broader message. This campaign relied on a distinctly humanitarian message that is reflected by statements by the ICRC.¹⁰⁸ The President of the ICRC called the Treaty a “victory for humanity” and the ICRC noted the probable devastating effects of any use of nuclear weapons.¹⁰⁹ It is worth noting that no nuclear weapon states have ratified or signed this treaty, and the Treaty currently only has 68 state parties.¹¹⁰

D. Anti-Personnel Mines

Anti-personnel mines offer a useful point of comparison for AWS because anti-personnel mines are the clearest instance of a “fire and forget” weapon that has been widely deployed to the battlefield. Anti-personnel mines

¹⁰² African Nuclear-Weapon-Free Zone Treaty (Pelindaba Treaty), Apr. 11, 1996, 35 I.L.M. 702.

¹⁰³ South Pacific Nuclear Free Zone Treaty, *opened for signature* Aug. 6, 1985, 1445 U.N.T.S. 177.

¹⁰⁴ The Antarctic Treaty, Dec. 1, 1959, 402 U.N.T.S. 71.

¹⁰⁵ Treaty on the Prohibition of Nuclear Weapons, *opened for signature* Sept. 20, 2017, 57 I.L.M. 350.

¹⁰⁶ *Id.* at art. 1.

¹⁰⁷ *Id.* at pmb.

¹⁰⁸ *The International Red Cross and Red Crescent Movement Celebrates the Entry into Force of the Treaty on the Prohibition of Nuclear Weapons*, INT’L COMM. RED CROSS (Jan. 21, 2010), <https://www.icrc.org/en/document/international-red-cross-and-red-crescent-movement-entry-force-treaty-prohibition-nuclear-weapons>.

¹⁰⁹ *Id.* (“No health system, no government, and no aid organization is capable of adequately responding to the health and other assistance needs that a nuclear blast would bring.”).

¹¹⁰ *Treaty on The Prohibition of Nuclear Weapons*, U.N. OFF. OF DISARMAMENT AFFS., <https://treaties.unoda.org/tpnw> (last visited Jan. 17, 2023).

bringing up many of the same problems of attribution, distinction, and accountability that arise in the AWS debate. The Anti-Personnel Mine Treaty of 1997 was completed only after a significant time and considerable lobbying by a host of non-governmental organizations and governments.¹¹¹ High explosive anti-personnel mines had been regularly used since the American Civil War.¹¹² Anti-personnel mines saw over a hundred years of use before they were first regulated by treaty in 1983.¹¹³ The severe human harms posed by anti-personnel mines were very real and well-known long before the Anti-Personnel Mine Treaty was put into place.¹¹⁴ Anti-personnel mines were deployed in enormous numbers in the 20th century, especially in the Second World War where the estimated numbers used were “in the hundreds of millions.”¹¹⁵ The conflicts in Korea and Vietnam also saw large numbers of anti-personnel mines deployed.¹¹⁶ Around the time that the Treaty was completed, anti-personnel mines were maiming or killing approximately 26,000 civilians a year.¹¹⁷ As this grisly figure demonstrates, anti-personnel mines and their effects were a well-documented fact.

The Anti-Personnel Mine Treaty was largely the result of an unprecedented public campaign by the International Committee of the Red Cross.¹¹⁸ The unprecedented aspect of this campaign was that it was not only aimed at the experts, governments, and other elite actors that the ICRC normally deals with, but also at the general public.¹¹⁹ The campaign’s goal was “to stigmatize anti-personnel mines in the public conscience so that their use would be viewed, by . . . the general public, as abhorrent, just as the use of poison gas is now considered an outrage.”¹²⁰ The campaign used the media to reach an estimated 700 million people with a message emphasizing the human costs of

¹¹¹ Knut Dörmann & Louis Maresca, *The International Committee of the Red Cross and Its Contribution to the Development of International Humanitarian Law in Specialized Instruments*, 5 CHI. J. INT'L L. 217, 218 (2004).

¹¹² Lorraine Boissoneault, *The Historic Innovation of Land Mines—And Why We've Struggled to Get Rid of Them*, SMITHSONIAN MAG. (Feb. 24, 2017), <https://www.smithsonianmag.com/innovation/historic-innovation-land-minesand-why-weve-struggled-get-rid-them-180962276>.

¹¹³ 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, *opened for signature* Apr. 10, 1981, 1342 U.N.T.S. 137 (entered into force Dec. 2, 1983).

¹¹⁴ Dörmann & Maresca, *supra* note 111, at 219.

¹¹⁵ Sean Watts, *Regulation-Tolerant Weapons, Regulation-Resistant Weapons and the Law of War*, 91 INT'L L. STUD. 540, 581 (2015).

¹¹⁶ *Id.*

¹¹⁷ Stephanie M. Taverna, *The Anti-Personnel Mines Treaty: Protecting Civilians or Protracting Injuries?*, 22 SUFFOLK TRANSNAT'L L. REV. 567, 567 (1999).

¹¹⁸ Dörmann & Maresca, *supra* note 111, at 223.

¹¹⁹ *Id.*

¹²⁰ *Id.*

anti-personnel mines and the impacts on their victims.¹²¹ This media campaign relied heavily on images of the victims harmed by landmines that remained after wars concluded, often emphasizing the tendency for landmines to leave victims missing feet and legs.¹²² The horror of anti-personnel mines did not enter the public consciousness through a single well-publicized event, but rather through a steady exposure to the devastating effects of these weapons on their victims. The Preamble of the Anti-Personnel Mines Treaty invokes the “suffering and casualties caused by anti-personnel mines, that kill or maim hundreds of people every week, mostly innocent and defenceless civilians and especially children.”¹²³

As for a dual use of anti-personnel mines, there is essentially none. Because the treaty itself was narrowly focused on anti-personnel mines—mines that are specifically designed to injure and maim individuals—there is no legitimate civilian use of this technology.¹²⁴ Anti-personnel mines arguably create a detriment for civilians rather than a benefit, because their persistence in mined post-conflict areas inhibits agricultural and economic development.¹²⁵

The military or strategic value of anti-personnel mines is one factor that is not conclusively decided. Their most-often intended use is as a means to deny access to entire areas from enemy troops.¹²⁶ But their proliferation led to anti-personnel mines being used outside of traditional military doctrine and used “in guerrilla-type operations and internal conflicts.”¹²⁷ National policymakers and militaries argued, well into the 1990s, that anti-personnel mines had a significant military value.¹²⁸ Those insisting on their continued use were typically “Defence Ministries, which were reluctant to eliminate what they considered to be a highly effective weapon system from their national armouries.”¹²⁹ This support for anti-personnel mines by militaries was subjective, and the value of these weapons was not based on any factual determination of their utility.¹³⁰ The use of anti-personnel mines in non-international armed conflicts

¹²¹ *Id.* at 223–24.

¹²² ICBL Network, *Mine Ban Treaty Video*, YOUTUBE (Dec. 3, 2012), <https://www.youtube.com/watch?v=eaYp4vXMUWM> (tracing the history of the ICBL’s push for a landmine treaty and featuring many of the signature visual cues of the campaign).

¹²³ Mine Ban Treaty, *supra* note 8, at pmbl.

¹²⁴ *See id.*

¹²⁵ Theresa Oby Ilegbune, *Wartime Environmental Pollution and Endangerment: The Landmine Scourge and the Global Effort to Eliminate It*, 21 ANN. SURV. INT’L & COMPAR. L. 177, 182 (2016) (noting not only that landmines inhibit agricultural development, “but also transportation, communication and even emergency aid land routes”).

¹²⁶ Watts, *supra* note 115, at 581–82.

¹²⁷ INT’L COMM. OF THE RED CROSS, ANTI-PERSONNEL LANDMINES: FRIEND OR FOE? 9 (1996), https://www.icrc.org/en/doc/assets/files/other/icrc_002_0654.pdf.

¹²⁸ *Id.* at 12.

¹²⁹ *Id.*

¹³⁰ *Id.*

was more objectively practical. Mines were used in civil wars “in Cambodia and . . . Africa and Latin America” because of “their low cost and ease of use.”¹³¹ States did claim usefulness in the lead up to the conclusion of the Mine Ban Treaty, but the treaty has been widely adopted.¹³²

E. Blinding Laser Weapons

Blinding laser weapons, lasers which are intended to blind the naked eye, are the only weapon to be regulated, in modern times at least, while development was still in the beginning stages and before any meaningful battlefield deployment. This fact offers another useful point of comparison for AWS because AWS are in a similar, albeit slightly more advanced, development stage. Blinding lasers also were shrouded in a science-fiction mystique at the time of their regulation, much like AWS today. The Blinding Laser Weapons Treaty, a protocol to the existing Treaty on Conventional Weapons, is decidedly different from the other treaties discussed, but also most parallels the discourse surrounding AWS. Blinding laser weapons were never deployed on a battlefield before the protocol banning their use was put into effect.¹³³ Militarily powerful countries did not even begin to study the possibility of laser weapons until the 1980s.¹³⁴ The first proposal to regulate the use of these weapons followed quickly in 1986, when the governments of Sweden and Switzerland submitted a proposal to the ICRC conference “which would have pronounced the anti-personnel use of laser weapons to be illegal because they would cause unnecessary suffering or superfluous injury.”¹³⁵

Since blinding laser weapons were never deployed to the battlefield, there is no striking image associated with their use. There were fears of blinding lasers being deployed in the former Yugoslavia and in Iraq during the First Gulf War.¹³⁶ The U.S. Armed Forces Medical Intelligence Center reported

¹³¹ *Id.* at 20.

¹³² *Membership*, ANTI-PERSONNEL MINE BAN CONVENTION, <https://www.apmineban.convention.org/en/membership> (last visited Jan. 15, 2023) (listing 164 state parties to the Convention).

¹³³ *Precedent for Preemption: The Ban on Blinding Lasers as a Model for a Killer Robots Prohibition*, HUM. RTS. WATCH (Nov. 8, 2015, 11:55 PM), <https://www.hrw.org/news/2015/11/08/precedent-preemption-ban-blinding-lasers-model-killer-robots-prohibition> (describing the preemptive ban on blinding lasers).

¹³⁴ Burrus M. Carnahan & Marjorie Robertson, *The Protocol on “Blinding Laser Weapons”*: A New Direction for International Humanitarian Law, 90 AM. J. INT’L L. 484, 485 (1996) (mentioning the Soviet Union, United States, and United Kingdom specifically).

¹³⁵ Louise Doswald-Beck, *New Protocol on Blinding Laser Weapons*, 312 INT’L REV. RED CROSS 272, 273 (1996).

¹³⁶ HUMAN RIGHTS WATCH, U.S. BLINDING LASER WEAPONS, pt. I (1995), <https://www.hrw.org/reports/1995/General1.htm> (“During the Gulf War, British ground

that cases of blinding by laser were “highly probable” in the First Gulf War but did not confirm any.¹³⁷ There are also no well-known instances in fiction of blinding lasers.

There was limited development of laser weapons which could be used to blind. By 1995, there were two known examples of weapons being developed which could blind individuals, one of which was specifically marketed as doing so. Chinese-owned Norinco developed and marketed a system called the “Portable Laser Disturber” which was specifically marketed as being able to blind optical instruments or the naked eye.¹³⁸ The other laser weapon in development at the time was a U.S.-developed, rifle-mounted laser which was not specifically marketed as being able to blind the naked eye, although it was certainly capable of doing so.¹³⁹ The potential proliferation problems of laser systems with characteristics of small arms, like those discussed above, supported their regulation.¹⁴⁰ While proponents of the ban on these weapons were discouraged by their development, the demonstration of real-world potential made the case for the need for regulation.

The dual-use problem with regulating lasers was solved by the narrow scope of the protocol itself. The protocol contains a number of qualifications that safely remove from its scope any civilian development of laser technology.¹⁴¹ The protocol prohibits the use of lasers which are “specifically designed, as their sole combat function or as one of their combat functions, to cause permanent blindness to unenhanced vision.”¹⁴² This left ample room for the development of laser technology for civilian uses. The campaign and negotiations for Protocol IV coincided with huge strides in the civilian use and development of lasers. The compact disc (CD) was introduced in 1982, only a few years before the first call to regulate blinding lasers, and the digital vid-

forces were issued [sic] protective goggles because they were concerned about Russian-made lasers believed to be in service with the Iraqis. German pilots flying over the Iraqi no-fly zone were also issued laser protective goggles.”).

¹³⁷ *Id.*

¹³⁸ Doswald-Beck, *supra* note 135, at 283 (“[O]ne of its major applications is, by means of high-power laser pulses, to injure or dizzy (*sic*) the eyes of an enemy combatant, and especially anybody who is sighting and firing at us with an optical instrument.”).

¹³⁹ *Id.* at 283–84 (explaining that the potential to blind was increased by the fact that this was a rifle-mounted laser, which would increase the likelihood that it would be aimed at individuals in combat, as opposed to a separate laser system).

¹⁴⁰ *Id.* at 277.

¹⁴¹ Additional Protocol 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 art. 1, *adopted* Oct. 13, 1995, 2024 U.N.T.S. 163.

¹⁴² *Id.*

eodisc (DVD) was introduced to the market in 1995, the same year that Protocol IV was concluded.¹⁴³ Blinding laser weapons lacked any major military or strategic value, but lasers used for other purposes were militarily valuable. This factor led to the very narrow scope of Protocol IV because many states wanted to continue to freely use lasers “for range-finding and target designation.”¹⁴⁴ The use of blinding lasers was imagined as most beneficial in the context of “counterinsurgency, counterterrorism and peacekeeping” operations.¹⁴⁵ Ultimately, the usefulness for blinding lasers on the battlefield was never supported by commanders or military doctrine.¹⁴⁶

The campaign for the Blinding Laser Weapons Treaty relied on a proven framing for weapons bans, the immorality of the physical and psychological effects of the targeted weapon.¹⁴⁷ The ICRC relied on messaging surrounding the effect of these weapons on their victims, the soldiers that would be blinded by their use.¹⁴⁸ The messaging highlighted the second-order effects and disabilities of blindness, specifically emphasizing the depression caused by sudden blindness.¹⁴⁹ The imagery that the ICRC invoked in their materials was soldiers blinded by poison gas in the trenches of World War One.¹⁵⁰ The principle of international humanitarian law most often invoked by those advocating for the campaign to ban blinding laser weapons was the “prohibition against unnecessary suffering and superfluous injury.”¹⁵¹ The wider social consequences of any particular type of injury were also considered, which was the focus of much of the debate around blinding lasers.¹⁵²

III. ANALYSIS

A. Factors Which Lead to Regulation

The history of regulating weapons of war has plenty of examples of successful and unsuccessful campaigns to regulate certain weapons.¹⁵³ Some scholars have attempted to classify and dissect weapons in a way that might

¹⁴³ DVD, ENCYC. BRITANNICA (Sept. 21, 2021), <https://www.britannica.com/technology/DVD>.

¹⁴⁴ Doswald-Beck, *supra* note 135, at 279.

¹⁴⁵ HUMAN RIGHTS WATCH, BLINDING LASER WEAPONS: THE NEED TO BAN A CRUEL AND INHUMANE WEAPON (1995), <https://www.hrw.org/reports/1995/General1.htm>.

¹⁴⁶ *Id.*

¹⁴⁷ Doswald-Beck, *supra* note 135, at 281.

¹⁴⁸ *Id.*

¹⁴⁹ *Id.*

¹⁵⁰ *Id.* The ICRC was not subtle about the comparison, titling a brochure on the subject “*Blinding Weapons: Gas 1918...Lasers 1990s?*” *Id.*

¹⁵¹ HUMAN RIGHTS WATCH, *supra* note 145.

¹⁵² *Id.*

¹⁵³ See Crootof, *supra* note 37, at 1904–15.

allow for some prediction of whether they will be regulated.¹⁵⁴ These attempts include Sean Watts's use of effectiveness, novelty, deployment, medical compatibility, disruptiveness, and notoriety,¹⁵⁵ as well as Rebecca Crootof's factors of superfluous injury, inherent indiscriminateness, ineffective weapons, alternative military means, narrowly tailored prohibitions, prior regulations, public concern and civil society engagement, and sufficient state commitment.¹⁵⁶ However, there is no widely-accepted cohesive theory for why some weapons or methods of war are successfully regulated or banned while others escape regulation.¹⁵⁷

The taxonomies put forth by Watts and Crootof speak predominantly to a binary of regulation, whether a weapon is banned or not.¹⁵⁸ But regulation is much more easily understood as a spectrum, with no regulation on one extreme, and outright banning of use, possession, and development on the other. At minimum, all weapons are governed by the fundamental principles of laws of war and principles of international humanitarian law.¹⁵⁹ These principles include proportionality, distinction, and the prohibition of methods of war which cause superfluous injury.¹⁶⁰ Most conventional weapons, for instance, are regulated by the Arms Trade Treaty, which regulates the international commerce in weapons like helicopters, tanks, and small arms.¹⁶¹ The other extreme would be a weapon that is completely and thoroughly banned through international agreement, including the development, usage, and possession of such a weapon. Blinding laser weapons are an example of a weapon where use is entirely prohibited by international law.¹⁶²

The factors that determine where a weapon falls on this spectrum are a combination of concrete and abstract considerations. The concrete considerations reflect the fact that the realm of weapons regulation is where states are most likely to rely on realist motivations of power, competitive advantage, and unilateralism. The more abstract considerations account for perceptions among the public and elite actors, as well as the messages and framings conveyed by groups seeking regulation. These considerations represent a view

¹⁵⁴ Watts, *supra* note 115, at 542–43; Crootof, *supra* note 37.

¹⁵⁵ Watts, *supra* note 115, at 543.

¹⁵⁶ Crootof, *supra* note 37, at 1843.

¹⁵⁷ Watts, *supra* note 115, at 542.

¹⁵⁸ *Id.* at 608; Crootof, *supra* note 37, at 1884.

¹⁵⁹ See Watts, *supra* note 115, at 542 (“military necessity, discrimination, proportionality, and humanity or unnecessary suffering”).

¹⁶⁰ MARCO SASOLI ET AL., *Fundamental Principles of International Humanitarian Law*, in 1 HOW DOES LAW PROTECT IN WAR?, ch. 4, § III, at 10.

¹⁶¹ Arms Trade Treaty arts. 2, 3, *adopted* Apr. 2, 2013, 3013 U.N.T.S. 269. The Arms Trade Treaty has 110 state parties and 31 signatories. *Arms Trade Treaty*, U.N. OFF. FOR DISARMAMENT AFFS., <https://www.un.org/disarmament/convarms/arms-trade-treaty-2> (last visited Jan. 18, 2023).

¹⁶² Treaty on Blinding Laser Weapons, *supra* note 10, at art. 1.

that might be labelled constructivist, in that it focuses on perceptions, norm creation, and the socially constructed understandings of what these weapons mean.¹⁶³

i. Public Image

One of the most important factors in determining whether a particular weapon or weapon system will be banned is the image that weapon conjures in the public consciousness. If the public, including those involved in decisions to negotiate or the negotiations themselves, have a mental image of the horror of the particular weapon and its effects, they are more likely to be in favor of regulating or banning it.¹⁶⁴ The visceral mental image of a weapon's downrange effects will play a role in that person's thinking. This is most apparent in the case of nuclear weapons, which created a searing visceral image with their first use in 1945, followed by the steady stream of images of their testing in the 1950s and 1960s.¹⁶⁵ Anti-personnel mines create their own visceral image, albeit on a much smaller scale. The images of civilians, often children, that accompanied the campaign to ban anti-personnel mines relied on humanitarian and moral imagery. Additionally, the minimal visual impact associated with AWS, as compared to the visual effect of something like nuclear weapons, works to prevent its negative perception. AWS rely on existing weapons to do their damage, and other weapon systems, especially nuclear weapons, have their own distinct visual cues that leave an impression.

The more real—the more vivid—the image that comes to mind, the more likely it will spur that person to action. This factor is likely more important than all the others discussed. This factor is where calls for an AWS treaty will fail because the mental image of autonomous weapons that comes to mind is not the real-world effect of a battlefield-deployed weapon, but of science fiction and science fiction alone. Those involved in negotiations to regulate nuclear weapons had the mental image, publicized around the world, of Hiroshima and Nagasaki and their associated horrors.¹⁶⁶ Those involved in

¹⁶³ See Sarina Theys, *Introducing Constructivism in International Relations Theory*, E-INT'L REL. (Feb. 23, 2018), <https://www.e-ir.info/2018/02/23/introducing-constructivism-in-international-relations-theory> (explaining the basic background and central tenets of constructivism).

¹⁶⁴ See Lene Hansen, *Theorizing the Image for Security Studies: Visual Securitization and the Muhammad Cartoon Crisis*, 17 EUR. J. INT'L REL. 51 (2011) (conceptualizing the image in international relations and its impact on security politics).

¹⁶⁵ Ben Cosgrove, *Mannequin Mayhem: Aftermath of an A-bomb Test in Nevada*, LIFE, <https://www.life.com/history/nevada-a-bomb-test> (last visited Jan. 18, 2023) (depicting some now-iconic images of tattered mannequins and seared buildings in the Nevada desert); Alan Taylor, *When We Tested Nuclear Bombs*, THE ATLANTIC (May 6, 2011), <https://www.theatlantic.com/photo/2011/05/when-we-tested-nuclear-bombs/100061>.

¹⁶⁶ See *supra* notes 85–86 and accompanying text.

negotiation of the Anti-Personnel Mine Treaty could picture the horrors that landmines produced in places like Vietnam and Cambodia.¹⁶⁷ While discussions about banning blinding lasers did not have the benefit of a clear mental image of the effects of that weapon, blinding lasers create a very specific physical effect on the victim that is not difficult to imagine.

AWS have not had a highly publicized event which created a negative image of their use in the minds of the general public. There has been nothing involving autonomous systems which resembles the horrors of Hiroshima or the continued graphic images of anti-personnel mines. While landmines did not have a single large-scale or well-known event before their regulation, they were continuously used, and their effects were understood by the general public. In contrast, there are no well-known instances of blinding lasers being used on humans. Advocates of an AWS ban are impeded by the abstract nature of AWS. Because this system itself consists of a compilation of code, there is no readily available visual medium to communicate the perceived dangers of autonomous weapons.

Those advocating for an AWS treaty have followed a similar playbook to those who advocated for previous treaties within international humanitarian law.¹⁶⁸ Groups who support the treaty raise the issue among the general public and key stakeholders, frame the issue in a way to support the pro-treaty group's conception of it, and use their support and audience to put pressure on the institutional actors with the power to act.¹⁶⁹

Those asked to support or negotiate a treaty to regulate autonomous weapons have only science fiction to refer to. Most coverage of the issue relies on images that play on Arnold Schwarzenegger's *Terminator*,¹⁷⁰ the Asimov-inspired look of the robots from *iRobot*,¹⁷¹ and images from CKR demonstra-

¹⁶⁷ See *supra* note 122 and accompanying text.

¹⁶⁸ Rosert & Sauer, *supra* note 51, at 7–9 (“In a nutshell, successful norm building requires the initial raising of awareness by active and committed norm entrepreneurs . . . who subsequently construct a resonant framing, mobilize their audience, pressure the norm addressees, and choose (or create) a favorable institutional setting.”).

¹⁶⁹ *Id.* at 7.

¹⁷⁰ See Mark Smith, *Is ‘Killer Robot’ Warfare Closer Than We Think?*, BBC (Aug. 25, 2017), <https://www.bbc.com/news/business-41035201>. Schwarzenegger's is arguably the most menacing and anamorphic depiction of a deadly, fully sentient robot in popular culture.

¹⁷¹ See Mike Ryder, *Killer Robots Already Exist, and They've Been Here a Very Long Time*, THE CONVERSATION (Mar. 27, 2019), <https://theconversation.com/killer-robots-already-exist-and-theyve-been-here-a-very-long-time-113941>. This association is potentially insulting to the legacy of Isaac Asimov, who created guiding rules for the use of robotics decades before advanced robotics. Mark Robert Anderson, *After 75 Years, Isaac Asimov's Three Laws of Robotics Need Updating*, THE CONVERSATION (Mar. 17, 2017), <https://theconversation.com/after-75-years-isaac-asimovs-three-laws-of-robotics-need-updating-74501>.

tions in London and Berlin¹⁷² that involved a homemade (and non-threatening) mockup of a robot. There is no well-known tragic use of autonomous weapons, no visceral example of their irresponsibility, that negotiators can look towards to justify their regulation. CKR itself relies on science fiction imagery to support its mission. CKR's YouTube page hosts multiple videos that show futuristic autonomous drones.¹⁷³ These videos depict rogue autonomous weapons destroying cities filled with civilians, relying on science fiction-conversant imagery.

These depictions which rely on fictional and fantastical weapons and threats are not inherently incapable of having the same effect on the mind of the public and policymakers as the very real images of devastation caused by other weapons. What can be said is that fictional depictions are inherently more abstract in relation to the very real images of destruction caused by anti-personnel mines or nuclear weapons. The fictional depictions of nuclear war and nuclear terror rely on the visual cues of well-known images of nuclear destruction from usage in Japan and test sites. While more abstract usage of nuclear imagery is used in some films, this abstract imagery is based on the knowledge that this horror is real and understood.

ii. Dual Use

A valuable dual use for a weapon that is the target of a proposed treaty is an important factor in whether the treaty aims for a regulation, a partial ban, or an outright ban. A dual use means that the underlying technology which the weapon relies on has value for both civilian and military uses. The European Commission defines dual use as “goods, software and technology that can be used for both civilian and military applications.”¹⁷⁴ A valuable dual use shifts support from an outright ban to a mere regulation or partial ban to avoid interfering with the legitimate civilian use of the technology. This is especially

¹⁷² Dharvi Vaid, *Human Rights Watch Seeks Treaty Banning 'Killer Robots'*, DEUTSCHE WELLE (Aug. 10, 2020), <https://p.dw.com/p/3glUB>; Mary Wareham, *Opinion, Killer Robots Are Not a Fantasy. The World Must Reject and Block These Weapons.*, USA TODAY (Dec. 30, 2019, 2:21 PM), <https://www.usatoday.com/story/opinion/2019/12/30/world-must-ban-autonomous-weapons-killer-robots-column/2729729001>.

¹⁷³ See Campaign to Stop Killer Robots, *Facing Fully Autonomous Weapons*, YOUTUBE (Oct. 19, 2018), <https://www.youtube.com/watch?v=oTtoPCjBgxQ> [hereinafter CKR, *Facing Fully Autonomous Weapons*]; Campaign to Stop Killer Robots, *Will Fully Autonomous Weapons Spark Wars?*, YOUTUBE (Aug. 21, 2019), <https://www.youtube.com/watch?v=2NXKTnQtyDM>.

¹⁷⁴ *Dual-Use Trade Controls*, EUR. COMM'N (July 14, 2021), <https://ec.europa.eu/trade/import-and-export-rules/export-from-eu/dual-use-controls>.

true where the civilian use is one that is potentially lucrative and transformative.¹⁷⁵ A dual use also increases the chances of engagement with those groups that stand to gain from the non-weapon use of that technology.¹⁷⁶

On this factor, AWS most resemble nuclear weapons. There is a robust, lucrative, and possibly transformative civilian use for artificial intelligence and autonomous machines much in the same way that the civilian nuclear field showed immense potential in the mid-twentieth century.¹⁷⁷ Anti-personnel mines have no dual use due to the limited nature of the weapon. Lasers in general have a valuable dual use, and this is where the blinding lasers prohibition might act as a model for an AWS prohibition. A legitimate dual use likely increases the chances of a regulating treaty for at least one reason; a robust civilian use will mean more development within the technology, leading states to see a heightened need for guardrails for that industry.

iii. Strategic Value

The military or strategic value of the weapon to be regulated partially determines whether the weapon is regulated in a way similar to dual use technology. The military or strategic value of a weapon accounts for the realist approaches to regulating weapons under IHL. The realist position would take as a given that states only submit to regulating weapons that they see as not militarily valuable, or where the value of banning the weapon outweighs the value of owning or using it. But there is also support for the counterargument in the case of nuclear weapons. Nuclear weapons were and continue to be seen by states as enormously valuable strategically, which is exactly why those states submitted to regulation.¹⁷⁸ It is telling that the first treaties to regulate nuclear weapons were several limits on testing, and then the NPT, which

¹⁷⁵ See *supra* Part II(E) for the discussion of the development of laser technology alongside the development and eventual ban of blinding laser weapons.

¹⁷⁶ See Jake Chapman, *Reliance on Dual-Use Technology Is a Trap*, WAR ON THE ROCKS (Sept. 8, 2022), <https://warontherocks.com/2022/09/reliance-on-dual-use-technology-is-a-trap> (discussing the dual-use technology market and its shortcomings).

¹⁷⁷ *50 Years of Nuclear Energy*, IAEA ¶¶ 5–11 (last visited Jan. 16, 2023), https://www.iaea.org/sites/default/files/gc/gc48inf-4-att3_en.pdf.

¹⁷⁸ The idea being that the more stringent the regulation of nuclear weapons, the more difficult they are to obtain for new States. See Stewart M. Patrick, *The Nonaligned Movement's Crisis*, COUNCIL ON FOR. REL. (Aug. 30, 2012, 9:01 AM), <https://www.cfr.org/blog/nonaligned-movements-crisis> (“Meanwhile, in the nuclear field, [non-aligned movement] members criticize the discriminatory nature of the Nuclear Non-Proliferation Treaty (NPT). That treaty rests on a bargain between the nuclear haves and have-nots. In return for foreswearing such weapons, non-nuclear weapons states were assured under Article 6 of the NPT that nuclear weapons states would move steadily toward disarmament. That has not happened.”).

barred any non-nuclear states from ever obtaining nuclear weapons.¹⁷⁹ Watts uses a similar, albeit slightly different, factor in his reasoning which he calls novelty.¹⁸⁰ He argues that currently “a ‘wait and see’ approach seems to prevail with respect to prospective or early regulation of novel military technology.”¹⁸¹ In considering the military value of the weapon to be regulated, AWS are most similar to nuclear weapons. Autonomous systems and artificial intelligence have tremendous utility outside of the military context and are discussed as potentially transformational technologies. This mirrors how nuclear technology was discussed in the “Atomic Age.”¹⁸²

Military or strategic value has an element of the more abstract, socially constructed considerations to it as well. This strategic value is not a completely objective determination, and the perceived value of a weapon can be constructed by those seeking to take advantage of it. This practice is most apparent in how proponents of AWS have discussed the value of their development. AWS have been compared directly to nuclear weapons in the terms of their strategic value. Autonomous weapons, these proponents argue, represent “the third revolution in warfare” coming behind the previous revolutions caused by “gunpowder and nuclear arms.”¹⁸³ This comparison takes AWS out of a category of *useful new weapon in the arsenal* and closer to a category of *redefining how we fight wars from now on*. If AWS can achieve many of the tasks that have been proposed, then they very well could change how wars are fought fundamentally. With respect to this factor, nuclear weapons and autonomous weapon systems are alone in their own category. These weapons were placed on a pedestal and set aside as more revolutionary than anything else seen in modern times. These descriptions form the basis for the counterargument to the arguments of activists advocating for an AWS treaty.¹⁸⁴ When activists rely on their attempted framings of weapons, these partly objective, partly subjective, framings will be used to push back against them.

¹⁷⁹ *Arms Control Treaties*, ATOMICARCHIVE.COM, <https://www.atomicarchive.com/resources/treaties/index.html> (last visited Jan. 16, 2023); Treaty on the Non-Proliferation of Nuclear Weapons, *supra* note 9, at art. II.

¹⁸⁰ Watts, *supra* note 115, at 612.

¹⁸¹ *Id.*

¹⁸² William L. Laurence, *The Great Promise of the Atomic Age*, N.Y. TIMES (Oct. 27, 1957), <https://timesmachine.nytimes.com/timesmachine/1957/10/27/132842422.html?pageNumber=241>.

¹⁸³ Kai-Fu Lee, *The Third Revolution in Warfare*, THE ATLANTIC (Sept. 11, 2021), <https://www.theatlantic.com/technology/archive/2021/09/i-weapons-are-third-revolution-warfare/620013>; see TED, *Military Robots and the Future of War* | P.W. Singer, YOUTUBE (Apr. 3, 2009), <https://www.youtube.com/watch?v=M1pr683SYFk> (giving a somewhat dated presentation on robotics in warfare, but explicitly making the “third revolution” argument about AWS).

¹⁸⁴ See *infra* Part III(A)(vi).

iv. *Deployment*

The length of time, manner, and extent to which the weapon was deployed before its regulation or ban are important because these factors create the image of that weapon in the public consciousness. Watts argues that weapons which have been minimally deployed are less resistant to regulation.¹⁸⁵ Specifically, he argues that “[w]eapons that have not yet been deployed by States have proved somewhat tolerant of efforts at regulation or prohibition” and that “widely deployed systems have proved, at least for long periods, to be prohibition resistant, but by no means prohibition proof.”¹⁸⁶ Watts does note, however, that there are weapons that have seen widespread and lengthy deployment which have been banned.¹⁸⁷ Those weapons are the already-discussed anti-personnel mine, as well as cluster munitions.¹⁸⁸ Both weapons were deployed for some time before attempts to regulate them were successful.¹⁸⁹ The clearest example of a weapon being regulated at the earliest stages of deployment is the prohibition of blinding laser weapons.¹⁹⁰ Watts also points to the 1899 Hague Gas Declaration,¹⁹¹ addressing chemical weapons, and the 1925 Geneva Gas Protocol’s regulation of biological weapons¹⁹² as other examples of early deployment regulations.¹⁹³

Where deployment most factors into whether a weapon is regulated is at the extremes. Weapons are more likely to be regulated early on, as Watts argues, before they can be widely used, developed, and relied upon.¹⁹⁴ But they can also be susceptible to regulation after considerable deployment, and this is for two reasons: the longer a weapon is deployed, the more likely it is to become obsolete; and the longer a weapon is deployed, the more opportunity exists for opinions to change about its use.¹⁹⁵ Watts notes that weapons that have been deployed for some time are subject to “shifting senses of humanity,

¹⁸⁵ Watts, *supra* note 115, at 614.

¹⁸⁶ *Id.* at 613–14.

¹⁸⁷ *Id.* at 614.

¹⁸⁸ *Id.*

¹⁸⁹ *Id.* at 614–15.

¹⁹⁰ *See supra* Part II(E).

¹⁹¹ Declaration Concerning Asphyxiating Gases, July 29, 1899, 32 Stat. 1779, 187 Consol. T.S. 453.

¹⁹² Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of Bacteriological Methods of Warfare, June 17, 1925, 26 U.S.T. 571, 94 L.N.T.S. 65.

¹⁹³ Watts, *supra* note 115, at 614.

¹⁹⁴ *Id.* at 614–15.

¹⁹⁵ *Id.* at 615.

public opinion or even what constitutes unnecessary suffering or discrimination.”¹⁹⁶ Groups seeking to regulate widely-used weapons can rely on the ample evidence of the ill-effects of those weapons to shift public opinion. This factor feeds into the public perception because the longer a weapon has been deployed, or the more widely it is deployed, the more opportunity there is for the weapon to imprint onto public perceptions.

Among the weapons discussed here, AWS are closest to the never-deployed blinding lasers, as compared to nuclear weapons or anti-personnel mines. Like blinding lasers, AWS have not been deployed in any meaningful numbers, yet many countries are investing resources into their use. They are on the precipice of being deployed and have had their first unconfirmed battlefield deployment.¹⁹⁷ AWS are still in the early stage where regulation is most possible, but this factor naturally clashes with other factors, such as the military value placed on the weapon. The United States has invested immense resources into robotics and artificial intelligence research, with the Department of Defense previously requesting \$900 million in allocations for its development of AI systems in its fiscal year 2020 budget request.¹⁹⁸ The momentum of existing investments in AWS among the world’s largest militaries is likely too strong for attempts at regulation to advance in these early stages of deployment. This contrasts with the investments into blinding lasers before their regulation, which totaled only \$400 million, presumably over the entire lifecycle of the program.¹⁹⁹ What these figures suggest is that, because of how much has been invested in them, AWS are likely to survive the early window for regulation and move into regular deployment.

v. *Proliferation Risk*

The likelihood that the weapon would be used by non-state actors or rogue states is an indication, although likely not a strong indication, that a weapon or weapon system will be subject to regulation or a ban. States naturally want to restrict access to dangerous weapons systems if they can easily be used by non-state actors. The first multilateral treaty regulating nuclear weapons dealt exclusively with their proliferation.²⁰⁰ States might regulate a weapon that

¹⁹⁶ *Id.*

¹⁹⁷ See Walsh, *supra* note 35.

¹⁹⁸ Michael Klare, *Pentagon Asks More for Autonomous Weapon*, ARMS CONTROL ASS’N: ARMS CONTROL TODAY (Apr. 2019), <https://www.armscontrol.org/act/2019-04/news/pentagon-asks-more-autonomous-weapons>.

¹⁹⁹ HUMAN RIGHTS WATCH, *supra* note 136, at pt. II.

²⁰⁰ See Treaty on the Non-Proliferation of Nuclear Weapons, *supra* note 9.

they already own so that they can control who else gains it.²⁰¹ This is a common perception and understanding of the NPT.²⁰² The proliferation factor plays heavily on realist attitudes about states' motivations in regulating weapons. Restricting who may possess or develop a certain weapon maintains the status quo and prevents strategic rivalries created by that weapon.

States may want to quell proliferation for objective security threats, like rogue states and non-state actors gaining access to powerful weapons. This concern is somewhat dependent on the nature of the weapon itself. Some weapons are more dangerous in the hands of a non-state actor due to how they are deployed. A terrorist organization with a stockpile of chemical weapons is more dangerous than one with a stockpile of anti-personnel mines.

The proliferation risks concerning AWS are unique when compared to nuclear weapons, anti-personnel mines, and blinding lasers. What makes AWS unique is the ease with which they could proliferate. First, the tools to make AWS are widely accessible and widely understood.²⁰³ AWS are built on the same code that any other autonomous system would use but is applied in a different way. Numerous companies are developing and have already deployed autonomous systems in their operations.²⁰⁴ This is a stark contrast to the secrecy surrounding information regarding nuclear weapons and the lengths the government has gone to restrain that information.²⁰⁵ Second, not only is the underlying technology of AWS widely accessible, it is easily shareable. AWS are software, which has the same benefits of any other digital product; it is easily shared around the world through the internet. AWS are most similar to cyberweapons in this respect, another type of weapon which is not

²⁰¹ See note 178 and accompanying text.

²⁰² See *id.*; see also Victor Gilinsky & Henry Sokolski, *Taking Erdogan's Critique of the Nuclear Non-Proliferation Treaty Seriously*, BULL. ATOMIC SCI. (Nov. 14, 2019), <https://thebulletin.org/2019/11/taking-erdogans-critique-of-the-nuclear-non-proliferation-treaty-seriously> ("The inequality between states with nuclear weapons and those without, Erdogan argued, was a principal factor in undermining the international balance. Those with weapons of mass destruction abuse their privileged status by using it to gain leverage in crises.").

²⁰³ Widely understood and accessible to software developers at the very least. See *Tools for Everyone*, GOOGLE, <https://ai.google/tools> (last visited Jan. 16, 2023). But see West & Allen, *supra* note 1 ("As an illustration, when 1,500 senior business leaders in the United States in 2017 were asked about AI, only 17 percent said they were familiar with it.").

²⁰⁴ See Monica Mehta, *Top 5 Industry Early Adopters of Autonomous Systems*, FORBES (May 28, 2018), <https://www.forbes.com/sites/oracle/2018/05/28/top-5-industry-early-adopters-of-autonomous-systems/?sh=164462fbb931>.

²⁰⁵ See *United States v. Progressive, Inc.*, 467 F.Supp. 990, 998–1000 (W.D. Wis. 1979); 42 U.S.C. §§ 2271–2273.

currently regulated.²⁰⁶ These unique aspects of AWS make proliferation concerns especially strong. These concerns are heightened by the potential transformative power of AWS. If AWS are compared to nuclear weapons in terms of their potential for reshaping how wars are fought, then the prospects of terrorist organizations or rogue states obtaining AWS are similarly appalling to states who possess AWS. States' proliferation worries regarding AWS are most likely to mirror the worries of nuclear proliferation, that untrustworthy actors will gain possession, further fueling the chaos of a transformational era. However, AWS proliferation among terrorist groups and non-state actors might be an unrealistic concern because of the necessary sophistication and technical ability it would require operating a truly autonomous weapon. Concerns about proliferation of AWS are grounded in concerns that rogue states or aggressive states will use these weapons irresponsibly.

Proliferation and military value are linked because a weapon may become less valuable militarily due to proliferation. Part of the value of a novel weapon is the competitive advantage of other states not having the same technology, which is reduced the more widely proliferated that weapon is. Because the military value placed on AWS is reminiscent of nuclear weapons, it follows that concerns about proliferation of AWS will be like that of nuclear weapons. This reaction might be tempered by the fact that AWS are less passively dangerous than nuclear weapons because the risk of radiation, meltdowns, and volatility are not present for AWS.

This issue does put proponents of AWS into a trap of their own making to some extent. If they argue that AWS should be embraced because they could eventually make fewer mistakes than humans and put fewer humans into harm's way, then there is an argument for proponents of AWS being pro-proliferation. Giving the "enemy" a high-functioning AWS might even be a good strategic choice in some situations, but ultimately, this decision would require military commanders and civilian policy makers to give the opposing side a strategic win, which they would find difficult to spin.

vi. Framing

Framing refers to how an issue is packaged rhetorically, or how actors present an issue to a certain audience. The goal of those seeking a ban or regulation of AWS is to frame them in a way that leads the public and policymakers to believe that regulation is necessary by invoking some sort of motivational factor to persuade that audience.

²⁰⁶ Cyberweapons are also another weapon which many might not call a weapon at all because they are nothing but software, and the software itself cannot harm anyone or do any damage unless it has access to some physical element.

As Rosert and Sauer have noted, the framing of AWS up to this point has been centered around the idea that certain weapons are inherently inhumane, a framing that campaigns to ban blinding laser weapons, anti-personnel mines, and cluster munitions successfully took advantage of.²⁰⁷ Groups like CKR and the Future of Life Institute use humanity/inhumanity messaging as their central tool. CKR lists two inhumanity-centric reasons among its “[n]ine problems with killer robots.”²⁰⁸ But AWS, as Rosert and Sauer note, “differ[] fundamentally from [those weapons]. Not only is the technology more abstract and complex, but it is also less clear that [AWS] (would) violate basic IHL principles.”²⁰⁹ Rosert and Sauer conclude that the currently used framing of AWS as inhumane weapons is not a useful one.²¹⁰ This difficulty in framing is a stark contrast to the framing of blinding laser weapons and anti-personnel mines, which were both quite simple to frame in a way that led to their banning. Each of those campaigns had an easily articulated and understood slogan: “Blinding is cruel” and “mines maim civilians.”²¹¹ The debate on AWS is not structured in a way to give activists an easy slogan for their campaign. The “killer robots” language is what attempts to mimic the simple slogans of other campaigns, but it does not achieve the same effect because it puts a sci-fi gloss on the debate, making the constructed threat feel more abstract, especially when compared to the immediate and visible harms of something like anti-personnel mines.²¹²

The issue of framing is not entirely separable from the consideration of powerful images relating to the relevant weapons. Activists seek to take advantage of the associated images available to them to support their framing, harnessing the power of a visual message. But there is, as discussed above, no viable AWS image for activists to use. AWS not only lack any images to use as shorthand, but also have “potentially myriad variants that, from the outside, might be indiscernible from remotely operated weapons.”²¹³

Constructing a campaign to ban AWS around existing principles of IHL—proportionality, necessity, distinction—is difficult because AWS are not inherently violative of those principles. Other weapons are, and only ever will be, inherently against the principles of IHL. Anti-personnel mines will never know who is stepping on them and decide whether to explode or not. But AWS are at least theoretically able to abide by these principles. Benefiting

²⁰⁷ Rosert & Sauer, *supra* note 51, at 6.

²⁰⁸ *Problems With Autonomous Weapons*, *supra* note 43 (listing “[d]igital dehumanization” and “[l]oss of meaningful human control” as two reasons to stop killer robots).

²⁰⁹ Rosert & Sauer, *supra* note 51, at 6.

²¹⁰ *Id.*

²¹¹ *Id.* at 16.

²¹² *Id.*

²¹³ *Id.* at 17.

AWS here is the undefined and abstract understanding of the technology. Because the technology is not widely understood or deployed and is in a constant state of development, the average person does not concretely understand how advanced the technology is.²¹⁴ AWS could theoretically be deployed in a way that does not violate IHL, with the possibility that compliance will improve over time.²¹⁵

Ethical arguments are not unprecedented framings when attempting to regulate weapons, but those ethical arguments are typically rooted in existing IHL principles. AWS activists allege “that delegating life-and-death decisions on the battlefield to machines reduces human being to objects and thus violates human dignity.”²¹⁶ The idea of maintaining human control over weapons is not a legally binding principle of IHL.²¹⁷ The campaign to ban blinding lasers played on the cruelty of the weapon as an ethical argument, but that is supported by the IHL principle prohibiting superfluous injury. The campaigns to ban anti-personnel mines and nuclear weapons both used ethical arguments about unintended and unavoidable consequences for civilians, but those are built on the foundation of the principle of distinction. The ethical arguments for banning or regulating AWS do not have such solid ethical footing in IHL. This means that AWS activists are pushing uphill because they must establish their ethical foundation, and then use that foundation to support regulating AWS.

One aspect of the framing of AWS has had success with other weapons and might offer more stopping-power than ethical arguments. The framing of existential threat has been used to discuss AWS.²¹⁸ This is a framing that has also come up in debates on nuclear weapons but is arguably more scientifically supported when applied there.²¹⁹ The argument that AWS pose an existential threat is less intuitive than nuclear weapons. The general public has some understanding of the effects of nuclear war, nuclear winter, and radiation. The understanding of how AWS could pose their own existential threat is less clear cut, partly because those invoking it do not thoroughly explain it.²²⁰ It is likely that this is being used as a rhetorical device to frame the debate, but the audience still must be convinced.²²¹

²¹⁴ See West & Allen, *supra* note 1.

²¹⁵ *Id.* at 17–18.

²¹⁶ *Id.* at 16.

²¹⁷ *Id.* at 18.

²¹⁸ *Id.* at 16.

²¹⁹ *Existential Risk*, FUTURE OF LIFE INST. (Nov. 16, 2015), <https://futureoflife.org/background/existential-risk>.

²²⁰ Wareham, *supra* note 172. Wareham, advocacy director of the Arms Division of Human Rights Watch, describes autonomous weapons as an existential threat without even attempting to explain how that might come to be. See *id.*

²²¹ See BARRY BUZAN ET AL., *SECURITY: A NEW FRAMEWORK FOR ANALYSIS* 26 (1998). The discussion of securitization of autonomous weapon systems deserves its own separate

Those on the other side of any issue can also attempt to frame the issue to their advantage.²²² Proponents of AWS can frame the issue to their own advantage and are likely to frame the weapon in the best terms possible. This framing will focus on things like the precision of automated systems, which would “allow[] for a more discriminate and IHL-compliant use of force.”²²³ In sum, AWS have generally been framed in a way that has had success with other weapons, but with weapons that are fundamentally different from AWS. An ethical framing could be used to regulate AWS, and is the most likely argument going forward, but this will still take some wrangling.²²⁴

B. What Sets Autonomous Weapons Apart and How This Affects Regulation

Autonomous weapons are starkly different from many of the previously discussed weapons with regards to several factors. First, autonomous weapons do not directly concern many of the IHL principles which led to the regulation of weapons like anti-personnel mines and blinding lasers. This is because AWS are not weapons at all. AWS cause only the amount of unnecessary suffering as the weapon system they control. If a Predator drone controlled by a human pilot does not inherently cause superfluous injury or death, then a Predator drone controlled by an autonomous system does not either. The principles of discrimination and distinction cannot be adequately tested on autonomous weapons absent some set of data to evaluate. If autonomous systems live up to their hype, then they very well could be just as capable as humans at differentiating combatant from non-combatant.²²⁵ But when these weapons are still mostly in a hypothetical state, or at least an extremely secret state, it is almost impossible to prove their actual effectiveness and compliance with IHL. Arguments about preventing superfluous injury or suffering fall short when applied to AWS. Approaching the question from this angle can be difficult because it is not apparent how an autonomous system is likely to increase

analysis, but the basic analysis relevant here would be that activists invoke the existential threat of autonomous weapons to justify extraordinary measures outside the realm of normal politics. *Id.*

²²² See *supra* Part III(A)(iii).

²²³ Rosert & Sauer, *supra* note 51, at 15.

²²⁴ *Id.* at 22. Rosert and Sauer do ultimately suggest that the proponents of an AWS ban shift to an entirely ethical argument because it will “make the case against LAWS less susceptible to consequentialist counter-positions . . . [and] make[] it more likely that the general public will react viscerally and reject LAWS more sharply.” *Id.*

²²⁵ Recall the definitional discussion, *supra* Part II(A), which mentioned that some define autonomous weapons as those able to think on a human’s level. If that is our definition, then problems with distinction and discrimination possibly go away.

suffering on the part of combatant or non-combatant when compared to the same weapon system with a human pilot.²²⁶

Second, and most importantly, intangible factors set AWS apart from weapons like anti-personnel mines and blinding lasers and move them much closer to nuclear weapons. These intangible factors are things like the apocalyptic framing used by activists, reminiscent of the anti-nuclear movement; the uncontrollable and terrifying effects of “runaway AI” inspired by science fiction,²²⁷ reminiscent of the fears of uncontrollable nuclear fallout and nuclear winter; proliferation concerns of powerful autonomous systems falling into the wrong hands, directly comparable to concerns of nuclear proliferation and nuclear terrorism; and military strategy concerns, which are taken to a transcendent level in the autonomous weapons discussion, similar to the transformational role of nuclear weapons. These subjective factors are what will most centrally determine how AWS are regulated, and all those factors point toward the lighter end of the regulation spectrum. The combination of a high strategic value assigned by policymakers and military commanders with anti-AWS activists who lack a clear visual framing means that the nations who have invested in AWS have the controlling hand in the public perception of these weapons. That situation will lead to those in power, at least in the near future, to only concede regulation that focuses on non-proliferation, allowing them to maintain their control. In sum, proponents have a seemingly credible argument that these weapons are important enough to own and develop, and only regulate to reduce spread. Meanwhile, activists lack a credible argument that these weapons are too dangerous to exist without a concrete example or visual shorthand for the possible negative effects of AWS.

For now, regulation is non-existent. However, the campaigns to ban or regulate AWS continue. To highlight the unique nature of AWS, it is useful to ask what would need to change about AWS to increase the chances of regulation. The inherent properties of AWS are not alterable, so the inability to directly apply IHL principles can be set aside. That leaves the subjective values of AWS. If policymakers and military commanders did not see AWS as such a highly valuable weapon, they would be more likely to be regulated. This might be possible if AWS end up being more difficult to deploy than previously thought, or not as effective as previously thought, or if the technology never develops to the point desired. If this happens, then AWS might more closely follow the path of blinding laser weapons, which were quickly banned partly due to their low strategic value.

The other variables which could be changed are the visual and framing aspects of the public perception of AWS. Striking images associated with

²²⁶ See *supra* Part II(B).

²²⁷ CKR, *Facing Fully Autonomous Weapons*, *supra* note 173 (depicting a city under assault by flying autonomous weapons).

AWS might be created the more widely they are deployed. A well-publicized AWS error could create a new image of these weapons in the minds of policymakers and the public. Activists could also reframe AWS in a way that speaks more directly to policymakers and the public and mobilizes action. This is the variable most likely to change because the campaigns supporting an AWS treaty are motivated, and the prolonged nature of these efforts gives ample opportunity to learn from mistakes and fine-tune messaging.

Ultimately, AWS are most likely to generally follow the path of nuclear weapons in terms of regulation, if they are regulated at all. States have invested considerable resources into their development, which also have potentially transformational implications for civilian sectors. The most likely first step in the regulation of AWS is a non-proliferation treaty, so that the states which have developed this technology may keep it for themselves while citing the danger of letting it fall into the hands of others. The realist concerns of state power and competitive advantage, as well as the immense resources already invested, are likely to weigh heavily in favor of states maintaining their development of autonomous weapons at least into the near future. As these weapons develop and become battlefield-ready, states are likely to favor regulating their proliferation in a way that mimics nuclear weapons. Like nuclear weapons, initial regulation might take some time following deployment. AWS do not have the same environmental and collateral dangers of testing as nuclear weapons do, but nuclear treaties very well could be copied. The treaties banning the use of nuclear weapons from entire regions are likely to be emulated where a large bloc of countries reach consensus on the illegality or immorality of autonomous weapons.²²⁸

IV. CONCLUSION

Autonomous weapon systems have not yet been regulated on the international stage, and their regulation in the near future is likely minimal. These weapons possess stark differences from other weapons that were regulated, making AWS regulation difficult. These weapons do not directly invoke or violate the central tenets of international humanitarian law and the public understanding of them is based on shifting and confusing definitions and invocations of abstract threats and science fiction imagery.

Artificial intelligence is rapidly changing and developing simultaneously with early autonomous weapons being deployed to the battlefield. While autonomous weapons do not yet have a tragically iconic moment akin to mushroom clouds on magazine covers, that is subject to change. Because these weapons remain unregulated and are starting to see the battlefield, it is entirely possible that the world sees an unfortunate misfiring of an autonomous

²²⁸ See *supra* notes 98–104 and accompanying text.

weapon system that crystalizes an image in the public consciousness and leads to their regulation.