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Original Article

Ensuring Compliance of Autonomous Weapons System (AWS) with IHL: Navigating Legal Constraints and Optimization Challenges

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ABSTRACT

This article, titled "Ensuring Compliance of Autonomous Weapons System (AWS) with IHL: Navigating Legal Constraints and Optimization Challenges," explores the intersection of autonomous weapons systems (AWS) and International Humanitarian Law (IHL). With the rise of AWS in modern warfare, ensuring their compliance with IHL is crucial. The article addresses key questions: What legal constraints does IHL impose on AWS? What optimization challenges must be overcome to ensure compliance? How can policymakers and military developers navigate these issues? The article analyzes documents, ICRC Comments, Reports and existing literature using a qualitative, library-based research methodology. Findings reveal significant legal constraints related to accountability, proportionality, and distinction, alongside technical and ethical optimization challenges. The article concludes with recommendations for robust human oversight and clear legal frameworks to ensure AWS compliance with IHL, contributing valuable insights to the ongoing discourse on AWS regulation.

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INTRODUCTION

The development of Autonomous Weapons Systems (AWS) is rooted in the broader historical evolution of military technology, which has seen a continuous pursuit of increased efficiency, precision, and operational capability. This evolution can be traced back to the advent of gunpowder in the 9th Century, which revolutionized warfare by introducing firearms and cannons, significantly altering combat strategies and battlefield dynamics.[1]

The 20th Century marked a significant leap with the introduction of nuclear weapons during World War II (WWII), leading to a new era of deterrence and strategic balance. The Cold War further used technological advancements, resulting in sophisticated missile systems, unmanned aerial vehicles (UAVs), and precision-guided munitions. These developments laid the groundwork for the modern era of warfare, characterized by the increasing integration of artificial intelligence (AI) and machine learning technologies.[2]

Autonomous Weapon System (AWS) emerged from this technological lineage, driven by the desire to enhance military effectiveness while minimizing human risk. The concept of AWS encompasses systems that can independently select and engage targets without human intervention. This represents a significant shift from traditional remotely operated systems, such as drones, which still require human control for critical decision-making processes.[3] The push towards AWS has been fueled by several factors. First, the operational advantages of AWS, including faster decision-making capabilities, reduced reaction times, and the ability to operate in environments that are too dangerous for humans, have made them highly attractive to military planners.[4] Second, the ongoing advancements in AI and machine learning have provided the necessary technological foundation for developing such systems.[5]

However, the deployment of AWS raises significant ethical, legal, and humanitarian concerns. Critics argue that the use of AWS challenges existing frameworks of international humanitarian law (IHL), particularly concerning accountability, the distinction between combatants and non-combatants, and the proportionality of force used in armed conflict.[6] There is a separate concern that such systems may not have an identifiable operator in the sense that no human individual could be held responsible for the actions of the autonomous weapon system in a given situation, or that the behavior of the system could be so unpredictable that it would be unfair to hold the operator responsible for what the system does.[7] Such systems might thus eliminate the possibility of establishing any individual criminal responsibility that requires moral agency and a determination of mens rea.[8] Therefore, the lack of human oversight in the decision-making process of AWS further exacerbates these

[1] Rogers, C. *The Development of Gunpowder Weapons in Europe*. United Kingdom: Oxford University Press, 2004. p. 12.

[2] Singer, P. W. (2009). Wired for War: The Robotics Revolution and Conflict in the 21st Century. Penguin, p. 1- 10. <https://media- .carnegiecouncil.org/import/studio/PWSinger_WiredWar.pdf> (accessed on 10/7/2024)

[3] Schmitt, M. N., & Thurnher, J. S. "*Out of the Loop: Autonomous Weapon Systems and the Law of Armed Conflict*," Harvard National Security Journal, 4, 2013. p. 234-35. <file:///C:/Users/User/Downloads/ssrn-2212188.pdf> (accessed on 10/7/2024)

[4] Arkin, R. *Governing Lethal Behavior in Autonomous Robots.* CRC Press, 2009. p. 45. <https://www.cs.cmu.edu/~illah/CLASSDOCS/Arkin.pdf> (accessed on 10/7/2024)

[5] Russell, S., & Norvig, P. *Artificial Intelligence: A Modern Approach* (4th ed.). United Kingdom: Pearson Education Limited, 2021. p. 301. <https://api.pageplace.de/preview/DT0400. 9781292401171_A41586057/ preview-9781292401171_A41586057.pdf> (accessed on 10/07/2024)

[6] Asaro, P. "*On Banning Autonomous Weapon Systems: Human Rights, Automation, and the Dehumanization of Lethal Decision-Making*," International Review of the Red Cross, 94(886), 2012. p. 692. <file:///C:/Users/User/Downloads/on-banning-autonomous-weapon-systems-human-rights-automation-and-the-dehumanization-of-lethal-decision-making.pdf> (accessed on 10/7/2024)

[7] Sparrow R., '*Killer robots'*, in Journal of Applied Philosophy, Vol. 24, No. 1, 2007, pp. 62–77.

[8] Noel S., '*Death strikes from the sky: the calculus of proportionality'*, in IEEE Technology and Society Magazine, Vol. 28, No. 1, 2009, pp. 16–19.

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concerns, leading to calls for robust legal frameworks to govern their development and use.[9]

Therefore, in response to these challenges, international bodies, including the United Nations, have initiated discussions on the regulation of AWS. The United Nations Office for Disarmament Affairs has published several reports highlighting the need for comprehensive legal frameworks to address the unique challenges posed by AWS.[10] Scholarly debates and policy proposals continue to evolve, aiming to balance the operational benefits of AWS with the imperatives of ethical and legal accountability.[11]

LITERATURE REVIEW

Historical Background

The development of Autonomous Weapons Systems (AWS), also known as Lethal Autonomous Weapons Systems (LAWS), raises significant concerns within the international community regarding their potential impact on warfare and compliance with International Humanitarian Law (IHL).[12] AWS, characterized by its ability to select and engage targets without direct human intervention, present profound ethical, legal and humanitarian challenges.[13] These challenges arise from the potential for AWS to operate in ways that are unpredictable and beyond human control, raising significant concerns regarding compliance with International Humanitarian Law (IHL).[14] The development and deployment of Autonomous Weapons Systems (AWS) have roots in the broader historical context of military technology evolution. From the introduction of mechanized warfare in World War I (WWI) to the rise of drone technology in the late 20th century, each technological leap has prompted corresponding advancements in legal and ethical frameworks.[15] For instance, the Geneva Conventions of 1949 and their Additional Protocols have long been central to regulating the conduct of armed conflicts, ensuring compliance with principles such as distinction and proportionality.

One of the primary concerns with Autonomous Weapons Systems (AWS) is their ability to adhere to the principles of distinction, proportionality and necessity which are the cornerstones of International Humanitarian Law (IHL). The principle of distinction requires combatants to differentiate between military targets and civilians, a task that is inherently complex for autonomous systems. Therefore, the lack of human oversight in AWS decision-making processes may lead to indiscriminate attacks, thereby violating the principle of distinction.[16] Similarly, the principle of proportionality, which prohibits attacks causing excessive civilian harm relative to the anticipated military advantage, is challenging to program into Autonomous Weapon System (AWS).

[9] Crootof, R. "*The Killer Robots Are Here: Legal and Policy Implications*," Cardozo Law Review, 36(1), (2015). p. 1872. <https://scholarship.richmond.edu/cgi/viewcontent.cgi?article=2605&context=law-faculty-publications> (accessed on 10/7/2024)

[10] United Nations Office for Disarmament Affairs. *Perspectives on Lethal Autonomous Weapons Systems. United Nations.* 2017. Available at https://www.un.org/disarmament/publications/more/perspectives-on-lethal-autonomous-weapons-systems/ (accessed on 10/7/2024)

[11] Heyns, C. "*Autonomous Weapons in Armed Conflict and the Right to a Dignified Life: An African Perspective*," South African: Journal on Human Rights, 32(1), 2016. p. 50.

[12] Heyns C., Report of the Special Rapporteur on extrajudicial, summary or arbitrary executions in A/HRC/23/47, 9 April 2013, available online <http://www.ohchr.org/Documents/HRBodies/HRCouncil/ RegularSession/Session23/A-HRC-23-47_en.pdf> (accessed at 6/03/2024.)

[13] Russell S., Autonomous Weapons: An o pen letter from AI & Robotics researchers. Future of Life Institute, July 28 2015, <https://futureoflife.org/open- letter- autonomous-weapons.> (accessed 6/03/2024.)

[14] Solovyeva A., & Hynek N., *'Going Beyond the 'Killer Robots' Debate: Six Dilemmas Autonomous Weapon Systems Raise'* in Central European Journal of International and Security Studies 12, No. 2: 166-208., 2018, p.190.

[15] Chengeta, T. *The challenges of increased autonomy in weapons*: in search of appropriate legal solution, LLD: University of Pretoria, 2015, p.7.

[16] Asaro, P. *"On Banning Autonomous Weapon Systems: Human Rights, Automation, and the Dehumanization of Lethal Decision-Making,"* International Review of the Red Cross, 94(886), 2012.p.692.<file:///C:/Users/User/Downloads/on-banning-autonomous-weapon-systems-human-rights-automation-and-the-dehumanization-of-lethal-decision-making.pdf>(accessed on 10/7/2024).

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Sharkey argues that "the computational limits and the unpredictability of AWS make it difficult to ensure compliance with proportionality".[17] The principle of necessity, which mandates that military actions must be necessary to achieve a legitimate aim, can be compromised by AWS's inability to adapt to changing circumstances in the battlefield.[18]

Nevertheless, Schmitt points out that, Autonomous Weapons Systems (AWS) might fail to dynamically assess and respond to the situational nuances that human judgment can".[19] These challenges underscore the pressing need to develop legal frameworks that can adequately address the deployment of AWS, ensuring that their use remains consistent with the ethical and legal standards of IHL. However, the existing International Humanitarian Law (IHL) framework, as embodied in instruments such as the Geneva Conventions of 1949 and their Additional Protocols, does not explicitly address Autonomous Weapons Systems (AWS). This gap necessitates the development of new rules or the modification of existing ones to ensure that AWS is deployed in a manner consistent with IHL. As Schmitt points out, "there is an urgent need to clarify how the principles of IHL apply to AWS to prevent legal ambiguities and ensure accountability".[20] The Geneva Conventions and their Additional Protocols were drafted at a time when such autonomous technologies were not envisioned, leading to a lack of specific provisions governing their use.[21]

Additionally, Article 36 of Additional Protocol I, which requires states to review the legality of new weapons, methods, and means of warfare, has not adequately addressed the complexities of AWS. While Article 36 mandates that states ensure any new weapon complies with IHL, it does not provide clear guidelines for the unique challenges posed by Autonomous Weapon Systems (AWS).[22] Scholars and legal experts, including Crootof, argue that the rapid technological advancements in AWS necessitate a re-examination of existing legal norms to address issues of control, accountability, and compliance with IHL principles.[23] This reexamination is crucial to bridging the gap between current legal standards and the operational realities of AWS, ensuring that their deployment adheres to the humanitarian objectives of IHL.

The international community has begun to address the challenges posed by Autonomous Weapons Systems (AWS), primarily through initiatives such as the United Nations Convention on Certain Conventional Weapons (CCW), The CCW has established a Group of Governmental Experts (GGE) to examine AWS and explore potential regulatory measures.[24] For example, the GGE's first session was held in 2017 with the main aim of discussing different aspects of AWS and its impacts on IHL as well as the advantages and

[17] Sharkey, N. *"Saying 'No!' to Lethal Autonomous Targeting'*, Journal of Military Ethics, 9(4), 2010, p. 369-83.

[18] Articles 51 and 57 of Additional Protocol I to the Geneva Conventions address the protection of the civilian population and precautions in attack. Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts, 8 June 1977, 1125 UNTS 3 (entered into force 7 December 1978), available at <http://www2.ohchr.org/english/law/protocol1_2.htm> (accessed on 10/7/2024)

[19] Schmitt, M. N. *'Autonomous Weapon Systems and International Humanitarian Law:* A Reply to the Critics', Harvard National Security Journal Features, 2013, pp. 4-6.

[20] Ibid. p. 13.

[21] Geneva Conventions Relation to the Protection of Civilian Persons in Times of War of 1949.

[22] Additional Protocol I to the Geneva Conventions of 12 August 1949, and relations to the protection of victims of International Armed Conflicts (Protocol 1) of 1977.

[23] Rebecca C., *The Killer Robots Are Here: Legal and Policy Implications*, 36 Cardozo L. Rev. 1837, 2015, P. 1840.

[24] See, for example, ICRC (2015) *Statement to the Convention on Certain Conventional Weapons (CCW) Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 13-17 April 2015, Geneva,* <https://www.icrc.org/en/document/lethal-autonomous-weapons-systems LAWS; > Future of Life Institute, *Autonomous Weapons: an Open Letter from AI & Robotics Researchers*. International Joint Conference on Artificial Intelligence, 28 July 2015, <https://futureoflife.org/open-letter autonomous-weapons;> and Future of Life Institute (2017), *An Open Letter to the United Nations Convention on Certain Conventional Weapons, 21 August 2017,* <https://futureoflife.org/autonomous-weapons> open-letter-2017. (accessed on 6/03/2024)

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disadvantages of autonomous weapon systems within their use on the battlefield.[25] However, progress has been slow, and failure of consensus from states on the way forward remains elusive. This is further observed by Boulanin and Verbruggen that, "while there is general agreement on the need for regulation, there is significant divergence on the specifics, reflecting broader geopolitical tensions".[26] The debates within the Group of Governments Experts (GGE) highlight the complexity of regulating AWS, as states grapple with issues of national security, technological sovereignty, and the ethical implications of deploying autonomous systems in combat. The lack of consensus is exacerbated by differing national interests and the strategic advantages that some states perceive in developing AWS.

Generally, this fragmentation underscores the urgency of establishing a cohesive international framework that can address the multifaceted challenges of AWS, ensuring that their deployment aligns with the humanitarian objectives of International Humanitarian Law (IHL) and mitigates the risks of indiscriminate or disproportionate use.

Definition and Characteristics of Autonomous Weapons Systems (AWS)

Autonomous Weapons Systems (AWS) refer to weaponry that can select and engage targets without human intervention once activated. These systems leverage advances in artificial intelligence (AI), robotics, and machine learning to perform complex tasks autonomously. According to Scharre, AWS are characterized by their capability to operate independently based on pre-programmed algorithms and data inputs, effectively performing tasks that traditionally required human decision-making.[27] Their autonomy levels can vary from semi-autonomous systems, which require some human oversight, to fully autonomous systems capable of independent operation in dynamic environments.[28] The main Key characteristics of AWS include decision-making algorithms, sensor integration, adaptability to changing conditions, and the ability to learn from interactions.[29]

The Examples of AWS in Modern Warfare

The Modern warfare has seen the deployment of several AWS examples, highlighting their transformative impact on military operations. One prominent example is the MQ-9 Reaper drone, used by the United States for surveillance and targeted strikes. The Reaper drone can autonomously execute flight paths and identify potential targets, although human operators typically retain the final decision to engage.[30] Another notable Autonomous weapon System (AWS) is the SGR-A1, a stationary robot developed by Samsung Techwin for the South Korean military, which can autonomously detect, track, and engage intruders along the Korean Demilitarized Zone.[31] Additionally, the Russian military's Uran-9 is a combat robot designed for reconnaissance and fire support, capable of navigating complex terrain and engaging targets autonomously.[32] These examples illustrate the diverse applications of AWS in modern military contexts, emphasizing their roles in enhancing operational efficiency and reducing human exposure to danger.

The overview of IHL Principles: Distinction, Proportionality, and Military Necessity

[25] United Nations Office for Disarmament Affairs, *Perspectives on Lethal Autonomous Weapons Systems*, United Nations, 2017. < https://disarmament.unoda.org/publications/library/> (accessed on 6/03/2024)

[26] Boulanin, V., & Verbruggen, M. *'Mapping the Development of Autonomy in Weapon Systems'*, SIPRI, 2017, p. 16.

[27] Scharre, P. *Army of None: Autonomous Weapons and the Future of War*. W.W. Norton & Company, 2018, p. 45.

[28] Arkin, R. C. *Governing Lethal Behavior in Autonomous Robots.* ICRC Press, 2009, p. 78.

[29] Asaro, P. M. "*On Banning Autonomous Weapon Systems: Human Rights, Automation, and the Dehumanization of Lethal Decision-making.*" International Review of the Red Cross, 94(886), 687-709, 2012, p. 395.

[30] Singer, P. W. *Wired for War: The Robotics Revolution and Conflict in the 21st Century.* Penguin,2009, p. 123.

[31] Park, S. *"Guard Robots along the Korean Demilitarized Zone."* Asian Survey, 51(2), 304-328,2011, p. 72.

[32] Bendett, S. "*Russian Ground Robots in Syria: A Reality Check."* War on the Rocks,2018, p. 5.

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International Humanitarian Law (IHL) is founded on three key principles: distinction, proportionality, and military necessity. The principle of distinction requires parties to a conflict to differentiate between combatants and civilians, as well as between military objectives and civilian objects. This principle is enshrined in Article 48 of Additional Protocol I to the Geneva Conventions, which mandates that "the Parties to the conflict shall at all times distinguish between the civilian population and combatants".[33] Proportionality, as outlined in Article 51(5)(b) of Additional Protocol I, prohibits attacks that may cause incidental loss of civilian life, injury to civilians, or damage to civilian objects which would be excessive in relation to the concrete and direct military advantage anticipated.[34] Military necessity justifies the use of force to achieve legitimate military objectives, but it is constrained by the requirement that such actions must not be excessive and must comply with the principles of IHL.[35]

Historical Development and Purpose of IHL in Armed Conflicts

The historical development of International Humanitarian Law (IHL) can be traced back to the mid-19th Century, marked by the establishment of the International Committee of the Red Cross (ICRC) and the adoption of the first Geneva Convention in 1864. This Convention aimed to protect wounded soldiers on the battlefield and laid the groundwork for subsequent treaties that expanded protections to other categories of persons and objects.[36] The Hague Conventions of 1899 and 1907 further developed the legal framework governing the conduct of hostilities, introducing regulations on the means and methods of warfare.[37] The core purpose of IHL is to mitigate the suffering caused by armed conflicts by protecting those who are not, or are no longer, participating in hostilities, and by restricting the means and methods of warfare. This dual objective aims to balance humanitarian concerns with military necessity, seeking to ensure that humanitarian considerations are respected even amidst the harsh realities of war.[38]

Legal Constraints and IHL Constraints on AWS

International Humanitarian Law (IHL) imposes stringent constraints on the use of Autonomous Weapons Systems (AWS) to ensure compliance with established legal principles. AWS must adhere to the fundamental IHL principles of distinction, proportionality, and military necessity, as articulated in various IHL treaties and customary law. The International Committee of the Red Cross (ICRC) emphasizes that AWS must be capable of reliably distinguishing between combatants and non-combatants, as well as lawful and unlawful targets, to comply with the principle of distinction.[39] Furthermore, AWS must be programmed to conduct proportionality assessments, ensuring that any collateral damage to civilians and civilian objects is not excessive in relation to the anticipated military advantage. These requirements pose significant challenges for the development and deployment of AWS, as current AI and machine learning technologies may not yet be sufficiently advanced to perform these complex legal assessments autonomously.[40]

Accountability in the Use of AWS

[33] Henckaerts, J. M., & Doswald-Beck, L. *Customary International Humanitarian Law:* Volume I: Rules. Cambridge University Press, 2005, p. 3.

[34] Sassòli, M. *International Humanitarian Law: Rules, Controversies, and Solutions to Problems Arising in Warfare.* Edward Elgar Publishing, 2019, p. 415.

[35] Schmitt, M. N. *"Military Necessity and Humanity in International Humanitarian Law: Preserving the Delicate Balance."* Virginia Journal of International Law, 50(4), 795-839, 2011, p. 92.

[36] Forsythe, D. P. *The Humanitarians*: The International Committee of the Red Cross. Cambridge University Press, 2005, p. 38.

[37] Best, G. *Humanity in Warfare: The Modern History of the International Law of Armed Conflicts*. Routledge, 1983, p. 34.

[38] Dinstein, Y. *The Conduct of Hostilities under the Law of International Armed Conflict*. Cambridge University Press,2016, p. 15.

[39] ICRC. (2019). *"Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons."* ICRC Report, p. 15, 17.

[40] Saxon, D. *Autonomous Weapons Systems and International Humanitarian Law: Living up to the Challenges.* Routledge, 2019, p. 224.

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The accountability for the use of AWS is a critical issue within the framework of IHL. The deployment of AWS raises questions about who is responsible for their actions, particularly when they operate with a high degree of autonomy. Traditional accountability mechanisms, which rely on human decision-makers, are challenged by the autonomous nature of these systems. However, how 'human responsibility' should be retained in practice remains a relatively underexplored, yet critical, question. This question is often answered differently depending on the perspective from which it is approached, with the main domains being ethical, legal and operational.[41] Furthermore, accountability for AWS should involve a combination of state responsibility, individual criminal responsibility, and the potential for manufacturer liability.[42] States deploying AWS are obliged to ensure that these systems are used in compliance with IHL and to investigate and prosecute any violations that occur. However, individual commanders or operators may be held liable if they fail to exercise appropriate oversight or if they negligently deploy AWS in a manner that results in unlawful actions.[43]

Proportionality and Distinction in AWS Operations

Ensuring adherence to the principles of proportionality and distinction in AWS operations is vital for maintaining IHL compliance. AWS must be capable of making real-time assessments about the proportionality of their actions, weighing the military advantage against potential harm to civilians and civilian objects. This capability requires sophisticated sensors, advanced algorithms, and real-time data processing, which may not yet be fully reliable.[44] Nevertheless, distinction, another cornerstone of IHL, demands that AWS can accurately differentiate between combatants and non-combatants. Given the complexities of modern battlefields, where combatants may not wear uniforms and may be intermingled with civilians, this requirement presents a significant technical and ethical challenge.[45] Therefore, the effective implementation of these principles in AWS operations necessitates rigorous testing, validation, and ongoing oversight to ensure that these systems can perform legally compliant operations under various battlefield conditions.

Technical and Ethical Optimization Challenges

The rapid development of Autonomous Weapons Systems (AWS) has raised profound ethical and legal dilemmas, particularly concerning the delegation of life-and-death decisions to machines. These systems challenge the very foundations of International Humanitarian Law (IHL), which is grounded in principles of humanity and the need to limit the effects of armed conflict. The ethical questions surrounding AWS are not merely theoretical but have practical implications for the conduct of warfare and the protection of civilians.

One of the central ethical dilemmas posed by AWS is the question of accountability. Traditional warfare involves human decision-makers who can be held accountable for violations of IHL, such as war crimes. However, when decisions are made by machines, it becomes unclear who is responsible for unlawful acts. This lack of accountability undermines the fundamental principle of IHL that individuals must be held responsible for their actions during armed conflict. As noted by the International Committee

[41] Marta B, Bruun L, and Boulanin V., "*Retaining Human Responsibility in the Development and Use of Autonomous Weapon Systems: On Accountability for Violations of International Humanitarian Law Involving AWS."* United Kingdom: Stockholm International Peace Research Institute (SIPRI), 2022, pp. 24-34.

[42] Crootof, R. "*The Killer Robots Are Here: Legal and Policy Implications."* Cardozo Law Review, 36(5), 1837-1915, 2015, p. 1391.

[43] Asaro, P. M., "*On Banning Autonomous Weapon Systems: Human Rights, Automation, and the Dehumanization of Lethal Decision-making."* International Review of the Red Cross, 94(886), 687-709,2012, p. 395.

[44] ICRC. *"Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons."* ICRC Report, 2019, p. 17.

[45] Boulanin, V., & Verbruggen, M., *"Mapping the Development of Autonomy in Weapon Systems."* SIPRI Report,2017, p. 48.

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of the Red Cross (ICRC), "the deployment of AWS raises significant questions about accountability for IHL violations, given the absence of a direct human role in the critical functions of selecting and engaging targets in practice"[46] Without clear accountability, victims of unlawful attacks may be left without recourse, violating their rights under IHL.

Furthermore, AWS challenge the ethical principle of distinction, which requires parties to a conflict to distinguish between combatants and civilians. The ICRC has emphasized that this principle is "a cornerstone of IHL and is essential to protecting civilians during armed conflict"[47] However, the ability of AWS to make such distinctions is questionable, particularly in complex environments where the line between combatants and civilians is blurred. The potential for AWS to misidentify targets raises serious ethical concerns, as it could lead to indiscriminate attacks and unnecessary civilian casualties, violating the principle of distinction and the prohibition against indiscriminate attacks under IHL.

The principle of proportionality, which prohibits attacks that may cause excessive harm to civilians in relation to the anticipated military advantage, is also at risk with the use of AWS. Machines lack the ability to make nuanced judgments about proportionality, which often requires a deep understanding of the context and potential consequences of an attack. According to the ICRC, "the application of the proportionality rule is inherently context-dependent and requires a degree of human judgment that may be beyond the capabilities of AWS"[48] The inability of AWS to apply proportionality effectively could result in disproportionate harm to civilians, further eroding the protections afforded by IHL.

The use of AWS also raises broader ethical concerns about the morality of delegating life-and-death decisions to machines. The ICRC has expressed concerns about the dehumanization of warfare, stating that "the use of AWS in armed conflict risks eroding the ethical and moral constraints on the use of force, as decisions about killing are removed from human hands"[49] This dehumanization could lead to a more permissive attitude towards the use of force, potentially lowering the threshold for military engagement and increasing the likelihood of conflict. The moral responsibility to make such decisions, which traditionally rests with human commanders, is a key aspect of the ethical framework of IHL. The delegation of this responsibility to machines raises fundamental questions about the nature of human agency and the moral constraints on the use of force.

However, the ethical dilemmas posed by AWS in warfare present significant challenges to the principles of IHL. The lack of accountability, the potential for violations of the principles of distinction and proportionality, and the broader moral implications of delegating life-and-death decisions to machines all raise serious concerns about the compatibility of AWS with IHL. As the ICRC and other scholars have argued, there is an urgent need for international legal frameworks to address these challenges and ensure that the use of AWS in armed conflict is consistent with the ethical and legal principles that underpin IHL.

CONCLUSION

[46] International Committee of the Red Cross (ICRC), "*Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons,"* ICRC Report, April 2021, available at ICRC Website < https://international-review.icrc.org/articles/icrc-position-on-autonomous-weapon-systems-icrc-position-and-background-paper-915> (Accessed on 13/08/2024)

[47] International Committee of the Red Cross (ICRC), "*The Principle of Distinction: Protecting Civilians in Armed Conflict,"* ICRC Commentary, July 2019, available at ICRC Website< https://ihl-databases.icrc.org/en/customary-ihl/v2/rule1> (Accessed on 13/08/2024)

[48] International Committee of the Red Cross (ICRC), "*Proportionality in Armed Conflict: A Key Principle Under International Humanitarian Law,"* ICRC Commentary, September 2020, available at ICRC Website. <https://www.icrc.org/en/document/international-expert-meeting-report-principle-proportionality> (Accessed on 13/08/2024)

[49] International Committee of the Red Cross (ICRC), "*Ethics and Autonomous Weapon Systems: An Ethical Basis for Human Control?" ICRC Report*, November 2018, available at <https://www.icrc.org/sites/default/files/document/file_list/icrc_ethics_and_autonomous_weapon_systems_report_3_april_2018.pdf> (Accessed on 13/08/2024)

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In conclusion, the effects of Autonomous Weapons Systems (AWS) on armed conflicts and their alignment with International Humanitarian Law (IHL) are still unclear due to the scarcity of empirical data. Furthermore, it is crucial for the international community to address these issues proactively. Fully autonomous weapons, given the current level of Artificial Intelligence (AI) development, could potentially breach IHL norms if used without thorough consideration. The threat of these systems being acquired by non-state actors is significant, highlighting the need for comprehensive regulation. States, international organizations, the UN, and global civil society must work towards establishing specific rules for the development and deployment of AWS. These regulations should cover their objectives, areas of operation, deployment scenarios, interaction requirements with operators, and weapon specifications while these systems are still emerging. Neglecting to implement such measures could widen the gap between modern technology and the law, possibly leading to the proliferation of uncontrolled weapons, similar to what happened with nuclear arms.

