Lack of International Consensus Regarding Usability of Lethal Autonomous Weapons Systems (LAWS)

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On my honor as a University Student, I have neither given nor received unauthorized aid on this

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Introduction

Humans have used weapons throughout all of history for everything from prehistoric hunting to modern day warfare. Weapons have changed from simple wooden spears to modern day nuclear bombs capable of mass destruction as new technologies are developed and adopted. One thing left primarily untouched, however, is the requirement of a human agent to utilize such weaponry. Guns must be pointed and have a trigger that must be pulled, and nuclear bombs are launched by pressing a button – humans are required to make real-time decisions and oversee the majority of operation. However, new advances in artificial intelligence and autonomous technologies are paving the way for a new series of weaponry less reliant on human agents. What was once seen as science fiction is now being developed and deployed by governments around the world and capable of targeting enemies and applying deadly force without human oversight.

Commonly known as "killer robots" or more formally lethal autonomous weapons systems (LAWS), the use of fully autonomous machines capable of killing humans on the battlefield has been the topic of serious debate (ICRC, 2020, p. 1). In 2015, over 1,000 leading artificial intelligence (AI) and robotics researchers signed an open letter warning of the dangers of lethal autonomous weapons systems, stating that they could be "the third revolution in warfare, after gunpowder and nuclear arms" (Russell, 2015). The world's leading powers, including the United States, Russia, and China, have already begun developing and investing heavily into LAWS. As an example, the U.S. Defense Advanced Research Projects Agency (DARPA) created the Sea Hunter, an unmanned surface vessel for anti-submarine warfare (Anderson & Waxman, 2020). Russia has begun developing the Uran-9, a ground combat robot capable of conducting reconnaissance and engaging enemy targets (Scharre, 2018). China has also developed an autonomous combat drone, known as the Blowfish A2 (Horowitz, 2021).

Despite these developments, the technology remains in an international "regulatory grey zone" (Stercke, 20, p. 1) as countries have yet to come to an agreed upon definition of LAWS (Sayler, 2022; Taddeo, 2022) and international debates have not led to a conclusive decision concerning the use of LAWS (Heyns, 2014; Geiss, 2015; Daisuke, 2019; Congress, 2021). In the absence of clear international regulations, individual nations have been left to develop their own policies and guidelines regarding the development and use of LAWS (Scharre, 2018).

This paper explores the historical impediments to an international consensus on the definition and usability of lethal autonomous weapons systems (LAWS). By analyzing the ethical and political considerations of the United States, Russia, and China, this paper argues that the lack of global agreement on LAWS is rooted in divergent views on delegating life-and-death decisions to machines, which may be addressed by prioritizing defensive autonomous systems and promoting trust through transparency and confidence-building measures.

The literature review highlights the lack of consensus on LAWS definition and usability and introduces the Social Construction of Technology (SCOT) framework to examine ethical and political perspectives of the United States, Russia, and China on LAWS (Pinch & Bijker, 1984). The methods section outlines how this paper's research was conducted using literature review and discourse analysis to facilitate the replication of this project and demonstrate the reliability of the findings. The analysis section investigates recent resources to examine ethical and political considerations of the major global players to argue that divergent views on the delegation of life-and-death decisions to machines have led to a lack of international consensus on LAWS, and how progress may be achieved by prioritizing defensive systems and transparency measures. This paper provides insights for stakeholders, proposes future research directions, and highlights the implications of ethical guidelines and international collaboration regarding LAWS.

Literature Review

A widely accepted definition of Lethal Autonomous Weapon Systems (LAWS) has been proposed by global humanitarian organizations, but the major global players, including the United States, Russia, and China, have not adopted it. The International Committee of the Red Cross (ICRC), a key organization in international humanitarian law, defines LAWS as "any weapon system with autonomy that can select (i.e., search for or detect, identify, track, select) and attack (i.e., use force against, neutralize, damage or destroy) targets without human intervention" (2020). However, achieving consensus on the definition of LAWS has proven to be challenging due to the divergent perspectives of these leading powers. According to Shanks and Washburn (2018), the United States, Russia, and China have all adopted different definitions of LAWS, making it difficult to find common ground on how to regulate these weapons.

This leaves lethal autonomous weapons systems (LAWS) in an international regulatory grey zone. International debates have not led to a conclusion decision concerning the use of LAWS (Heyns, 2014; Geiss, 2015; Daisuke, 2019; Congress, 2021), and in the absence of clear international regulations, individual nations have been left to develop their own policies and guidelines regarding the development and use of LAWS (Scharre, 2018). The lack of clear international regulations regarding LAWS raises concerns about accountability and transparency, as it is unclear who would be responsible for any harm caused by these weapons (Bijleveld and Breuer, 2020).

Existing literature has begun to explore various aspects of LAWS to address these concerns, offering preliminary insights into the factors contributing to the lack of a global consensus regarding these weapon systems. Researchers have examined various dimensions of LAWS in-depth, uncovering valuable insights into the complexities and challenges associated

with their development and deployment. For instance, Arkin (2009) investigated the operational considerations and risks associated with LAWS, highlighting the challenges of integrating these systems into military operations. Similarly, Asaro (2012) discussed the issues of target identification, discrimination, and proportionality, emphasizing the difficulties in ensuring that LAWS can adhere to international humanitarian law (IHL) standards. Wagner (2018) analyzed the challenges in developing LAWS with adequate decision-making capabilities, particularly in situations with high levels of uncertainty and rapidly changing circumstances.

However, the existing research exhibits a gap in addressing the ethical and political considerations of the major global players, namely the United States, Russia, and China, in shaping their respective positions on LAWS. The ethical and political perspectives of these leading powers are crucial in understanding the historical impediments to a strong international consensus on LAWS, as they significantly influence the development, deployment, and regulation of these weapon systems (Scharre, 2018; Horowitz & Scharre, 2015). These countries possess considerable influence in shaping international norms and policies, making their stances on LAWS critical in determining the trajectory of international consensus on these weapon systems (Boulanin & Verbruggen, 2017). Furthermore, their positions on LAWS have significant implications for global security, as nations may seek to develop and deploy LAWS to maintain or gain a strategic advantage over their rivals (Sukmanova & Horowitz, 2020). Analyzing the interplay between ethical and political factors will provide a more comprehensive understanding of the challenges in reaching international consensus on LAWS.

To address this gap, this paper offers a novel analysis of the ethical and political perspectives of the United States, Russia, and China in relation to LAWS, and their implications for consensus-building, using the Social Construction of Technology (SCOT) framework (Pinch

& Bijker, 1984). This perspective, which falls within the broader field of Science and Technology Studies (STS), is well-suited to explore the social, cultural, and political contexts shaping the development and deployment of LAWS, offering a deeper exploration of the factors that have historically hindered the establishment of a strong international consensus on LAWS. SCOT emphasizes that technologies are constructed and influenced by relevant social groups, interpretative flexibility, closure, and stabilization (Pinch & Bijker, 1984).

Relevant social group refers to the "social groups concerned with the technological artefact, and by the meanings which those groups give to the artefact" (Pinch & Bijker, 1984, p. 414). Interpretative flexibility refers to the idea that "different social groups have radically different interpretations of one technological artefact" and reflects how "there is flexibility in how people think of, or interpret, artefacts, and there is flexibility in how artefacts are designed" (Pinch & Bijker, 1984, p. 421). The SCOT theory defines closure mechanisms of a technology as "rhetorical closure" and "closure by redefinition of problem", both involving "the stabilization of an artefact (technology) and the disappearance of problems" (Pinch & Bijker, 1984, p. 425-426). Rhetorical closure is when "relevant social groups see the problem as being solved", and closure by redefinition of problem is when a technology surrounded by conflict is stabilized by utilizing it to solve a different problem (Pinch & Bijker, 1984, p. 427).

In the case of LAWS, the relevant social groups within each country—the United States, Russia, and China—include policymakers, military personnel, and civilian stakeholders, each with their unique perspectives and priorities (Kania, 2018). These groups contribute to the interpretative flexibility of LAWS, as they hold different views on the role of technology in warfare, the ethical implications, and the desired balance between human control and autonomy (Asaro, 2012). As the debate on LAWS continues, closure—or the point at which a consensus is

reached regarding the ethical, legal, and political frameworks for these weapons—has not been achieved (Daisuke, 2019). The rhetorical closure, or the emergence of a dominant narrative, remains difficult due to the divergent ethical and political perspectives among the global powers (Shanks & Washburn, 2018). Stabilization, or the establishment of standardized definitions and regulations for LAWS, is also hindered by these deep-rooted differences (Geiss, 2015).

To summarize, LAWS currently exist in an international regulatory grey zone, with existing literature providing preliminary insights into the complexities and challenges associated with their development and deployment. However, there is a research gap in addressing the ethical and political considerations of major global players—United States, Russia, and China—that significantly influence the trajectory of international consensus on LAWS. This paper fills that gap by employing the SCOT framework to analyze the ethical and political perspectives of these countries, providing a more comprehensive understanding of the challenges in reaching international consensus on LAWS.

Methods

The research methodology follows a systematic literature review, focusing on resources published within the last 15 years, to capture the most recent and relevant developments in LAWS. The literature review is divided into three main stages: identification, screening, and in-depth analysis.

During the identification phase, a wide range of resources was considered to capture diverse perspectives on LAWS. This included legal texts and speeches from international organizations and each of the three countries, academic journal articles and agency reports addressing ethical, legal, and practical issues of LAWS, and media accounts covering various

perspectives and opinions on LAWS. The resources were selected through a careful examination of their relevance, credibility, and recentness, to ensure that the analysis was based on accurate and up-to-date information.

In the screening phase, the identified resources were further scrutinized to assess their quality and suitability for the research objectives. The resources were evaluated based on their methodological rigor, the extent to which they addressed the research question, and their contribution to the existing literature on LAWS. Resources that did not meet these criteria were excluded from further consideration, while those that met the criteria were retained for in-depth analysis.

The in-depth analysis phase involved a thorough examination of the retained resources, with a focus on understanding their arguments, evidence, and conclusions. The analysis drew on the SCOT framework (Pinch & Bijker, 1984) to explore the ethical and political perspectives of the United States, Russia, and China, and to identify the factors that have hindered the establishment of a strong international consensus on LAWS. This in-depth analysis also facilitated the identification of common themes, patterns, and trends in the literature, which were instrumental in shaping the arguments and insights presented in this paper.

In addition to the literature review, this research also incorporates discourse analysis as part of its methodology. Discourse analysis refers to the close reading of texts produced by relevant social groups, such as users, producers, and other agents who interact with the technology. This analysis examines what is being said, who is saying it, and to whom it is being said (Tenorio, 2011). Texts were gathered from scholarly websites and journals, and include statements on LAWS by major global players, as well as records of international debates and conventions. Examples include the U.S. Department of Defense statement on LAWS, the

International Committee of the Red Cross's statement on humanitarian law and LAWS, and the international gathering at the UN Convention of Certain Conventional Weapons (Carter, 2017; ICRC, 2020; Heyns, 2014).

Overall, this research methodology aims to provide a comprehensive and robust analysis of the ethical and political perspectives of the United States, Russia, and China regarding LAWS. This approach has not only provided a solid foundation for the analysis, but also contributed to the reliability and validity of the findings, allowing for a greater understanding of the historical impediments to a strong international consensus on LAWS.

Analysis

By analyzing the ethical and political considerations of the United States, Russia, and China, this paper argues that the lack of global agreement on LAWS is rooted in divergent views on delegating life-and-death decisions to machines, which may be addressed by prioritizing the development of defensive autonomous systems and promoting trust through transparency and confidence-building measures. The delegation of life-and-death decisions to machines refers to the extent to which a country is willing to allow autonomous weapon systems to make critical decisions, such as identifying, selecting, and engaging targets, without direct human intervention (Crootof, 2016). Each country's level of acceptability for delegating life-and-death decisions to machines is directly connected to their relevant social groups, whose various ethical and political perspectives shape the interpretative flexibility of the definition and development of LAWS.

In the United States, ethical considerations like the protection of human life and adherence to international humanitarian law (IHL) play a significant role in shaping the country's more cautious approach to LAWS (Bijleveld & Breuer, 2020). Military personnel and defense

contractors may advocate for the development of LAWS for strategic and economic reasons, while civilian stakeholders and non-governmental organizations often emphasize ethical concerns and adherence to international humanitarian law (Scharre, 2018). Policymakers must navigate these differing perspectives to develop a comprehensive and balanced approach to LAWS. The US military's experience in conflicts like the Vietnam War and recent wars in Iraq and Afghanistan reinforce the importance of minimizing civilian casualties and maintaining a high standard of ethical conduct in warfare (Asaro, 2012; Singer, 2009). Thus, the US adopts a cautious stance towards LAWS, prioritizing human control and accountability in life-and-death decision-making processes.

In contrast, Russia has demonstrated interest in fully automating its military capabilities, as evidenced by the development of the Uran-9 unmanned ground combat vehicle (Gady, 2018) and the S-70 Okhotnik-B combat drone (Mizokami, 2020), indicating a greater willingness to delegate critical decision-making processes to machines and a more open approach to LAWS (Sukmanova & Horowitz, 2020). Russian military leadership and defense industry representatives predominantly drive the influence of social groups and stakeholders on policy and decision-making, often outweighing civilian stakeholders who have limited influence on policy (Kofman, 2021). Russian military doctrine and strategic objectives prioritize the development of cutting-edge technology and the modernization of its armed forces to assert its influence on the global stage, such as the establishment of the Russian Foundation for Advanced Research Projects, which aims to foster innovation in military technology (Giles, 2021). Consequently, Russia is more willing to delegate life-and-death decision-making processes to machines, even in the face of potential ethical concerns about compliance with IHL and protecting civilian lives (Sukmanova & Horowitz, 2020).

Conversely, China adopts a more balanced approach to LAWS, seeking to balance technological advancements with ethical considerations and the importance of human control (Kania, 2018; Allen, 2019). China's historical experiences, cultural values, and strategic objectives play a significant role in shaping its perspective on LAWS (Cheung, 2021). As a rising global power, China recognizes the importance of advancing its military capabilities while upholding its commitment to cultural values and principles, such as harmony and stability (Chen, 2020). China's approach emphasizes ensuring that autonomous weapons operate within the bounds of IHL and respect the sanctity of human life (Allen, 2019). Consequently, China seeks a more balanced approach to LAWS, reconciling the potential military advantages of autonomous weapons with the ethical imperatives of protecting civilians and maintaining human control in warfare (Kania, 2018).

The divergent perspectives on delegating life-and-death decisions to machines among the United States, China, and Russia have complicated international negotiations, hindering the establishment of consensus on LAWS. One notable example is the negotiations within the United Nations Convention on Certain Conventional Weapons (CCW) Group of Governmental Experts (GGE) on LAWS. Despite multiple rounds of discussions since 2014, the GGE has not reached a comprehensive agreement on the regulation of LAWS due to the differing stances of the participating countries, including the US, China, and Russia (Boulanin & Verbruggen, 2017). During these negotiations, the United States has emphasized the importance of maintaining human control and accountability in the development and deployment of LAWS. The US has advocated for the establishment of a regulatory framework that adheres to international humanitarian law (IHL) and minimizes the risk of unintended civilian casualties (Scharre, 2018). The US strategy in negotiations has involved promoting discussions on the development of

voluntary guidelines for the responsible use of LAWS, rather than pushing for a legally binding international ban (Boulanin & Verbruggen, 2017). On the other hand, China has sought a balanced approach in the negotiations, recognizing the potential benefits of LAWS for enhancing military capabilities while emphasizing the need for human control in decision-making processes. In 2018, China expressed its support for a ban on fully autonomous weapons but maintained that it only applied to offensive systems, leaving room for the development of defensive autonomous systems (Kania, 2018). This nuanced position highlights China's attempt to strike a balance between advancing its technological interests and adhering to international norms and standards. Russia, however, has demonstrated a higher level of acceptance for the delegation of critical decisions to machines, pursuing the development of fully automated military capabilities (Sukmanova & Horowitz, 2020). During the CCW negotiations, Russia has consistently opposed any form of regulation that would limit its ability to develop and deploy LAWS, arguing that existing IHL is sufficient to address the challenges posed by autonomous weapons, further preventing the establishment of a cohesive international policy on LAWS (Boulanin & Verbruggen, 2017).

Potential areas of compromise and common ground that could facilitate progress towards international consensus on LAWS among the United States, China, and Russia might involve focusing on the development of defensive autonomous systems and establishing transparency and confidence-building measures. By prioritizing defensive capabilities, countries could alleviate some ethical concerns related to life-and-death decision-making processes while still benefiting from the technological advancements in LAWS. This approach would align with China's position on the ban of fully autonomous offensive weapons, as mentioned earlier (Kania, 2018), and could be more acceptable to Russia, as it allows for continued development of LAWS

while addressing some of the ethical concerns raised by the US and other countries (Boulanin & Verbruggen, 2017; Sukmanova & Horowitz, 2020). For example, Russia's interest in the development of the Uran-9 unmanned ground combat vehicle (Gady, 2018) and China's focus on defensive systems like the Blowfish A2 drone (O'Connor, 2020) could pave the way for an agreement on prioritizing defensive LAWS.

In tandem with this focus, establishing transparency and confidence-building measures, such as sharing information on the development and deployment of LAWS and conducting joint military exercises or workshops, could foster trust and cooperation among the parties. For instance, China's expressed support for a ban on fully autonomous offensive weapons could be used as a starting point for discussions on the scope and limitations of LAWS, while still allowing for the development of defensive autonomous systems (Kania, 2018). Building on previous international negotiations, such as the Convention on Certain Conventional Weapons (CCW) meetings, countries could establish more structured dialogue and engage in joint efforts to study the implications of LAWS (UNOG, 2021). Moreover, the Biological Weapons Convention (BWC) and the Chemical Weapons Convention (CWC) provide examples of how international consensus can be achieved by establishing common ground and focusing on the humanitarian consequences of certain weapons (UNOG, 2006; Organization for the Prohibition of Chemical Weapons, 1993). Lessons from these conventions could inform negotiations on LAWS, as they emphasize the need for a shared understanding of the potential risks and humanitarian implications associated with the development and deployment of such weapons. Similarly, the Strategic Arms Reduction Treaty (START) between the US and Russia, signed in 1991 and later replaced by the New START in 2010, demonstrates the importance of bilateral negotiations and cooperation in managing strategic weapons (US Department of State, 2011).

The Intermediate-Range Nuclear Forces (INF) Treaty, signed by the United States and the Soviet Union in 1987, serves as an example of how adversaries can work together to reduce risks and ease tensions through arms control agreements (Kimball, 2019). Drawing from these historical examples, establishing transparency and confidence-building measures could pave the way for a more collaborative approach to regulating LAWS.

Acknowledging the arguments of those who believe that the development of LAWS can be left to individual countries and that each country can establish their own ethical and legal frameworks for the development and deployment of autonomous weapons systems (Scharre, 2018), it is essential to address the potential implications of this approach. While this perspective emphasizes national sovereignty and the autonomy of countries in regulating their military technologies, it raises concerns about the lack of international oversight and the potential for a destabilized security landscape. In response to this viewpoint, it is crucial to consider the potential risks associated with an unregulated development and deployment of LAWS by individual countries. A lack of international consensus and regulation could lead to an arms race, as nations might feel compelled to develop LAWS in response to perceived threats from other countries (Scharre, 2018). Moreover, the absence of globally accepted standards could result in the development of LAWS that do not adhere to international humanitarian law, increasing the potential for unintended civilian casualties and other ethical and legal concerns (Crootof, 2016).

In summary, this analysis section has demonstrated that the differing ethical and political perspectives of the United States, Russia, and China, has resulted in divergent views on the delegation of life-and-death decisions to machines, ultimately hindering cooperation and compromise in international negotiation and making it difficult to establish a cohesive international policy and regulatory framework for LAWS. Due to China's support for a ban on

only offensive LAWS, this analysis suggests that the development of strictly defensive LAWS

may be a point of common ground among the global leaders, as it would allow Russia to

continue developing autonomous systems for their military goals while addressing the ethical

concerns raised by the United States and other countries. Establishing transparency and

confidence-building measures, as outlined in many successful historical international

negotiations, could also foster trust and cooperation among the parties. While acknowledging

alternative viewpoints on national autonomy in regulating LAWS, the potential risks associated

with an unregulated development and deployment of these technologies underline the importance

of striving for a global consensus to ensure a stable and secure international security landscape.

Conclusion

This paper utilized the Social Construction of Technology (SCOT) framework to

examine the ethical and political considerations of the United States, Russia, and China in

relation to lethal autonomous weapons systems (LAWS). The analysis demonstrated that the lack

of global agreement on LAWS stems from divergent views on the delegation of life-and-death

decisions to machines, with potential progress from prioritizing defensive autonomous systems

and promoting trust through transparency and confidence-building measures. This emphasizes

the necessity for cooperation and compromise in international negotiations to create a stronger

international consensus and address the ethical, legal, and security challenges posed by LAWS.

The implications of this research are significant for researchers, engineers, policymakers,

and other actors involved in the development and regulation of LAWS. By identifying the

obstacles that hinder the formation of a robust international consensus, this paper provides a

foundation for future dialogue and negotiation among global powers. Policymakers can use

insights from this analysis to address each nation's ethical and political concerns on LAWS. By understanding different perspectives, they can engage in constructive negotiations, finding common ground and compromises like focusing on defensive autonomous systems or implementing transparency and confidence-building measures. They could propose a regulatory framework that balances strategic objectives, such as Russia's pursuit of technological superiority, with ethical concerns, like the United States' emphasis on human life protection and adherence to international humanitarian law. This may involve setting standards for human control and accountability, creating protocols for the use of LAWS that respect each nations' principles, or establishing cooperative mechanisms for sharing information and technology related to LAWS.

Future research should focus on exploring potential avenues for fostering cooperation and compromise among nations with divergent perspectives on LAWS. This could include examining the role of international organizations, such as the United Nations, in facilitating dialogue and consensus-building, as well as investigating best practices for incorporating ethical considerations into the design and development of LAWS. Moreover, future research could explore strategies for engaging a broader range of stakeholders, including civilian populations and non-state actors, in the conversation surrounding LAWS, ensuring that the diverse perspectives of those affected by these technologies are considered.

By addressing the challenges in achieving a global consensus on LAWS, the international community can develop a responsible framework that tackles ethical, legal, and security concerns. Drawing on the analysis' findings, collaborative efforts can lead to a more stable, peaceful world, transforming military technologies and promoting a shared commitment to nations' goals and ethical responsibilities.

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