War and the Use of Autonomous Weapon Systems

Introduction

Unmanned weapons systems are presently used in combat. Decisions on whether lethal force is to be utilized are remotely made by humans. However, just as it is technologically possible to build self-driving cars that do not need a human operator, it is possible to develop autonomous weapon systems (AWS) that require no remote human operator. These systems can be programmed so that decisions utilizing lethal force require no human operator making decisions based on situational battlefield contingencies.

AWS are already in use, although to a limited extent, in the targeting of sites whose destruction can reasonably be judged not to directly involve human causalities. It is virtually certain that technological advances, along with political and commercial factors will lead to the widespread use of fully autonomous weapons systems.

A fundamental question, however, is whether it is ethical to use AWS that are designed to kill or injure humans. Is it morally permissible to have life and death decisions made by artificial intelligence rather than human operators? Indeed, given their potential precision and reliability, might it be morally obligatory to employ such AWS? Might the use of AWS result in fewer battlefield deaths and injuries both for one's own and enemy forces?[1]

The Rules of War

The rules of war can be usefully divided into two categories: *jus ad bellum* (justice of war) and *jus in bello* (justice in war). *Jus ad bellum* sets out the criteria that must be met if engaging in war is morally justified. A country is considered justified in engaging in war if its reasons for going to war are ethically justified, for example self-defense against an aggressor,

and if the evils of going to war are outweighed by the moral goods that can reasonably be thought achievable.

Jus in bello sets out the ethical criteria that must be met once war takes place. These criteria are designed to safeguard fundamental human rights even in war. Combatants are ethically responsible for their actions. If they fail to discriminate between combatants and civilians, if they pursue enemies beyond reason, if they mistreat captured enemies, if they target non-military sites or if they follow orders they know to be immoral then they are in violation of *jus in bello* and guilty of war crimes.

Also, of importance is the principle of proportionality. This principle requires that the costs of war do not outweigh its benefits. The kind and extent of force used must be proportional to the objective being pursued. Combatants are required to oppose force with similar force and enemy combatants must not kill each other if the desired goal can be achieved without killing. Combatants must use the minimum amount of force consistent with effectively pursuing their strategy, so that the value of an attack is proportional to what is gained.

Autonomous Weapon Systems and *Jus Ad Bellum*

Although most ethical concerns respecting AWS arise in the context of *jus in bello*, a concern regarding AWS and *jus ad bellum* deserves examination. It is the concern that AWS may lead to the proliferation of unjust wars. There are several reasons for taking this concern seriously.

First, in the case of one country possessing AWS, but not another, the stronger country is in the position of being able to wage war without suffering many casualties and the political repercussions associated its soldiers coming home in body bags. A war fought on foreign soil

and without many casualties is far less likely to arouse domestic opposition. Such a fact may well be taken into consideration by a government deciding whether to initiate a war to further political and economic interests. Strong countries have historically proven quite willing to wage wars of annexation when they can prosecute such wars with little bloodshed to their own forces. Even in cases where both sides possess AWS, the threshold for initiating a war may prove lower, since AWS suggest the possibility of relatively bloodless fighting.

Second, AWS may plausibly be thought to lead to a 'numbing' effect. We know that awareness of killing and death may be decreased by extreme distance. In such instances, say high level bombing, where killing amounts to the pressing of a button and the awareness of persons' deaths amounts to a signal on a screen, agents can become numb to the horrific consequences of their actions. Similarly, the utilization of completely autonomous systems in which kill commands are the result of a machine's prior programming may diminish the sense of responsibility of those waging war.

Third, AWS may lead to the waging of 'secret' or unofficial wars. AWS in the hands of a nation's security or intelligence agency, up the likelihood of their clandestine use. Decisions taken in secret and not made available to public scrutiny make it easier to skirt ethical and legal requirements concerning the use of AWS. Countries not officially at war may nevertheless be waging what amounts to war with one another.

The potential of AWS to lead to the proliferation of unjust wars must be taken seriously as an ethical objection to the use of such systems. It is not, however, a conclusive objection, since there may be benefits to their use in war that outweigh this cost. It is to this topic that we now turn.

Autonomous Weapons Systems and Jus in Bello

Most ethical concerns regarding AWS are related to their use in war; the question being whether their employment is consistent with *jus in bello*. It is useful to divide these concerns into three general types: 1) concerns about AWS and a lack of moral accountability, 2) concerns about artificial intelligence decision making, and 3) precautionary concerns regarding unforeseen consequences of the use of AWS.

AWS and Moral Responsibility

Clearly, fully autonomous weapons systems are not moral agents and cannot be held responsible for the actions that result from their programming. It is important, however, to assign responsibility for acts of war, especially in cases involving the use of lethal force. If it is impossible to assign moral responsibility to AWS, if they cannot be held morally accountable for causing death, can their use on the battlefield be ethically justified?

The answer to this question appears to be yes. The fact that AWS cannot be held morally responsible for their actions does not imply that no responsibility exists for their actions. Rifles are weapons and AWS are weapons. We do not hold rifles morally responsible for causing injury or death, but rather the persons who either knowingly or negligently use them unethically. Analogously, although AWS cannot be held morally responsible for the harm they cause, it is appropriate to assign responsibility to those who decide to employ AWS. The fact that AWS can cause far more harm than rifles, and unlike rifles have been programmed to react to battlefield contingences, in no way implies that those employing them cannot be held responsible for the harm they cause. Both are weapons and those who use them are morally responsible for how they are used.

Further, ethical responsibility for harm come in differing degrees and can be spread across different agents. A military commander is in violation of her moral duty of proper care if she employs a machine on the battlefield without first ensuring it meets proper safety standards and operates as it should. Equally, a manufacturer breaches his moral duty of care if he markets a machine without first ensuring within the limits of reasonable foreseeability that it can safely be used. The rules of war forbid the killing of civilians. Any manufacturer of AWS, or has, therefore, the duty of ensuring that the ability to discriminate between civilians and enemy combatants is built into its AWS. If, either through negligence or direct intention, this ability is not a feature of its AWS then the manufacturer can be held morally responsible for its AWS's actions. *Mutatis mutandis*, (with the respective differences having been considered) the ethical duty of proper care also applies to designers and salespersons of AWS.

AWS and Artificial Decision Making

We have seen that the ethical use of AWS presupposes the ability to discern between combatants and civilians when using lethal force. A further ethical concern is whether, even if AWS possess this ability, do they have it to the same degree as humans? If humans are simply better at making decisions concerning the use of lethal force is it moral to use AWS.

It is true that if humans are simply better at making decisions concerning the use of lethal force on the battlefield then AWS should not be used to make such decisions. Two points deserve emphasis, however.

First, even if it is not presently true that AWS make such decisions better than humans, this may not be the case in the future. Humans, especially under extreme stress such as on the battlefield do not always behave rationally or ethically, otherwise events such as the My Lai

massacre of the Vietnam War, would not happen. AWS have no emotions, so, unlike humans their ability to discriminate targets and make ethical decisions is not undermined by horrific circumstances. If future technology brings to fruition AWS that can discriminate targets and make ethical decisions on a par with trained human military then there are good reasons to think their use in war is justified and surpasses in difficult circumstances the abilities of human agents. Of course, any future claim that AWS equal or surpass human decision makers must be extensively tested and have comprehensive independent verification.

Second, given that AWS have no right to life and thus no inherent right to self-defense, this allows greater prospects for the use of non-lethal force. For example, in capturing enemy forces human combatants are entitled to measures of self-defense and may in defending themselves inflict serious or lethal injuries on those being captured. This factor provides good reason to think that AWS can mitigate some of the harms of battle.

AWS and the Law of Unintended Consequences

Sophisticated technology typically brings about unforeseen negative consequences in its use, so much so that in common parlance people refer to the law of unintended consequences. The more complex the technology and the more complex the environment in which it is used the more unintended and unforeseen consequences are generated. Might it be argued that, given AWS immense capacity for destruction, their enormous technological sophistication, and the prospect of employing them in the colossally complex environment of modern warfare, that their use should be prohibited on the basis that it is bound to generate serious unforeseen negative consequences?

The answer to this question is, I think, no for at least two reasons. First, the argument seems to prove too much. That sophisticated technologies consistently come with serious unintended negative consequences cannot be disputed. Nevertheless, such technologies have enhanced our lives. Generally, the answer to such negative consequences lies not in banning the technology outright, but in placing ethical restrictions on how it is used. Thus, for example, we possess the technology to edit genes. This can lead to ethically justified activity, for example the targeted genetic engineering that resulted in rice plants producing β-carotene not simply in the leaves but in the grains, thus creating golden rice that provides provitamin to people who would otherwise be deficient in that essential vitamin.[2] Gene editing also generates the possibility of unethical behavior, for example experiments attempting to hybridize human and chimpanzees. The solution is not to ban gene editing technology, but rather to set moral parameters around its use. Regarding the technological development and use of AWS, it is essential to set strict, well-monitored, regulations around their development and deployment, not ban their use in principle.

Second, there are serious ethical costs to using humans to make battlefield life and death decisions. The issue, therefore, is not whether the use of AWS comes with ethical costs, but whether those ethical costs outweigh the ethical costs of their not being used. The potential of AWS leading to fewer human lives being lost in war cannot be ignored.

Conclusion

There are serious ethical concerns regarding the use of AWS both from the perspective of *jus ad bellum* and *jus in bello*. We have seen, however, that these concerns are not such as to render their future possible use impermissible. Some of the requirements of such use are that

AWS can be programmed to discriminate effectively between targets and that the algorithms guiding their battlefield behavior results in ethical action. Further requirements would be that there exist redundancy systems and controls that lessen the risks inherent in the operation of AWS. Thus, for example, AWS might be programmed only to operate with mission-specific locations, to operate only within a specific time period, or to have the possibility of human overriding of the system. If such requirements can be met and it can be verified that they are met then the use of AWS would not only be ethically permissible, but ethically obligatory, inasmuch as their use would lessen human death during war.

United Nations and Autonomous Weapons Systems

Antonio Guterres, the United Nations Secretary General has repeatedly called for an international ban on lethal autonomous weapon systems (LAWS), i.e. weapons which select their targets independently and fight them independently, stating that "autonomous machines with the power and discretion to select targets and take lives without human involvement are politically unacceptable, morally repugnant and should be prohibited by international law."[3] Since 2013, 30 countries have called for a pre-emptive ban on the use of fully autonomous weapons, the list including countries such as Austria, Brazil, Egypt, and Mexico. [4]

For over five years a possible ban within the framework of the existing Convention on Certain Conventional Weapons has been discussed by the UN but have gone nowhere. One of the reasons they have gone nowhere is that consensus is required if any new regulatory framework is to be reached. Heavily militarized states such as Russia and the U.S.A. have resisted any calls for such a ban insisting that present international humanitarian law provides

enough regulation. China's position is that it supports a ban on the use of autonomous weapons systems, but that it does not support prohibition on the development of such systems.

Defense Primer: U.S. Policy on Lethal Autonomous Weapon Systems (Dec 19/2019)[5]

Lethal autonomous weapon systems (LAWS) are a special class of weapon systems that use sensor suites and computer algorithms to independently identify a target and employ an onboard weapon system to engage and destroy the target without manual human control of the system. Although these systems generally do not yet exist, it is believed they would enable military operations in communications-degraded or -denied environments in which traditional systems may not be able to operate.

Contrary to some news reports, U.S. policy does not prohibit the development or employment of LAWS. Although the United States does not currently have LAWS in its inventory, some senior military and defense leaders have stated that the United States may be compelled to develop LAWS in the future if potential U.S. adversaries choose to do so. At the same time, a growing number of states and nongovernmental organizations are appealing to the international community for regulation of or a ban on LAWS due to ethical concerns.

Developments in both autonomous weapons technology and international discussions of LAWS could hold implications for congressional oversight, defense investments, military concepts of operations, treaty-making, and the future of war.

U.S. Policy

Definitions

There is no agreed definition of lethal autonomous weapon systems that is used in international fora. However, Department of Defense Directive (DODD) 3000.09 (the directive), which establishes U.S. policy on autonomy in weapons systems, provides definitions for different categories of autonomous weapon systems for the purposes of the U.S. military. These definitions are principally grounded in the role of the human operator with regard to target selection and engagement decisions, rather than in the technological sophistication of the weapon system.

DODD 3000.09 defines LAWS as "weapon system[s] that, once activated, can select and engage targets without further intervention by a human operator." This concept of autonomy is also known as "human out of the loop" or "full autonomy." The directive contrasts LAWS with human- supervised, or "human on the loop," autonomous weapon systems, in which operators are able to monitor and halt a weapon's target engagement. Another category is semi-autonomous, or "human in the loop," weapon systems that "only engage individual targets or specific target groups that have been selected by a human operator." Semi- autonomous weapons include so-called "fire and forget" weapons, such as certain types of guided missiles, that deliver effects to human-identified targets using autonomous functions.

The directive does not cover "autonomous or semi- autonomous cyberspace systems for cyberspace operations; unarmed, unmanned platforms; unguided munitions; munitions manually guided by the operator (e.g., laser- or wire-guided munitions); mines; [and] unexploded explosive ordnance," nor subject them to its guidelines.

Role of Human Operator

DODD 3000.09 requires that all systems, including LAWS, be designed to "allow commanders and operators to exercise appropriate levels of human judgment over the use of force." As noted in an August 2018 U.S. government white paper, "'appropriate' is a flexible term that reflects the fact that there is not a fixed, one-size-fits-all level of human judgment that should be applied to every context. What is 'appropriate' can differ across weapon systems, domains of warfare, types of warfare, operational contexts, and even across different functions in a weapon system."

Furthermore, "human judgment over the use of force" does not require manual human "control" of the weapon system, as is often reported, but rather broader human involvement in decisions about how, when, where, and why the weapon will be employed. This includes a human determination that the weapon will be used "with appropriate care and in accordance with the law of war, applicable treaties, weapon system safety rules, and applicable rules of engagement."

To aid this determination, DODD 3000.09 requires that "[a]dequate training, [tactics, techniques, and procedures], and doctrine are available, periodically reviewed, and used by system operators and commanders to understand the functioning, capabilities, and limitations of the system's autonomy in realistic operational conditions." The directive also requires that the weapon's human-machine interface be "readily understandable to trained operators" so they can make informed decisions regarding the weapon's use.

Weapons Review Process

DODD 3000.09 requires that the software and hardware of all systems, including lethal autonomous weapons, be tested and evaluated to ensure they

> function as anticipated in realistic operational environments against adaptive adversaries; complete engagements in a timeframe consistent with commander and operator intentions and, if unable to do so, terminate engagements or seek additional human operator input before continuing the engagement; and are sufficiently robust to minimize failures that could lead to unintended engagements or to loss of control of the system to unauthorized parties.

Any changes to the system's operating state—for example, due to machine learning—would require the system to go through testing and evaluation again to ensure that it has retained its safety features and ability to operate as intended.

Senior-level Review

In addition to the standard weapons review process, a secondary senior-level review is required for LAWS and certain types of semi-autonomous and human-supervised autonomous weapons that deliver lethal effects. This review requires the Under Secretary of Defense for Policy, the Chairman of the Joint Chiefs of Staff, and either the Under Secretary of Defense for Acquisition and Sustainment or the Under Secretary of Defense for Research and Engineering to approve the system "before formal development and again before fielding in accordance with the guidelines" listed in Enclosure 3 of the directive. In the event of "urgent military operational need," this senior-level review may be waived by the Deputy Secretary of Defense "with the exception of the requirement for a legal review."

The United States is not currently developing LAWS; therefore, no weapon system has gone through the senior- level review process to date.

International Discussions of LAWS

Since 2014, the United States has participated in international discussions of LAWS, sometimes colloquially referred to as “killer robots,” under the auspices of the United Nations Convention on Certain Conventional Weapons (UN CCW). In 2017, these discussions transitioned from an informal “meeting of experts” to a formal “Group of Governmental Experts” (GGE) tasked with examining the technological, military, ethical, and legal dimensions of LAWS. In 2018 and 2019, the GGE has considered proposals by states parties to issue political declarations about LAWS, as well as proposals to regulate them.

In addition, approximately 25 countries and 100 nongovernmental organizations have called for a preemptive ban on LAWS due to ethical concerns, including concerns about operational risk, accountability for use, and compliance with the proportionality and distinction requirements of the law of war. The U.S. government does not currently support a ban on LAWS and has addressed ethical concerns about the systems in a March 2018 white paper, “Humanitarian Benefits of Emerging Technologies in the Area of Lethal Autonomous Weapons.” The paper notes that “automated target

Identification, tracking, selection, and engagement functions can allow weapons to strike military objectives more accurately and with less risk of collateral damage” or civilian casualties.

Although the UN CCW is a consensus-based forum, the outcome of its discussions could hold implications for U.S. policy on lethal autonomous weapons.

Potential Questions for Congress

1. To what extent are potential U.S. adversaries developing LAWS?
2. How should the United States balance LAWS research and development with ethical considerations?
3. What role should the United States play in UN CCW discussions of LAWS? Should the United states support the status quo, propose a political declaration, or advocate regulation of or a ban on LAWS?
4. If the United States chooses to develop LAWS, are current weapons review processes and legal standards for their employment in conflict sufficient?

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[1] https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2017/Pros-and-Cons-of-Autonomous-Weapons-Systems/

[2] http://www.goldenrice.org/

[3] https://www.un.org/sg/en/content/sg/statement/2019-03-25/secretary-generals-message-meeting-of-the-group-of-governmental-experts-emerging-technologies-the-area-of-lethal-autonomous-weapons-systems

[4] https://www.hrw.org/news/2019/11/13/europe-poll-supports-killer-robots-ban

[5] https://fas.org/sgp/crs/natsec/IF11150.pdf