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Robots in the Battlespace: Moral and Ethical Considerations in the Use of Autonomous Mechanical Combatants

By/par Major D.A. Goldsmith

Abstract

This paper argues that it is not morally permissible to employ autonomous mechanical combatants in the Battlespace. While the discussion around the use of autonomous agents has been lively and sometimes fanciful this paper focuses on the tension between the utilitarian moral obligation to employ these devices in order to preserve the lives of one's soldiers and the impact of technological and resource gaps on the viability of applying the Golden Rule. It will be argued that the use of robotic combatants makes the horror of war asymmetric and, by doing so, removes the primary barrier to its use by those nations with sufficient financial and technological resources to afford them.

War is a trial of moral and physical forces through the medium of the latter.
Clausewitz

Introduction

"The robots are coming" is a false statement because they are already here. Millions of service robots are now hard at work in homes around the world[1]. More applicable to the military context they are now also hard at work in the Battlespace.[2] Military robots are a logical extension of the Uninhabited Vehicle more commonly known as UAVs (Unmanned Air Vehicles) and UGVs (Unmanned Ground Vehicles). Many variants of these vehicles are, even now, capable of autonomous or semi-autonomous operation. They have evolved past simple surveillance and reconnaissance duties to now include armed sorties in their repertoire of capabilities. The moment is fast approaching when these devices will be capable of waging war on behalf of those entities that can afford them. This situation naturally raises a number of questions with regards to morals and ethics. Many of these questions, such as whether a machine can be moral, have been discussed at length. This question, among others, has formed the central theme of numerous books and movies. Quite often these efforts are very negative in perspective with storylines like mechanical entities taking over the world while valiant mankind struggles to avoid extinction. The likelihood of this future becoming reality is debatable but the increased use of robots in the battlespace is not. The need to have a debate about the morality of their potential use is paramount.

[1] Over two million of the Roomba and Scooba service robots have been sold to date. There are also

Many of the technologies required, such as artificial intelligence, are actively being developed yet are not likely to mature in the foreseeable future.[3] Most would agree, however, that once an artificial intelligence has been created it would be preferable to have that intelligence be 'good' instead of 'evil.' It also follows that a mechanical device that can project force would ideally be blessed with the ability to discriminate between legitimate targets and non-combatants without error. In his dramatically titled article, *Killer* Robots, Sparrow provides as excellent treatment of discrimination, moral responsibility and many other issues[4]. He concludes that autonomous robotic weapons systems cannot be used because neither they nor those who designed or deployed them could be held morally responsible. The obvious inference is that these machines will make mistakes and that the major objection to their use lies in the inability to assign blame and punish a machine that errs. Many others have also explored the morality of using robots from this perspective as well with a focus on what might be done when the machine acts immorally. The narrow focus of these arguments, however, serves to limit the breadth of the moral discussion with respect to autonomous robotic weapons systems.

If one assumes that all the issues raised in these prior discussions could be resolved, and the autonomous device constructed that would act in a perfectly moral manner, then additional, unresolved, moral dilemmas are revealed. Foremost amongst these is the possibility that, even with a device that could act in a perfectly moral manner, its use still might not be morally permissible. Due to the impact of autonomous mechanical combatants on the nature of war this paper proposes that this is, in fact, the case. Moreover, due to a systemic technological and resource divide that exists between nations that have the means to construct and afford such

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[3] John M. Evans, "AI and Robotics," *The Industrial Robot* 30, no. 2 (2003).

[4] Robert Sparrow, "Killer Robots," *Journal of Applied Psychology* 24, no. 1 (2007).

devices and those that cannot, the use of these devices is also not moral. Removing the threat of death to people for only one side of a war creates a situation that is as morally asymmetric as it is physically.

Definitions and Context

Robots have long been a part of the fabric of Western society albeit primarily as fictional entities. Typically these robots have been represented as a sort of mechanical human equivalent. The reality that has emerged is that technological advances have allowed the field of robotics to advance rapidly especially in the area of service robots, industrial robots and finally, in the battlespace. Few of these machines have any similarity to the human form. Manufacturers of robots and robotic equipment have long since abandoned any idea of mimicking human appearance focusing instead on a device that can fulfill a similar function at the same or higher standard than could a person. Sparrow defines a robot as a mechanical apparatus resembling and doing the work of a human being.[5] Based on the reality of modern robotics we are not concerned with the need for human resemblance so we define a robot as a mechanical apparatus doing the work of a human being. The work with which we are particularly concerned is that of a soldier's role in combat.

Modern warfare has evolved to include a wide range of tasks for the soldier that are designed to help with the ultimate objective of winning a conflict. It is the robot operating as a combatant which is the area of ultimate concern here because it is while fulfilling this role that they would be most likely to proactively take a human life. In this case a combatant is defined as an entity that has actual fighting as a function. It is the attack element of the combat function that is of particular interest rather than intelligence gathering or more defensive tasks such as

[5] Ibid.

explosive ordinance disposal. While these tasks reduce risk to the human soldier it is the idea of killing without risk to our own soldiers that is central to this moral discussion.

Autonomy is a widely used term that has, as its conceptual essence, the ability to self-govern. For the purposes of a robot, the aspect of autonomy with which we are most concerned involves the making of decisions involving the taking of human life independent of any human input at the time the decision was made. For example, a UAV type of robot that identifies a human target from an available number of options and then fires on that target with the intent to kill would be considered an autonomous agent.

Combining the concepts of robots, combatants and autonomy we are able to devise a definition for an autonomous robotic combatant. For the purposes of this paper this will be a self-governing mechanical apparatus, having actual fighting as a function that is capable of deliberately choosing to take a human life. To orient our terminology to emphasize the difference between a robotic entity and a human we will use the term autonomous mechanical combatant (AMC). Such a device, however, must have at least some possibility of existing for this debate to have any meaning. A compelling argument for why autonomous mechanical combatants could reasonably be expected is found the following discussion on intelligent machines and in Clayton M. Christensen's theory of disruptive innovation.

The Turing Test and the Intelligent Machine

In 1950 Dr. Alan Turing proposed a test that would allow a machine to demonstrate intelligence. Published in his 950 paper[6] this test has endured as a standard for machine intelligence. Essentially a person acting as a judge has a conversation with a person and a machine which he cannot see, each of which are trying to appear human. If the judge is unable to

[6] A.M. Turing, "Computing Machinery and Intelligence," *Mind* (1950).

reliably determine which is the human then the machine is considered to have successfully passed the test.[7] An intelligent machine then is a device that passes the Turing test. Turing predicted that machines capable of passing this test would be unremarkable by the end of that century. That has obviously not occurred.

The "failure" of the AI community to create a human-like intelligence is well documented.[8] Even the most advanced robot that can be constructed today has at best a very rudimentary approximation of intelligence. Artificial Intelligence researchers, having failed to replicate the capability of a human brain, have regrouped and have made some impressive gains in the areas of learning software and behaviour reactive allow these devices to operate independently yet make behavioural adjustments in response to external conditions. Perhaps the best known example is the Deep Blue chess computer built by IBM that successfully defeated chess grand master Gary Kasparov in 1997. Rapid technological advances in all areas of computing have revived the expectations of AI researchers. Regardless of the timing of their ultimate success it is only required that there is a reasonable possibility that success will be achieved. Further support for the prospects for developing an autonomous mechanical combatant is found in the concept of disruptive innovation.

Disruptive Innovation

In his book, The *Innovator's Dilemma*, Clayton M. Christensen advances his concept of disruptive innovation. This theory does not focus on morality but it does credibly predict the likely impact of a disruptive technology on an existing industry. In this case the industry is war

[7] Ibid., 59.

[8] Evans, "AI and Robotics."

and the disruptive innovation is the autonomous mechanical combatant. The capability in question is the combat role of the human soldier. Christensen categorizes most technologies as sustaining technologies which he defines these as those which improve on existing capabilities.[9] Disruptive technologies, however, originally present as having capabilities that are inferior to existing products. Over time these technologies are incrementally improved until they replace the existing source become more and more capable until they replace the existing capability. The key to Christensen's theory is that the disruptive technology is consistently not observed as a potential threat to the status quo.[10] Examining the current state of autonomous robotics it is apparent that machines do not begin to approach human capability in terms of decision making. It is, therefore, easy to dismiss their potential to replace the soldier. Using the disruptive innovation model, however, a familiar pattern emerges. There is persistent demand for the product; there is a determined effort to improve the product and there are incremental technological advances in robotics across the spectrum of use. Finally, although this has not yet occurred, the capability of the disruptive innovation exceeds that of the existing product and the nature of the industry is changed. A recent example would be that of the digital camera which has improved in capability to the point that it has displaced film cameras as the dominant means of taking photographs. The use of AMCs in the battlespace in place of soldiers is mapping precisely to the Christensen model.

The Just War Tradition and the Nature of War

The horror of war is such that societies have long sought to find ways to ensure that the decision to go to war was not taken lightly and that the conduct of war was not unlimited. These

[9]Clayton M. Christensen, *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail* (Boston, Mass: Hrvard Business School Press, 1997).

[10] Ibid., 27.

moral discussions and legal efforts have coalesced into the Just War Tradition. The idea behind the tradition is that war is objectionable yet unavoidable. The best that can be done then is to place moral and legal constraints on conflict. War is then monitored to discourage war crimes. Considerable efforts have been made in the international arena to advance the idea of the just war and to put enforcement mechanisms in place. Waltzer states that the morality of war is always judged twice. The first time as to the adequacy of the reasons for going to war and the second when considering how the war is to be fought.[11] These aspects have come to be know as *jus ad bellum* which deals with the justness of war and *jus in bello* which addresses the conduct during a war. The employment of AMCs falls into the *jus in bello* area of concern.[12]

War has always involved a struggle wherein both sides strive to gain an advantage. Although this has often involved advances in weapons systems the advantages gained there have only been temporary and the advantage was lost when the other side in a conflict gained access to the advanced weapon and learned how to use it. This has meant that the weapons employed in the battlespace have always been relatively balanced.[13] It has resulted in a focus on the operational art as the primary means by which wars can be won. The ability to achieve balance has allowed discussions on the morality in war to focus on which weapon systems it is acceptable to be used. As a recent example the Ottawa Treaty has been ratified that bans the use

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[11] Daniel S. Zupan, *War, Morality, and Autonomy: An Investigation in Just War Theory* (Hampshire, England: Ashgate Publishing, 2004).

[12] Robert Kolb, "Origin of the Twin Terms Jus Ad Bellum/Jus in Bello," *International Review of the Red Cross* 320 (1997). The terms *jus ad bellum* and *jus in bello* are of fairly recent origin. They emerged around 1930 and have now become widely used. *Jus ad bellum* refers to the circumstances under which one may legally use force or declare war while *jus in bello* addresses the conduct of belligerents during a conflict and also attempts to address the rights and obligations of neutral parties during a conflict.

[13] Max Boot, *War Made New: Technology, Warfare, and the Course of History 1500 to Today* (New York: Gotham Books, 2006).

of anti-personnel mines.[14] Although there are many types of mines only anti-personnel mines were banned. This is germane because it sets a precedent for a targeted constraint in the employment of a weapons system in that an outright ban is not the only available option. This allows some flexibility in the moral discussion on the use of AMCs beyond a straightforward yes or no.

The driving force behind the Just War Tradition has been the horror of war. This horror is significantly reduced through the use of AMCs; at least for the side in a conflict that is able to use them in place of human soldiers. This would be a major transformation in the nature of war. The ease with which a wealthy nation could engage in war could also significantly weaken the Just War Tradition.

Other Moral Considerations

In the foreseeable future it is likely that the conditions will exist where one side in a conflict will be able to wage war without risk to the lives of its soldiers. It is an intriguing and seductive concept if one is part of the nation that is fortunate enough to be capable of producing AMCs and sustaining their use. This raises the first moral issue this paper addresses: Is it morally permissible to use AMCs in war? The discussion with respect to this question assumes that the AMCs can operate in a perfectly moral manner. It will be shown that the answer to this question depends on the underlying moral philosophy held by the discussant.

The second question under consideration is: Is it morally permissible to use AMCs so that we have no combat deaths in war because we have the knowledge and can afford the cost of

[14] International Campaign to Ban Landmines, "Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction." http://www.icbl.org Internet Accessed 27 April 2008

AMCs when our enemies cannot? One could argue that every advantage should be seized in war as long as it leads to victory or that such a move would be morally repugnant because it creates an asymmetric value for the human lives of the soldiers on the two sides of the conflict. In a similar vein it might be that because the use of AMCs would mean fewer casualties for 'our' side in a conflict they must be used. Certainly this would be demanded by those whose loved ones would otherwise be place at risk. Put another way: Are we obligated to use them because they exist and will save soldier's lives?

An appropriate theoretical framework is essential for establishing a meaningful position as to whether the use of AMC's could be countenanced from a moral perspective. The current Canadian Forces standard for moral reasoning is that of Virtue Ethics. This approach focuses on developing good character so that proper moral choices can be made. In this manner Virtue Ethics differs from many other moral theories as it is concerned with determining what kind of person an individual should strive to be rather than what a person should do.[15] This paper will, however, utilize a more action-oriented moral theory as a lens to frame the discussion on whether or not to morally countenance the employment of AMCs. The major theories of Utilitarianism and Kantianism were used as a theoretical lens for this discussion.

Of these theories Utilitarianism is teleological as it is concerned with the consequences of a decision or act when seeking to determine morality. Kantianism, a deontological theory, is not.[16] It is concerned with the act and the intent of that act rather than the outcome. Kant's underlying reasoning is that the consequences of a decision are often beyond our ability to control thus the decision maker cannot be held responsible for the results of a decision. The

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[15] Barbara MacKinnon, "Chapter 6 - Naturalism and Virtue Ethics," in *Ethics: Theory and Contemporary Issues, 2nd Ed.*, ed. Barbara MacKinnon (Belmont, CA: Wadsworth Publishing, 1998).

[16] Barbara MacKinnon, "Chapter 5 - Kant's Moral Theory," in *Ethics: Theory and Contemporary Issues, 2nd Ed.*, ed. Barbara MacKinnon (Belmont, CA: Wadsworth Publishing, 1998).

chaotic circumstances under which decisions must often be made in the military context, sometimes referred to as the "fog of war," ensure there is always an element of uncertainty as to outcome and support the applicability of the 'intent over results' Kantian approach. While Kant provides us with a meaningful moral framework with which to evaluate decisions that can accommodate the military reality there is also a strong utilitarian aspect to this discussion. Specifically, the idea that AMC's could reduce or eliminate casualties for the party that uses them requires the inclusion of this moral theory.

The Utilitarian Argument

Utilitarianism is a teleological moral theory that bases its evaluation of morality on the outcome of an act. Essentially any outcome that maximizes the happiness of the greatest number is considered moral[17]. With this approach the morality of the decision to kill a person would depend on whether greater happiness results from the killing than would have resulted from a decision to allow it to continue on its way. If, for example, it could be shown that, over the course of the war, fewer women and children died because of this killing then the act would be considered moral in utilitarian terms.

The primary difficulty associated with the use of this theoretical approach is the challenge in accurately calculating the relative amount of happiness generated by selecting one course of action over another. The complexity of the calculation is such that, usually, almost any decision could be argued as being moral. In this case, however, the calculation would be quite straightforward as it would be a simple body count of 'ours versus theirs.' By risking only AMCs in the battlespace we would expect zero human casualties so the determination of relative happiness should be absolute. With the Western objection to their soldiers losing their lives the

[17] MacKinnon, *Chapter 4 - Utilitarianism,* 34.

idea of losing none would be a best-case scenario.[18] It is evident that, in practical terms, this is a tremendously attractive means of waging war. Political objectives could be achieved without ever having to risk the lives of citizens. Families would never have to cope with the loss of a loved one. As long as a nation was willing to bear the financial cost of an autonomous mechanical army then it could be difficult to argue for placing human lives at risk. It must be noted that this is a practical rather than a moral argument.

The Kantian Argument

Unlike Utilitarianism Kant's approach to morality is deontological.[19] It is concerned with the act and the intent of that act rather than the outcome. The underlying reasoning is that the consequences of a decision are often beyond our ability to control thus the decision maker cannot reasonably be held responsible for the results of a decision. Given the often-noted "fog of war" it makes sense that the moral aspects of war be guided by a moral compass that selects moral acts with moral intent. The chaotic circumstances under which decisions are often made in the military context supports the concept of an element of uncertainty as to outcome further strengthening the utility of a Kantian approach. Kant also advocates determining morality *a priori* rather than analytically[20] or after the event. It is, therefore, clear that the Kantian approach offers a meaningful moral framework under which to make decisions across a spectrum of contexts that can include times of conflict.

Kant, however, believed that human life was of absolute value and that no one life could be traded for another or even a number of others. This has become embedded in the moral

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[18] Jeffery Record, "Collapsed Countries, Casualty Dread, and the New American Way of War," *Parameters: US Army War College Quarterly* Summer 2002 (2002).

[19] MacKinnon, *Chapter 5 - Kant's Moral Theory,* 55.

[20] Ibid.

concept of autonomy which "conceives human beings as having dignity and incomparable worth."[21] This means that each life is of infinite value so there is no basis for supporting a "net benefit" approach that involves trading off human lives. A Kantian must therefore object to the use of AMCs in place of human soldiers because it implicitly assigns a higher value to some lives over that of others. As an absolute position this perspective does not allow for any common ground or overlap with the utilitarian perspective which is perfectly willing to trade lives to achieve the best 'deal.' Thus, depending on the moral philosophy adopted, the willingness to employ or not use AMCs is predetermined. There is, however, a means of rising above these "divergent moral commitments."[22] C.D. Meyers presents us with a universalizable approach to determining if the use of a weapons system is permissible. It was also developed so as to assist in the resolution of practical moral issues.

The Golden Rule

Meyers builds on prior work on the Golden Rule to develop it into a means of determining the morality of an act that is independent of the moral philosophy espoused by the parties involved. He provides us with two principles upon which to make moral judgments: the universalizability principle (UP) and the prescriptivity principle (PP). The UP says that "if you think it would be morally permissible to do A to someone then you must think that it would also be permissible for someone to do A to you in similar circumstances."[23] Effectively it demands that similar moral judgments be made in similar cases. A different moral judgment could only be

[21] Note that the moral concept of autonomy differs substantially from the definition of independent self governance that is being used to describe the nature of the autonomous mechanical combatant for this discussion. This is simply an unfortunate confluence of terminology. The reference for the moral autonomy definition follows. Zupan, *War, Morality, and Autonomy: An Investigation in Just War Theory*., 23.

[22] C.D. Meyers, "Why (Most) People Must Disapprove of the Invasion of Iraq," *Social Theory and Practice* 32, no. 2 (2006)., 249.

[23] Ibid., 254.

made as a result of the identification of a morally relevant reason. It is also implied that this reason should not be in any way trivial. The PP says that "if you think it would be morally permissible to do A to someone then you must *consent* to the idea of someone doing A to you in similar circumstances."[24] This is to say that one must be willing to 'walk the talk.' As an extreme example, the use of nuclear weapons would be acceptable if you think that they could be used against you by your enemy in similar circumstances. It would also require that you consent to their being used against you in similar circumstances. This highlights the difficulty that lies in aligning the practical arguments with those of a moral nature.

The veracity of this moral argument depends on both sides in a conflict having similar capabilities. Were both sides, therefore, in possession of AMCs then using AMCs in the Battlespace could fit with the Golden Rule. Unfortunately for the neatness of the moral discussion this is unlikely to be the case. The primary reason is a systemic knowledge and resource gap that exists between the developed and the developing world.

According to James Gustave Speth, administrator of the U.N. Development Programme, "The world has become more economically polarized both between countries and within countries ….If present trends continue, economic disparities between industrial and development nations will move from inequitable to inhuman."[25] This gap is of critical importance as much of the developed world, especially Western nations, tend to belong to economic and defense alliances that make it unlikely that future conflicts will be among nations of the developed world. The most probable future, state against state war is a conflict between a

[24] Ibid., 254.

[25] Report Sees Growing Gap Between Rich And Poor Nations, http://www.mtholyoke.edu/acad/intrel/incomgap.htm, Internet Accessed 27 Sep 2007.

Western alliance and a nation in the Third World. The economic gap is compounded by a similar disparity in knowledge. In a recent World Bank study World Bank President, Mr James D. Wolfensohn, states in the foreword to the Report "the rapid growth of knowledge is also raising the danger that the poorest countries and communities will fall behind more rapidly than ever before."[26] The report notes that many developing countries lack the capability to acquire and adapt the economic, technical and social knowledge that has spurred many of the world's development success stories. Since creating this know-how is often costly, the gap is very difficult to close and developed countries also have greater opportunities to use knowledge once gained.[27] The combination of an economic and knowledge gap are evidenced in a wide technology gap between high-income and developing countries**,** with developing countries employing only a quarter of the level of technology in developed countries.[28]

This systemic disparity in resources and knowledge between wealthy and poor countries appears to invalidate the Golden Rule. In order for the rule to be meaningful it must be possible for each side to employ the weapon system in question. If this is impossible for reasons that cannot be overcome then the nation which uses the system is never truly at risk. This makes any claim by that nation that they would consent to having that weapon used against them in similar circumstances specious at best. Without a valid moral argument that makes the use of AMCs permissible then it must be concluded that they cannot be used.

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[26] The Technology Gap between Rich and Poor countries, http://econ.worldbank.org, Internet Accessed 27 April 2008.

[27] Knowledge gap between rich and poor focus of World Bank report, http://www.unescap.org/esid/psis/population/popin/bulletin/1998/v10n3ft.htm, Internet Accessed 27 April 2008.

[28]The Technology Gap between Rich and Poor countries, http://econ.worldbank.org, Internet Accessed 27 April 2008.

Conclusion

There is little question that the use of robots in the Battlespace will continue to increase. Our current use of these devices to avoid risk to our soldiers reflects a persistent desire in Western society to avoid combat related deaths. As these weapons become ever more capable it is possible, even likely, that one day AMCs will be used to replace soldiers in combat. This seemingly desirable state leads, however, to a disturbing moral dilemma that is revealed upon the assumption that the usual moral issues with respect to the employment of AMCs have been resolved. The change that will result in the nature of war and the subsequent impact on the Just War Tradition are concerning and morally troublesome. As well, given the gap in knowledge, technological and economic resources that exist between many nations, and the nature of economic and defense alliances, it is likely that a situation will arise where only one side in a conflict will be able to deploy AMCs. This will leave only one side bearing any risk to the lives of its soldiers. Due to the inability to morally justify this asymmetry of risk in any manner other than through a simplistic utilitarian argument it has been shown that, even if these devices could be constructed so as to operate in a perfectly moral manner, it would still be immoral to use them as combatants. Nothing precludes their use in roles that reduce the risk to our soldiers that do not involve killing the enemy, however.

The technologies required to build AMCs are all undergoing rapid development although progress is more pronounced in some areas than in others. The exact point in time at which these devices will be ready for use in the battlespace is unknown but the theory of disruptive innovation suggests that their arrival in that role is virtually certain. Regardless it is always best to raise the moral issues associated with the use of a weapon in advance of its delivery. Having

the discussion in advance of deployment, perhaps even in advance of design, will potentially be less divisive for society than would be the case with a *post facto* debate. The moral discussion surrounding the use of autonomous mechanical combatants in the Battlespace is both multifaceted and complex. Certainly the discussion that has been offered here was not exhaustive. There is much left to discuss. Indeed, it is highly likely that the endpoint of this type of discussion might never be reached. That in no way reduces the criticality of the need to begin that conversation today.

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