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Technological Revolution and its Effect on the Rules of War: A Study of Governed Conflict in the Era of Evolving Technology

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Introduction

Warfare will continue to evolve throughout the 21st century, and so must the rules meant to govern it. New technology provides an avenue to revolutionizing the effectiveness in the methods of how wars are fought, but with these new technologies comes the urgency to have regulations that will mitigate their potential for causing unnecessary levels of suffering. This thesis explores the daunting issues facing the rules of war in confronting the complexed landscape of warfare which continues to change at a rapid pace, along with what the laws and norms of modern combat may look like as the technological revolution continues to propel the world into a future of uncertainty.

War is an option that many in today's developed society would prefer to see as a last resort, but throughout history, war has often been one of the first options used to achieve a desired objective. Many share an anarchic view of war as being a violent and lawless way of fulfilling one's agenda, but its effectiveness in bringing about change and results makes it an inevitable option when diplomacy becomes fruitless. Indeed, war will come with a level of violence and destruction ranging from the exchange of hand-to-hand combat to the instant annihilation of entire cities with the loss of life soaring into the hundreds of thousands. When it comes to the claim of war being entirely lawless however, that is simply not true. Stemming from the distant past, belligerents of small and large-scale conflicts have adopted regulations in conflict to prevent battles from getting out of hand. War is not an excuse nor a setting for one to do as they please. Even in warfare, there is a fine line that signifies when the fighting has gone too far and the suffering has become too great, a line between right and wrong influenced by legal and moral reasoning.

History of Laws Governing Conflict

Lieber Code

The rules of war can be traced back to the 19th century during the American Civil War when U.S. President Abraham Lincoln issued the general order for the instructions for how the armies of the United States should conduct themselves on the field; these instructions became known as the Lieber Code, with its main author being Francis (Franz) Lieber.[1] Lieber was a political philosopher and legal theorist of German descent, but before his tenure as a philosophical influencer, he was a young soldier fighting for the Prussian army during the Napoleonic wars seeing firsthand the brutality of the conflicts all in the name of conquest. Having been born at the start of the century in Berlin, Francis saw the level of destruction brought forth by Napoleon's unwelcomed entrance into the Prussian capital at a very young age.[2] Through the experiences of enduring Napoleon's rule, Francis saw the tormenting elements of warfare; these early experiences would impact his drive to develop a way to limit such brutality in conflict. Fast forward a few decades later, Lieber would develop ideas for a way of governing war, promoting conventional and ethical ways of engaging in conflict and moving away from barbaric behavior. An opportunity presented itself to Lieber for him to put his ideas to use when

[1] Jenny Gesley, "The 'Lieber Code' - the First Modern Codification of the Laws of War," *The Library of Congress* (blog). *Law of Librarians of Congress,* April 24, 2018, https://blogs.loc.gov/law/2018/04/the-lieber-code-the-first-modern-codification-of-the-laws-of-war/.

[2] Paul Finkelman, review of *Francis Lieber and the Modern Law of War*, by John Fabian Witt. *The University of Chicago Law Review* 80, no. 4 (2013): 2078-2081, http://www.jstor.org/stable/23594958.

the United States found itself engaged in a civil war. The Lieber Code would definitively reduce the level of human suffering during the American Civil War and would form the basis for an authoritative legal system that would prosecute soldiers and civilians guilty of war crimes.[3]

Within the Lieber Code were 157 provisions that dealt with a wide range of issues based on legal and moral grounds surrounding armed conflict stemming from topics surrounding the treatment of civilians and prisoners of war to the methods in which wars may or may not be fought; even the treatment of slaves was addressed.[4]

To give an example, article 16 of the Lieber Code says this:

> Military necessity does not admit of cruelty—that is, the infliction of suffering for the sake of suffering or for revenge, nor of maiming or wounding except in fight, nor of torture to extort confessions. It does not admit of the use of poison in any way, nor of the wanton devastation of a district. It admits of deception, but disclaims acts of perfidy; and, in general, military necessity does not include any act of hostility which makes the return to peace unnecessarily difficult.[5]

The Lieber Code makes it clear what the intentions of the belligerents should be. Lieber embarked on a complexed journey that was littered in doubt and setback in establishing these set of rules for war; however, his work certainly paid off in that the Lieber Codes remain the basis

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[3] Jordan J. Paust, "Dr. Francis Lieber and the Lieber Code," *Proceedings of the ASIL Annual Meeting* 95 (April 2001): 112-113, https://doi.org/10.1017/s0272503700056731.

[4] Gesley, "The 'Lieber Code'."

[5] Francis Lieber, *Instructions for the government of armies of the United States in the field*, Washington, D.C.: Government Printing Office, 1898. Article 16, https://tile.loc.gov/storage-services/service/ll/llmlp/Instructions-gov-armies/Instructions-gov-armies.pdf.

for much of the regulations for the rules of war that the US follows, being referred to many times in the preface and main sections of the Department of Defense Law of War Manual.[6]

The works of Francis Lieber proved to be a pioneering struggle that would lead to the development of laws and morals which would limit the unnecessary suffering and brutality of war. Lieber's works behind these laws of war inspired other countries at the time to incorporate similar rules into their war doctrines and would be used as a foundation for international efforts for codifying laws and customs of war globally.[7] However, the idea of regulations for conflict dates back in time to ancient history. Early cultures and empires such as the Sumerians, The King of Babylon - Hammurabi, the Persian King Cyrus I, and the Hittites, all constructed some sort of rules or codes intended to provide a moral and structural basis for armed conflict. The need for war to adhere to rules would be echoed centuries later in the likes of Saint Thomas Aquinas, Saint Augustine, Hugo Grotius, and Jean Jacques Rousseau.[8] Professor Francis Lieber was indeed at the forefront of the development of the governing principles of conflict that would

[6] Office of General Counsel, Department of Defense Law of War Manual § (2015), Page iv, https://media.defense.gov/2023/Jul/31/2003271432/-1/-1/0/DOD-LAW-OF-WAR-MANUAL-JUNE-2015-UPDATED-JULY%202023.PDF.

[7] Paust, "Dr. Francis Lieber," 114-115.

[8] Gregory P. Noone, "The History and Evolution of the Law of War Prior to World War II," *Naval Law Review* 47 (2000): 177, https://heinonline.org/HOL/Page?handle=hein.journals/naval47&div=7&g_sent=1&casa_token=&collection=journals#.

be known as the Laws of War, but it's important to understand that relevant ideas already existed long before him.

Hague and Geneva Conventions

The Lieber Code's influence on the development of rules of war in the international community can certainly be seen both in the Hague and Geneva Conventions. In 1864, shortly after the incorporation of the Lieber Code in the US, the first Geneva Convention was established.[9] A pioneering figure of making this happen was Henri Dunant who was also the founder of the International Red Cross. In this earliest form of the international treaty, armies from all sides of the conflict were mandated to provide care for the wounded and sick on the battlefields; this treaty was adopted by 12 European countries.[10] Diplomats convened and debated for the next 85 years what additional amendments should be adopted and how to expand the treaty to include not just combatants, but civilians caught in the crossfires of battle as well. As diplomats from different nations continued to search for common ground of what should be allowed in war and what was blatantly unacceptable; they finally reached a point of unity in 1949 when the convention reached a point where it could be signed in unity amongst many nations following the horrors of World War II. These updated versions of the treaties became known as the Geneva Conventions of 1949 and contained the most important rules of war, impacted greatly by the agonizing treatment and practices inflicted by the Japanese and Germans on their

[9] Joanne Lu, "The 'Rules Of War' Are Being Broken. What Exactly Are They?," NPR, June 28, 2018. https://www.npr.org/sections/goatsandsoda/2018/06/28/621112394/the-rules-of-war-are-being-broken-what-exactly-are-they.

[10] Lu, "The 'Rules Of War'."

armed and unarmed foes.[11] The Hague Convention on the other hand, closely resembled the Lieber Codes and the regulation of warfare tactics. While the Geneva Conventions had the primary focus of establishing protection for the victims of war such as the innocent or wounded, the Hague Conventions were focused on regulating the rules for conducting war with the attention being placed on the means and methods of warfare.[12] Humanitarian laws would be the main topic of the Geneva Conventions, and the laws of war would be addressed primarily in the Hague Convention; the two were not meant to be mixed at the time.[13] However, International Humanitarian Law would end up including most of the principles of what is known as the Law of War.[14]

Technological Revolution

Drones

Military technology has evolved immensely in the past century, with drones and other unmanned devices being one of the leading products of the technological revolution. Drones often resemble the future of warfare and continue to make headlines as an innovative tool for fighting as demonstrated in the war in Ukraine, but drone's themselves are nothing new. In fact, the idea of using an unmanned aerial vehicle for military purposes is older than the concept of

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[11] Lu, "The 'Rules Of War'."

[12] Noone, "The History and Evolution," 177-178.

[13] Richard L. Fruchterman, "Enforcement: The Difference Between the Laws of War and the Geneva Conventions," *Georgia Journal of International and Comparative Law* 13 (1983): 304, https://digitalcommons.law.uga.edu/cgi/viewcontent.cgi?article=1863&context=gjicl.

[14] Noone, "The History and Evolution," 178.

manned aircraft. Drone usage can be dated back to the 19th century when Austrian soldiers used unmanned balloons to drop explosives on the city of Venice. Drones were made at the beginning of the 20th century as well with small radio-controlled aircraft were developed during the First World War.[15] Fast forward to World War II, pilots in the German Air Force found it challenging to hit targets out in the open seas; enemy ships were the moving targets that made it difficult to track and required pilots to come in closer for a more accurate attack, making the risk of being shot down even greater. In addressing this issue, German scientists developed a bomb which could be steered towards its target. Called the Fritz X, the bomb was dropped from an aircraft and radio controlled by the bombardier aboard that plane. Although Fritz X was classified as an unmanned aircraft at the time, it would be considered more as the first precision guided bomb in the modern era. However, the bomb provided an effective way of attacking the enemy while minimizing the risk of friendly casualties.[16] Across the Atlantic at roughly the same time, the U.S. Navy would develop a drone of its own: the McDonnell TD2D-1, a drone used for target practice of anti-aircraft guns.[17]

Following the Second World War, the United States and the Soviet Union raced each other to develop the best aerial vehicles for war, particularly fighter jets armed with evolving missile technology. To test these fighters and their armaments, target drones were developed to

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[15] Richa Tyagi, "History of Drones in Conflict Zones," Geospatial World, April 3, 2023, https://www.geospatialworld.net/prime/business-and-industry-trends/history-of-drones-in-conflict-zones-2/.

[16] Tim Cooke, *A timeline of military robots and Drones*, North Mankato, MN: Capstone Press, a Capstone imprint, 2018, 8-9.

[17] Cooke, *A timeline of military robots*, 8.

act as adversaries for the fighters to find and destroy; these drones were even equipped with parachutes so that the drone could fall in a controlled manner and possibly be reused.[18] During the Vietnam War, the U.S. introduced the Lightning Bug to the field which was a lightweight drone used as a remote combat aircraft; over 3,500 Lighting bugs were deployed by US forces.[19] The year 1974 gave rise to the Predator, the long awaited unmanned aerial vehicle which would be used for many years to come. The Pioneer UAV will also see its introduction into military service in the mid 1980's followed by micro-UAVs a few years later. UAVs demonstrated themselves to be valuable assets in the war zones of Kosovo and elsewhere in the 90s. The Reaper UAV would be developed from the Predator as a larger and more capable aircraft and would be used extensively in the wars in Iraq and Afghanistan.[20]

The concept of using an aerial vehicle that doesn't require a pilot to be on board proved to be an ingenious solution for mitigated human casualties in action. When a vehicle gets destroyed or shot down, the primary concern is the occupants, not the equipment or hardware destroyed. Indeed, the loss of a fighter jet or helicopter comes at an expensive cost, but there's no price tag when it comes to the loss of human life. Life is priceless and irreplaceable, and over time, we have seen more of the developed world treating that notion with more seriousness. However, there are still potential problems even with the luxury of having an operator sitting in

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[18] Cooke, *A timeline of military robots,* 10.

[19] GlobalData Thematic Intelligence, "Drones in Aerospace and Defence: Timeline," Army Technology, September 29, 2020, https://www.army-technology.com/analyst-comment/drones-aerospace-defence-timeline/.

[20] GlobalData Thematic Intelligence, "Drones in Aerospace."

front of a screen in a safe and comfortable room to control a drone thousands of miles away. Drone pilots are still susceptible to experiencing much of the post-traumatic stress disorders that stem from war. A recent test done on unmanned aerial vehicle pilots flying missions in the Middle East showed that PTSD among UAV operators were found to be low, roughly between 2-5%, but the studies showed that such mental health issues were still prevalent amongst these service members despite being away from the combat zone.[21] While drones are here to stay, the worrisome signs presented amongst its operators must be addressed. Drones present a means of limiting human casualties, but without the presence of an on-board pilot behind the controls, the risk becomes substantially greater of them becoming a liability as well as a significant threat to innocent civilians and friendly assets too. Drones are also susceptible to being compromised, which makes the absence of a human operator much more worrisome to think of. In a test to see the susceptibility of drones to outside , a University of Texas research team demonstrated how a drone's flight path was able to be altered just by feeding it a false GPS signal; such a technique is also referred to as spoofing.[22] UAVs have shown the world to be an invaluable strategic asset throughout the years, but drones succumbing to system hacking and other forms of cyber-attacks would spell absolute disaster which is why extra caution must be taken in where, when, and how they are used. The same can be said about land bots despite their roles being drastically different

[21] D Wallace and J Costello, "Eye in the Sky: Understanding the Mental Health of Unmanned Aerial Vehicle Operators," *Journal of Military and Veterans' Health* 25, no. 3 (July 2017): 38, https://jmvh.org/wp-content/uploads/2017/11/36-41.pdf.

[22] Michael Mayer, "The New Killer Drones: Understanding the Strategic Implications of next-Generation Unmanned Combat Aerial Vehicles," *International Affairs (Royal Institute of International Affairs 1944-)* 91, no. 4 (July 2015): 768-769, https://www.jstor.org/stable/24539203.

compared to their aerial cousins. Considering their vulnerabilities and weaknesses, the morality of using drones in combat has been a lingering idea that many continue to question. The biggest aspect in judging the morality of such unmanned technology in war is the ability to destroy an intended target while avoiding the collateral damage of non-combatants; drones have continuously struggled in this area.[23] According to the *Bureau of Investigative Journalism*, between 2004 and 2012, 344 drone strikes have claimed the lives of between 2562 and 3325 in Pakistan alone. Of those totals, an estimate between 474 and 881 have been identified of non-combatant civilians, of which, 176 were children. Approximately 10 percent of the casualties inflicted by drone strikes in Yemen and Pakistan were civilians.[24] Indeed, drones have a grimacing record of mistakes and moments of infamy. With these statistics, an argument can be made of how reckless drone usages and strikes have become of recent years, but expecting anything designed by man to work perfectly with no errors or mistakes is also reckless. Like humans, drones are not perfect, but they have proven their worth a countless number of times; they played a significant role in the 20th and early 21st century and will continue to be a valuable asset in the years to come. Through strict regulation and proper supervision, drones can excel in the bright future that lays ahead of them in military affairs.

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[23] S. Krishnan, "The Ethics of Drone Warfare," Edited by Ajai Sahni. *Faultlines - The K.P.S. Gill Journal of Conflict & Resolution* 24 (July 2019): 54-55, https://www.satp.org/Docs/Faultline/24.pdf.

[24] Sarah Leo, "A Picture of War: The CIA's Drone Strikes in Pakistan," The Bureau of Investigative Journalism (en-GB), September 10, 2012, https://www.thebureauinvestigates.com/stories/2012-09-10/a-picture-of-war-the-cias-drone-strikes-in-pakistan.

Artificial Intelligence

Artificial intelligence (AI) is a complex subject to discuss, perhaps too complex to be dissected just yet, but AI does play a substantial role in the future of warfare. Retired Lt. Colonel Paul Maxwell, a Cyber Fellow of Computer Engineering at the Army Cyber Institute at the United States Military Academy, shares his vision on artificial intelligence as a rapidly developing capability of modern militaries. Maxwell views AI as having plenty of potential, but its abilities are still far-fetched given the overarching limitation it still has. Despite its rapid development, there are still many things that AI is incapable of doing which is why AI's impact, according to Lt. Col Maxwell, will be centered mostly on, "mundane, dull, and monotonous tasks."[25] Systems that are run by artificial intelligence lack basic skills necessary to carry out specific tasks; interpreting images in new environments outside of the system's normal setting is one of them; constant data needs to be fed to the system for it to adapt to the new surrounding and make an accurate interpretation.[26] Humans can exercise their own judgment when figuring out what to do in basic scenarios like this. However, if an image differs from what the AI system is acclimated to from its training set or veers the slightest from the computing rules being followed, the system will struggle to guide itself in making a reasonable conclusion.[27] AI's struggles in interpretating images and accurately identifying parts of an image can explain why

[25] Paul Maxwell, "Artificial Intelligence Is the Future of Warfare (Just Not in the Way You Think)," Modern War Institute at West Point, April 20, 2020, https://mwi.westpoint.edu/artificial-intelligence-future-warfare-just-not-way-think/.

[26] Maxwell, "Artificial Intelligence Is the Future of Warfare."

[27] Maxwell, "Artificial Intelligence Is the Future of Warfare."

websites and online applications will conduct an image test on a user to confirm they are not a robot or artificial being by having them point out specific images of a picture. Why could this be significant? This question becomes very prevalent when AI becomes involved in armament. If AI struggles to identify portions of a picture that show a specific object, what makes anyone think it will be able to identify friend from foe in combat? How will AI be able to distinguish between a combatant and noncombatant, a warship and a cargo vessel, or a bomber from a civilian jetliner? These are areas where AI has yet to prove its dependability in.

Another area where AI has shown weakness is in multi-tasking; this is not to say that AI is fully incapable of carrying on and conducting multiple tasks at once.[28] In self-driving cars, we can see how the automated systems within those vehicles are able to go through multiple tasks and decisions at once just as the ordinary human driver does when they're behind the wheel. AI is already making their presence known in the civilian world, but asking AI to take on the role of a soldier or pilot in the military is much riskier and more complicated. Human-level achievement is a milestone that AI has fallen short of in many categories. Humans can identify enemy vehicles and recognize what their next move would likely be, all while deciding what weapons to employ and when to act; this is done much more efficiently and effortlessly by humans and sometimes without much thought. AI systems would struggle at adapting to the new situation and making decisions in reaction to ongoing events because of how much it would need to multitask.[29] With such complexity comes added room for error. Just like their human

[28] Maxwell, "Artificial Intelligence is the Future of Warfare."

[29] Maxwell, "Artificial Intelligence is the Future of Warfare."

counterparts, AI has shown that it is indeed not perfect, no matter how idiot-proof their designers try to make them. Some of the errors which AI systems are prone to experiencing resemble mistakes that humans rarely make, showing that the sophisticated lines of code and algorithms installed in AI software is essentially incapable of replacing common sense and basic situational awareness. To add on to the plethora of issues, not only are AI's prone to mistakes just as humans are, but they are also vulnerable to software interference and attacks which have become very prevalent in recent decades in the world of cyber warfare.[30] With all these current and potential problems plaguing the artificial intelligence industry, the vision of humans sitting back and watching machines do their work for them will surely have to wait for quite some time since the idea is still too far-fetched and outright dangerous.

AI is a term that has been used since the 1950's, but there is still no general definition accepted today other than the name itself for which it stands for.[31] There is much to artificial intelligence that is not known, even by those who develop and use it. Despite there being no cemented definition to explain artificial intelligence, it helps to understand the three types of AI. Narrow Artificial Intelligence, also known as weak AI, refers to a computer system that is very limited in its capabilities of performing tasks more efficiently than a human, giving the reason for the use of 'narrow' in its name.[32] Most AI applications would fall into the category of Narrow

[30] Maxwell, "Artificial Intelligence is the Future of Warfare."

[31] István Szabadföldi, "Artificial Intelligence in Military Application – Opportunities and Challenges," *Land Forces Academy Review* 26, no. 2 (2021): 158, https://doi.org/10.2478/raft-2021-0022.

[32] Szabadföldi, "Artificial Intelligence in Military Application," 158.

AI, and while this type of AI is the most popular amongst AI systems in the present world, it is by far the most restrictive of the three types in what it can do.[33] The next type is General Artificial Intelligence or General AI. Also known as Strong AI, General AI can carry out intellectual tasks in a manner that outperforms human capabilities. This type of AI can carry out most tasks faster and more efficiently than that of a human, but as stated before, most AI applications nowadays are not as widely capable enough to fall into this category.[34] Much of the examples that can be found of AI's falling under this type would be seen in movies such as the Terminator and I, Robot where machines formulate the ability to decide for themselves what the best course of action is, making decisions that could certainty go against human intentions. This world seems to be far away from reaching this point, but it is a scary thought to think of when discussing AI's future in society. The third type of AI is called Artificial Super Intelligence or ASI; little is known about this type given the far-fetching theories surrounding it, but ASI is expected to outperform humans in almost all subjects and areas ranging from logic and wisdom to scientific creativity.[35] Social skill is also an area that ASI is expected to be better at than human, a mind-boggling idea to imagine. However, scientists have expressed their strong doubts that such technology could ever exist given how hard it would be to develop something able to achieve all that. An application having such capabilities would still be dependent on human contribution. Certain human characteristics such as intuitional and spiritual motives are aspects

[33] Szabadföldi, "Artificial Intelligence in Military Application," 158.

[34] Szabadföldi, "Artificial Intelligence in Military Application," 158.

[35] Szabadföldi, "Artificial Intelligence in Military Application," 158.

exclusive to humans that AI would struggle to fully understand, let alone adopt, without significant human contribution.[36]

Artificial Intelligence is a concept that will be in development and use in civilian society for the indefinite future, but the conversation reaches a whole new depth when discussing its application in the military sector. The course of development of artificial intelligence for military application was and still is very complex and rightfully so given that AI would be used not as a business asset for profit or an analytically tool for learning, but as an added weapon of warfare. The stakes are still very high in developing AI for military usage. Since AI's debut some several decades ago, its development was divided into three states. The first stage was centered around rules-based approaches based on logical reasoning and expert knowledge or criteria; this part of AI's development was generally referred to as an expert system. An example of AI in this stage of development would be its use in online tax preparation.[37] The next stage revolves around machine or statistical learning which includes natural voice processing, computer-vision-technologies, voice recognition, and much more. [38]The third stage is contextual adaptation which combines the strengths from the first and second stages, combining the two as a means of testing AI technology to use what it has learned to adapt and act on its in certain situations; an example

[36] Szabadföldi, "Artificial Intelligence in Military Application," 158.

[37] Szabadföldi, "Artificial Intelligence in Military Application," 159-160.

[38] Szabadföldi, "Artificial Intelligence in Military Application," 159-160.

of this would be autonomous ships.[39] With these stages of development come expectations for AI in both the civilian sector and in the military.

Artificial intelligence in the military will have a presence in areas ranging from logical systems to medical purposes and much more; the list goes on as AI can apply itself to almost any area if its host is ready for it to adopt such a role. The readiness for using and reacting to AI varies amongst countries with the United States being among the most prepared states as of 2018 and 2019, but they are not the only ones investing heavily in the future as China pushes to rival the US in AI readiness as well.[40] Just as the Americans and Russians strived to compete with one another in the nuclear arms race during the Cold War, it's likely that the world will see a standoff between two mighty powers once again, an arms race centered around AI involving the US and China. From this viewpoint, one can see AI mimicking the dangers that came when nuclear, biological, and chemical weapons were making their debut on the world stage. When such weaponry was introduced to the battlefield, they attracted a large amount of concern regarding their devastating potential; such weaponry was motivated, grounded, and judged by their stability, legality, ethics, and most of all, safety. These four distinct rationales raised many concerns over the weaponry then; now it raises its own concerns over military AI as well.[41]

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[39] Szabadföldi, "Artificial Intelligence in Military Application," 159-160.

[40] NATO, *Science & Technology Trends 2020-2040,* by D.F. Reding and J. Eaton. NATO Science & Technology Organization, 53, (March 2020), https://apps.dtic.mil/sti/pdfs/AD1131124.pdf.

[41] Matthijs M. Maas, "How Viable Is International Arms Control for Military Artificial Intelligence? Three Lessons from Nuclear Weapons," *Contemporary Security Policy* 40, no. 3 (February 6, 2019): 2-3, https://doi.org/10.1080/13523260.2019.1576464.

AI can change the landscape of warfare and thus the world, just as the introduction of the atomic bomb did; AI is just more complicated given its wider application and uses. Measuring the extent of AI expectations in a combative role is undoubtably difficult, but through its decades of development and usage, the assumption can be made that AI will be a game-changer in the future of warfare; therefore, it's imperative that proper guidelines are established and enforced to govern its use and application in military affairs.

Cyber Warfare

Cyber warfare can be defined as: "Any act intended to compel an opponent to fulfill our national will, executed against the software controlling processes within opponent's system."[42] Throughout history, mankind has fought each other using common direct methods of conventional warfare ranging from swords and shields to armor and gunpowder just to name a few; evolution in technologically have enabled wars to be fought without such direct exchange. What hasn't changed is the urge and desperation to achieve a political or economic goal through the adoption of such technological solutions for military usage. The objective could be for national interest or for the independent gain of groups and individuals; this is where cyber terrorism comes into play. People are more than willing to go through all ends to achieve a goal, no matter how complex the process may be; hence, cyberspace must receive adequate attention to truly understand the capabilities and dangers that lie within it. The first concept to look at in understanding cyberspace is operational space which refers to how individuals and organizations

[42] Lionel D. Alford, "Cyber Warfare: Protecting Military Systems," *Acquisition Review Quarterly* 7, no. 2 (Spring 2000): 105, https://apps.dtic.mil/sti/pdfs/ADA487951.pdf.

use cyberspace create effects and act solely within cyberspace or across, veering into other domains.[43] Another concept to understand is natural domain which best describes cyberspace as being made up of electromagnetic activity and entered using electronic technology, while information based refers to the idea that people enter cyberspace with the intent to store, modify, create, and exchange and exploit information.[44] Finally, the idea of interconnected networks has a significant role in the way cyberspace works and refers to the existence of specific connections which allow electromagnetic activity to carry information.[45]

Cyber warfare with its complex nature is one of the prime examples of how fast the world is evolving technologically and militarily. The old days of fighting wars only on land and at sea are far behind us. Just as warfare moved to the air and demonstrated its reach into outer space, cyberspace showed itself to be battleground of its own, even being considered as the fifth operational domain of warfare.[46] Cyber warfare is strange given its indirect methods of inflicting harm on others, which is why it is difficult to govern. In the case of rules governing cyber warfare and security, there is much change that is needed. Under International Humanitarian

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[43] Michael Robinson, Kevin Jones, and Helge Janicke, "Cyber Warfare: Issues and Challenges," *Computers and Security* 49 (March 2015): 5, https://www.researchgate.net/publication/276248097_Cyber_warfare_Issues_and_challenges.

[44] Robinson, Jones, and Janicke, "Cyber Warfare: Issues and Challenges," 5.

[45] Robinson, Jones, and Janicke, "Cyber Warfare: Issues and Challenges," 6.

[46] Larry D. Welch, "Cyberspace - The Fifth Operational Domain," *IDA Research Notes*, 2011, 3, https://apps.dtic.mil/sti/pdfs/AD1124078.pdf.

Law (IHL), civilians must not be attacked unless they directly participate in hostilities.[47] The area that comes under intense debate is discussing where cyber-attacks fall under in terms of "participation in hostilities". Conducting cyber-attacks can be considered "participation in hostilities" in which individuals taking part in those types of actions would lose their protection under IHL, giving the green light for others to attack them as if they were armed combatants.[48] For those conducting cyber-attacks who end up being captured, the case of becoming prisoners of war (POW) adds to the dilemma. Armed combatants lawfully abiding by the rules of war would be treated normally as POWs, but the case for individuals behind cyber-attacks, even civilian hackers, becomes more complicated given how easy it can be for their actions to stem outside of the ethical boundaries laid out by the rules governing warfare. Therefore, civilians taking part in cyber warfare risk being designated as criminals and even terrorists, being prosecuted as such if captured.[49] What constitutes as a war crime in the age of cyber warfare is difficult to determine, but to some extent, cyber-attacks are viewed and treated the same way as physical attacks. IHL applies to cyber-operations that occur during an armed conflict;

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[47] International Committee of the Red Cross, *Convention (IV) relative to the Protection of Civilian Persons in Time of War*, Part III: Status and treatment of protected persons. Geneva, 12 August 1949, https://ihl-databases.icrc.org/en/ihl-treaties/gciv-1949.

[48] Tilman Rodenhäuser and Mauro Vignati, "8 Rules for 'Civilian Hackers' during War, and 4 Obligations for States to Restrain Them," EJIL:Talk!, October 6, 2023, https://www.ejiltalk.org/8-rules-for-civilian-hackers-during-war-and-4-obligations-for-states-to-restrain-them/.

[49] Tilman Rodenhäuser and Mauro Vignati, "8 Rules for 'Civilian Hackers'."; International Committee of the Red Cross, Convention (III) relative to the Treatment of Prisoners of War, Article 85, Offences committed before capture, para. 3634, Geneva, 12 August 1949, https://ihl-databases.icrc.org/en/ihl-treaties/gciii-1949/article-85/commentary/2020?activeTab=undefined.

penetrating the firewall and compromising the system of a military installation would be viewed as a lawful attack but doing the same on a hospital or a civilian airliner would not be.[50]

While there may be rules governing the application of cyber warfare, the question can be raised on whether the urgency in enforcing those rules match that of conventional warfare; this is a significant issue given there is still a serious risk of collateral damage in cyber-operations just as there is with conventional weaponry. The United States has made it a practice to assess collateral damage before authorizing cyberoperations, but no agreement has been made on the international stage to make other countries take the same level of care.[51] Given the nature of cyber warfare, we will likely not see these much-needed precautions for some time. Absorbing cyber-attacks into the case of international armed conflict is more complicated than it seems since the principles of cyber warfare may not be in line with what is considered to be armed conflict amongst other nations. Even when striving for the same political or military objective, cyber-attacks are not treated the same as conventional attacks because of its non-physical nature.[52] The non-physical nature of cyber warfare leads to a different perception and interpretation of the domain, making it more complicated to govern and regulate.

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[50] International Committee of the Red Cross, *How does Law Protect in War? Conduct of hostilities,* Accessed November 10, 2023. https://casebook.icrc.org/law/conduct-hostilities#footnote89_53g7yaj.

[51] Tarah Wheeler, "IN CYBERWAR, THERE ARE NO RULES," *Foreign Policy*, no. 230 (2018): 37, https://www.jstor.org/stable/26535815.

[52] Russell Buchan and Nicholas Tsagourias, "Cyber War and International Law," *Journal of Conflict and Security Law* 17, no. 2 (Summer 2012): 185, https://doi.org/https://doi.org/10.1093/jcsl/krs016.

Where is the line drawn when it comes to cyber warfare? It's hard to draw the line with something that seems to have endless capabilities just like what is seen with AI. However, humans are at the center of developing cyber and AI technologies; therefore, we must understand the limits and possibilities of these innovative and dangerous products so that we may establish moral and justifiable grounds as a basis for control. Indeed, the abuse of such innovative tools is almost entirely unavoidable given the reality of the world we live in. There will always be those who seek to use such technology for their own desires and to carry out their agenda no matter who may be in the crosshairs nor the risk it may pose to the rest of the population, but through such principles, we can at least limit the destructive power and potential abuse of these innovative tools so that the future may showcase more of its positive attributes rather than its haunting potentials.

Changes in how Conflict is Governed

The issue of governing the use of new technologies and methods in war is nothing new. Throughout its past, the rules of war have undergone change and significant revisions to address and adapt to the fluctuating landscape of war so heavily impacted by revolutionary inventions that were brought onto the field for show and tell. Legal institutions originating from the United Nations Charter in 1945 and the 1949 Geneva Conventions along with the Geneva Protocols of 1977 have sought to develop and create moral interpretations to the principles governing the actions taken before, during, and after conflict.[53] The stages of armed conflict correlates with the three categorization of war that is commonly used amongst scholars when discussing ethical and

[53] Scott D. Sagan, "Ethics, Technology & War," *Daedalus* 145, no. 4 (2016): 7-8, https://doi.org/10.1162/daed_e_00407.

legal questions of war. The first category is *jus ad bellum* which is a Latin term that translates to "the right to wage war"; as stated in the translation, this term refers to the regulations that are in place to determine the justification for inciting or engaging in armed conflict.[54] The second category is *jus in bello,* "justice in war", which governs the behavior and actions taken during the conflict while the last category is *jus post bellum*, "justice after war", which refers to the regulations that determine the appropriate steps taken after the conflict.[55] With their Latin names, these three categories may seem redundant to go over, but behind these categories are a plethora of questions and gray areas pertaining the timing of a conflict which the international society has attempted to solve for many years and failed. The laws governing conflict make themselves clear in what specific issue they pertain to, whether that issue precedes, succeeds, or occurs during a conflict.[56]

Many have the mindset that rules are meant to be broken and go about their business ignoring them. In the case for war, this has been seen and heard too many times in history. Why would anyone think of rules during the chaotic tribulations of war? Douglas MacArthur, a well-known military general, can be quoted saying, "Rules are mostly made to be broken and are too

[54] Sagan, "Ethics, Technology & War," 7.

[55] Sagan, "Ethics, Technology & War," 7.

[56] Sagan, "Ethics, Technology & War," 7-8.

often for the lazy to hide behind."[57] Quite ironic indeed for those words to come from the person who took on the title of being one of the leading military figures in America's campaigns in the Pacific during World War II and the Korean War. Asides from his accolades and periods of fame (and infamy), MacArthur raised a relevant issue pertaining to governing conflict when he shared those words. The rules of war are bound to be broken just like any other set of rules, so one may question the purpose of having such laws in place. Indeed, laws mitigating the severity and extremes of war will be broken just as state and local laws are violated all the time due to criminal activity. However, these civil laws set the standard that society needs to live by, and the same can be said about the laws of armed conflict.

Moral Reasoning

The technological revolution will never stop as it only continues to pick up speed as new ideas and inventions continue to be rolled out into the public image like products from an assembly line. Even with these new inventions and instruments of fighting, it's important to uphold the moral objective of limiting the number of civilian casualties and excluding tools and methods that would otherwise lead to unnecessary human suffering. Former US President Barack Obama made history in May of 2016 by visiting Hiroshima where the atomic bomb was used by the Americans over seventy years ago during the Second World War. In a speech delivered during his visit, Obama addressed the dangers of evolving technology by saying, "*the wars of the*

[57] W. C. Cirocco, "Rules Are Made to Be Broken," *Techniques in Coloproctology* 26, no. 10 (June 19, 2022): 841, https://doi.org/10.1007/s10151-022-02648-3.

modern age teach us this truth. Hiroshima teaches this truth. Technological progress without an equivalent progress in human institutions can doom us. The scientific revolution that led to the splitting of an atom requires a moral revolution as well."[58] President Obama certainly had his own stance in the debate on if America was right to use the bomb against the Japanese, but this ongoing debate points to the concern of how the use of new technology is justified and regulated. The atomic bomb brought with it a whole new level of devastation that humanity had never seen before nor came close to matching in terms of sheer power and destructiveness. The birth of nuclear weapons serves as one of the most notable examples of the scientific revolution changing the world forever as well as a lesson of how dangerous this revolution can be as it feeds off human ingenuity and innovation. Obama's speech in Hiroshima contained urgency just as much as it did empathy, urgency to improve and reinforce the bridge between science and morality.

Factors and Concerns Impacting the Future of Governed Conflict

Military technology advanced at an alarming rate over the past couple centuries. Mankind moved on from the ancient tools of warfare like swords, spears, and bows and arrows, progressing to the modern weapons of guns, rifles, tanks, missiles, and aircraft just to list a few. The 18th and 19th century saw gradual advances in such technology, but the changes seen in the 20th century can best be described as dramatic.[59] The First World War ushered in the dawn of

[58] New York Times, "Text of President Obama's Speech in Hiroshima, Japan," *Tampa Bay Times*, May 2016, https://www.tampabay.com/news/world/text-of-president-obamas-speech-in-hiroshima-japan/2279218/.

[59] Vinod Anand, "Impact of Technology on Conduct of Warfare," *Strategic Analysis* 23, no. 1 (April 1999), https://ciaotest.cc.columbia.edu/olj/sa/sa_99anv02.html.

tanks and aircrafts as well as poisonous gas, and the Second World War introduced a new way of crushing your enemy swiftly and efficiently through a fast-paced style of fighting called Blitzkrieg, which led to Germany's initial successes.[60] The arms race between the Soviet Union and the United States during the Cold War led to the rapid developments in fighter jet and missile technology; both of which would be complimented with the introduction of stealth capabilities in the later decades of the 20th century.[61] Predicting how the rules of war will change or the direction it will take in the future has proven to be extremely difficult because of these examples of rapid developments in military technology. A pivotal part of foreseeing such changes in the future is the firm understanding of what standards and principles are most important when governing the actions and considerations taken before, during, and after conflict. Karl A. Kaszuba, a former Lieutenant Colonel l in the United States Air Force, breaks down the laws of armed conflict into five principles which he sees as being the standards of primary concern: military necessity, proportionality, discrimination, humanity, and collateral damage.[62]

Military necessity is centered around the justification of measures on lawful regulated force viewed as indispensable for promptly bringing an enemy into submission.[63] The standard is addressed by Francis Lieber in article 14 of the Lieber Code: "Military necessity, as understood

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[60] Anand, "Impact of Technology."

[61] Mick Ryan, "An Evolving Twentieth-Century Profession: Technology after World War II," Modern War Institute at West Point, July 1, 2021, https://mwi.westpoint.edu/an-evolving-twentieth-century-profession-technology-after-world-war-ii/.

[62] Karl A. Kaszuba, *Military technology: Has it changed the rules of warfare*?, (Montgomery, AL: Air University, Air War College, 1997), 3, https://apps.dtic.mil/sti/tr/pdf/ADA399023.pdf.

[63] Kaszuba, *Military technology*, 3.

by modern civilized nations, consists in the necessity of those measures which are indispensable for securing the ends of the war, and which are lawful according to the modern law and usages of war."[64] Military necessity can be defined by its name, but as seen in the Lieber Codes, the principle comes with some added complexity when considering all the different scenarios in war.

Proportionality is the principle that imposes limitations on the use of certain kinds of weapons and the methods in which they are used as well.[65] The principle also covers the damages or injuries inflicted on those with protected status such as civilians and hospital; the harm inflicted on those under such protection should not be disproportionate to the legitimate advantages for military means achieved by the use of such weapons as well as the manner in which it is used.[66] An example of a weapon that posed to great of a risk in violating this rule of proportionality would be Nazi Germany's V-I rocket which was capable of causing massive destruction, but was not reasonable equipped with navigational control to guide the rocket to an intended target that was non-civilian and unprotected; thus, there was more harm than good in using the rocket given the risk was disturbingly high of the rocket killing more non-combatants that what was necessary for completing the military objective. The rocket would've been viewed more as a source of genocide than a tool for military success.[67]

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[64] Kaszuba, *Military technology*, 3.

[65] Kaszuba, *Military technology*, 3.

[66] Kaszuba, *Military technology*, 3-4.

[67] Kaszuba, *Military technology*, 3-4.

Discrimination is the next principle which heavily relates to the principle of proportionality and feeds almost entirely off the V-I rocket example. Weapons need to be capable of targeting military objectives while avoiding protected objects and individuals as much as possible; this is done primarily in how the weapon is employed which is affected greatly on the weapon's controls and navigation systems.[68] Hitler's V-1 rockets struggled in being guided to their targets and would therefore be in violation of this principle.

Surely all weapons will cause some level of suffering amongst those who bear the scale of their destructive might. Even those who employ the weapons are prone to physical risks as well as emotional effects. Step into the shoes of the airmen aboard the Enola Gay in 1945 that flew over Hiroshima to drop a single bomb that would annihilate the entire city. With the risk of being shot down or caught in the effects of the nuclear blast, it's reasonable to assume there was a psychological toll placed on the men who were responsible for carrying out such an unprecedented bombing mission, especially upon witnessing firsthand the destructiveness of the device they dropped. The principle of humanity aims to limit the severity of war by weeding out weapons and methods that resulted in injury and suffering inflicted on the participants that would be considered unneeded.[69] In addition, a combatant is knocked out of action because of injury but has a chance to survive, the humanity principle protects that combatant as the opposing adversary must not intentionally make death inevitable for that combatant.[70] Weapons using

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[68] Kaszuba, *Military technology*, 4.

[69] Kaszuba, *Military technology*, 4-5.

[70] Kaszuba, *Military technology*, 5.

glass projectiles would receive heavy backlash because of this principle since such weapons were no better at incapacitating a combatant in an efficient manner compared to the ordinary rifle, but they would cause wounds that inflicted a greater level of suffering for the victims.[71]

Collateral damage is the final principle shared by Lt. Col. Kaszuba, but this principle doesn't serve the purpose that many people think it does and is commonly misunderstood; this principle does not place limits or restrictions on the use of weapons to avoid civilian casualties. Instead, the principle recognizes the reality of collateral damage as being a part of war that is almost entirely unavoidable in certain situations, specifically when civilians or civilian objects are in proximity to lawfully valid military targets.[72] Civilians can never be targeted, and every possible care must be taken to avoid harming them, but the collateral damage principle emphasizes the sad realization that non-combatants will inevitably find themselves in the crossfire in many armed exchanges.[73]

Kaszuba's five principles can help shed light on the uncertain path that lies ahead for laws governing the everchanging landscape of warfare. Collateral damage may seem like a hot topic to many, but it is one of the few guidelines that give the combatant the benefit of the doubt, so long as the combatant has no malicious intentions of harming civilians. Clearly, not everyone will follow these principles; there will always be those who approach and engage in conflict in barbaric ways with little regard for human life, just as there will always be those who

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[71] Kaszuba, *Military technology*, 5.

[72] Kaszuba, *Military technology*, 5.

[73] Kaszuba, *Military technology*, 5-6.

intentionally target the innocent to satisfy their sick sadistic desires. Ethical standards of conflict hold minimal recognition for extremist eager to take part in acts of terrorism; the rules of war fail to establish much legitimacy in these situations and become largely obsolete.

Thucydides, the great Athenian general and historian, once presented his vision of war with the absence of morality, sharing his famous quote from the Melian Dialogue, "right, as the world goes, is only in question between equals in power, while the strong do what they can and the weak suffer what they must."[74] The opposite argument could be made by fast forwarding to the modern era of warfare where the stronger powers are the ones mainly following the rules while the armed militants do as they wish. In thinking of that, it seems more like the weak do what they can on one side while the strong suffer what they must on the other.[75] War is two-sided in this sense, split between those who follow the rules and those who don't. Consideration must be given to the soldiers who follows the rules since they are asked to submit to these laws while pursuing their tactical or strategic objective. At times, soldiers are even expected to put their chances of mission success in jeopardy as well as their lives for the sake of civilians.[76] Respect is deserved by those of the modern era who have been caught in such dilemmas, but such intense pressure to follow the law must not be alleviated as new technology and methods of fighting are tested and used on the battlefield.

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[74] Scott D. Sagan, "The Changing Rules of War," *Daedalus* 146, no. 1 (Winter 2017): 9, https://doi.org/10.1162/daed_a_00418.

[75] Sagan, "The Changing Rules of War," 9.

[76] Sagan, "The Changing Rules of War," 9.

Science and Ethics

Nations and people-groups continuously go to war with one another in different parts of the world for their own reasons, and these conflicts pose as exhibition for the presentation and demonstration of new tools and ways for combat. Lieutenant Colonel Timothy M. Goines, senior military faculty and assistant professor of law at the United States Air Force Academy, brings up the present reality of how the battlefield is becoming far more technical than anything else.[77] Perhaps the battlefield will become less barbaric and gruesome as it once was in the years before, but it's hard to be certain of anything given our lack of a full understanding as to the capability and reliability of these newer weapons. What we can be certain of is that there is an existential threat to world order and therefore peace with the introduction of revolutionary tools of warfare; some of these tools are so new that we don't even possess the necessary knowledge of how to control and lawfully govern such accessories.[78] Lt. Col. Goines elaborates on this danger and shares how there is a gap forming between technology and ethics; he does this with his focus being primarily on the onset and evolvement of AI and cyber capabilities, but this concerning thought is applicable in an abundance of other cases far beyond those two.[79] One side of the gap contains the interests and perspectives of the scientists and engineers behind the wonderworks, while the other side contains that of lawyers and those striving to ensure that law

[77] Duke University School of Law, *LENS 2023 | Ethics and the New Technologies of War: AI and Cyber*, Lt. Col. Timothy M. Goines, Center on Law, Ethics and National Security, April 10, 2023, video, 1:04:25, https://www.youtube.com/watch?v=Myg2NHKJ4Zw&t=426s.

[78] Duke University School of Law, *LENS 2023.*

[79] Duke University School of Law, *LENS 2023.*

and ethical justice always stays at the forefront of everyone's interest.[80] In a world so susceptible to immeasurable death and destruction because of the new weapons of warfare, this gap must be filled. The gap between such different fields may never be fully bridged, but everything must be done to narrow it as much as possible. In his lecture, Lt. Col. Goines emphasizes the importance of developing new military capabilities with the law always in mind and presents the significance of law and ethics being incorporated at the onset of these military creations.[81] No matter the field of specialty or the level of distinguishment, neglection of the law must never be tolerated. The gap fear doesn't highlight the lack of understanding lawyers and lawmakers have in new technology; rather, it sheds light on the worrisome thought of the lack of understanding engineers and scientists have in the moral and ethical principles outline in law and governing regulations.

The importance of being able to draw a fine line between right and wrong couldn't be emphasized more in today's culture; determining what actions crosses such a line or could lead to the breaching of the established code of conduct is just as important as well. Having a lack of awareness of the law impairs anyone from being able to establish proper moral boundaries and ethical principles behind their actions. The ethical framework of the just war doctrine does not change as newer technology is introduced; from the developmental phase to the application of

[80] Duke University School of Law, *LENS 2023.*

[81] Duke University School of Law, *LENS 2023.*

such weapons, ethics should be in the discussion in every part of the process.[82] Lt. Col. Goines' concerns about the weakened bridge between engineers and lawyers will continue to be valid for as long as engineers and scientists carry on with their agenda of developing high tech products to attract interest and contracts from the big wallets of Uncle Sam and other clients abroad.

Conclusion

The evolution of technology has placed an immense burden on the ethics of warfare, and history has taught us that the art of war mirrors the evolution of technology. Scientists and engineers have demonstrated their ability to change the way battles are fought and thus alter the landscape of geopolitics. We cannot be fully certain in determining the direction new technology will take going forward, but there should be just as much concern as there is excitement on these concepts. There is much potential behind new technology like drones and AI, but the risks will be high of them doing more harm than good if they are not controlled and regulated properly. The rules of war have shown its adaptability in the past when faced with these issues surrounding evolving technology. However, such adaptability is meaningless if the level of urgency doesn't match the level of concern when discussing this topic. Through unity and determination, technology can be developed and used for great proposes and roles in which it is more than capable of fulfilling.

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[82] James Jay Carafano, "Future Technology and Ethics in War," *Utah Law Review* 2013, no. 5 (2013): 1264, https://heinonline.org/HOL/Page?handle=hein.journals/utahlr2013&id=1309&collection=journals&index=#.

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