

MACHINE ON TRIAL

BY

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A THESIS PRESENTED TO THE FACULTY OF
THE SCHOOL OF ADVANCED AIR AND SPACE STUDIES
FOR COMPLETION OF GRADUATION REQUIREMENTS

SCHOOL OF ADVANCED AIR AND SPACE STUDIES

AIR UNIVERSITY

MAXWELL AIR FORCE BASE, ALABAMA

JUNE 2012

APPROVAL

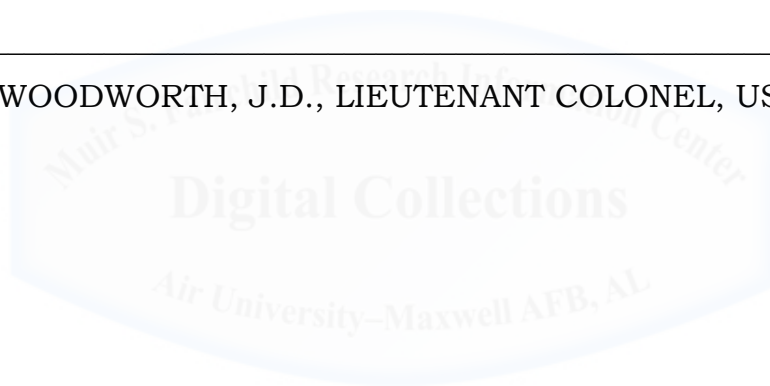
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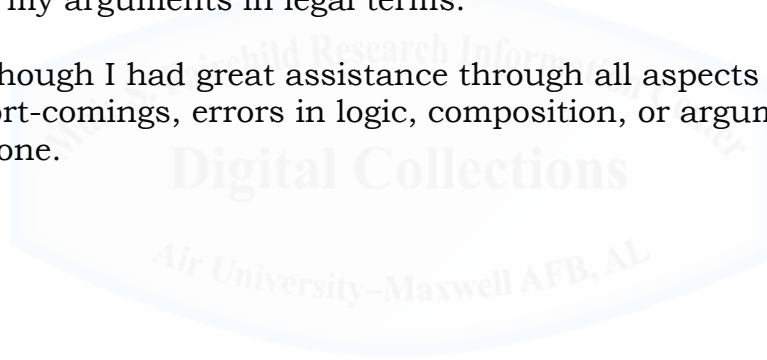
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ACKNOWLEDGMENTS

I would not have completed this thesis without significant consultation, guidance, and editorial assistance from the faculty, staff, and fellow students of the School of Advanced Air and Space Studies (SAASS). Each day I found myself in utter awe, challenged by the level of discourse heard in the seminar rooms, around the lunch table, and throughout the halls.

Doctor Everett C. Dolman served not only as my thesis chair but as my yearlong mentor. He provided clarity to my thoughts and motivation to continue during the challenging times while I attended SAASS. As I formulated my arguments presented throughout this thesis, Dr. Dolman served as a sounding board, always willing to hear me out and encourage the growth of my arguments. I spent many hours framing arguments in Lieutenant Colonel David Woodworth's office. He not only served as a patient thesis reader, he also provided immeasurable help guiding my arguments in legal terms.

Though I had great assistance through all aspects of this process, any short-comings, errors in logic, composition, or argumentation are mine alone.



ABSTRACT

Will a machine someday be held accountable for its actions? This paper provides one view of events to answer the question “how trustworthy and reliable must an Autonomous Lethal Engagement (ALE) system have to be to satisfy ethical and legal requirements?” A fictional legal argument acts as the framework to debate this question.

The more quantitative side of reliability relates to discrimination while the qualitative aspect of trustworthiness relates to proportionality. Context matters with respect to the ethical argument. Historically, acceptable ethical lines at both the national and societal levels vary based on the context surrounding actions. From precedence, how one kills matters less than why one kills with two notable exceptions. How one kills matters with regard to 1) distinction of target and discrimination of friendly or neutral entities and 2) the effective proportionality of the kill. The crux of the central thesis question is a related question that drives the theoretical legal proceeding; “can a machine be held accountable for its actions?” By taking a broad look at the legal, ethical, philosophical, and technical fields surrounding the emergence of ALEs, one potential future is evaluated.

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Introduction

Although our intellect always longs for clarity and certainty, our nature often finds uncertainty fascinating. It prefers to day-dream in the realms of change and luck rather than accompany the intellect on its narrow and tortuous path of philosophical enquiry and logical deduction only to arrive – hardly knowing how – in unfamiliar surroundings where all the usual land-marks seem to have disappeared. Unconfined by narrow necessity, it can revel in a wealth of possibilities; which inspire courage to take wing and dive into the element of daring and danger like a fearless swimmer into the current.

- Carl Von Clausewitz

Air Force Material Command (AFMC) posed the following research question: “How reliable would an autonomous lethal engagement system have to be to satisfy ethical and legal requirements?”¹ The lynch pin to this question is legality, more specifically, legal accountability. Assuming jurisdiction of all parties, the legal argument is reduced to one of standing and accountability. The AFMC point of contact added to the question with the following statement: “Before we invest R&D [research and development] dollars, it made sense to me to think through some of the ethics and trust issues ... You might also note that I proposed this topic from an Remotely Piloted Aircraft (RPA) perspective but you could probably apply it to air to air scenarios as well.”²

What follows is not a straightforward answer to AFMC’s question. However, the arguments presented should indicate the non-uniqueness of the issue relevant to reliability and ethics while focusing on the unique aspects of autonomous systems related to trustworthiness and legality. Chapter 1 sets the stage for the background trial as an underlying story for the thesis. Historical case studies address ethical concerns in

¹ Air University Research Information Management System, “AURIMS, AY11, Research Topic List (updated 22 Sep 10),” Listed on line 296 as Autonomous Lethal Engagements, 11AFMC004, Submitted by Air Force Material Command.

² Kevin Stamey, Director of Engineering AFPEO/ISR & SOF, email “Re: Regarding Autonomous Lethal Engagements,” (August 8, 2011).

Chapter 2. Reliability, related to the acquisitions process, is also addressed in Chapter 2. Chapter 3 broaches the concept of trust. Although trust is not quantifiable, societal interpretations of social norms and transfers of moral hazard do exert influence. Trust from one moral agent to another does not dissolve accountability from the trusting agent. Accountability must exist to justify or explain the consequences of failed acts of trust. While legal themes run the course of the thesis, Chapter 4 addresses the legal concerns of accountability and demonstrates what some view as extreme, yet legal, uses of autonomy related to discrimination.

This thesis may seem fanciful. Prior to dismissing the arguments surrounding autonomous lethal systems, the reader is asked to examine other significant events in human history and consider how fanciful discussion surrounding commonly accepted ideas such as human rights or states as independent actors seemed only a few hundred years ago.

In 1648 the Peace of Westphalia ended the Thirty Years' War. The desire of the signatories to ensure the treaty lasted beyond the life span of single rulers drove the concept of modern statehood. The appointed representatives of the various royal heads of state signed the international treaty under authority of the so-called crowns, a continuing public power, and not the personal authority of the individual rulers. Straumann argues that Westphalia served as a "historiography of international law and international affairs" and is thus the basis for the international legal norms established throughout Europe.³ These legal norms became the basis for international legal sovereignty. Prior to this act, the idea of statehood existing as a distinct entity apart from individual rulers may have seemed as absurd as the idea of legal standing for an autonomous machine.

³ Benjamin Straumann, "The Peace of Westphalia as a Secular Constitution," *Journal Constellations* 15, no. 2 (2008), <http://www.iilj.org/aboutus/documents/straumann.westphalia.pdf> (accessed April 23, 2012)

Thoughts of science fiction may cross the reader's mind when first encountering the assumptions outlined in Chapter 1. The US military, in part driven by efforts to reduce personnel liability and cut operating costs, is moving in the direction of more autonomous systems. While discussing possible next generation RPAs, Lt General Deptula states, "The third major attribute of the MQ-X (a general term used to describe a future RPA) will be autonomy, since it is likely that an enemy will seek to cut the links between the operator and the aircraft. Today, RPAs know when they are out of touch with their operators, and if that happens, some can return safely to base. With the MQ-X, the Air Force wants an aircraft that can continue the mission on its own, if control links are cut."⁴ He also expanded on the early stages of autonomous discrimination; "The things that we're working very hard on is automating a lot of what analysts do individually. And so, instead of having a person [watch] a video screen looking for a person to come out of a building, I can come up with the technology that does that automatically ... [and] tracks that person and provides notification."⁵

The basic assumption, the existence of machines with enough autonomy to execute discriminatory kill criteria, relies on technological advances not yet realized. Futurists, such as Kurzweil, proclaim that these events will occur sooner than most accept as possible and that we will likely find ourselves beyond the precipice before we realize how much life has changed.

⁴ John A. Tirpak, "The RPA Boom," *The Air Force Magazine.Com*, August 2010. <http://www.airforce-magazine.com/MagazineArchive/Pages/2010/August%202010/0810RPA.aspx> (April 24, 2012).

⁵ Tirpak, "The RPA Boom."

Chapter 1: A Preliminary Trial

There was nothing abnormally interesting about the January attacks. The Associate Press carried the story. A senior terrorist leader was killed as part of ongoing peacekeeping operations. The sensational part of the story occurred three months after the events.

Also killed in the attack were several civilians. One of those was a twenty-two year old college student traveling in the region. Parents of the student were outraged at the loss of their only child and sought justice. First, the parents pressured the military. Their loss, while sad, was acceptable when viewed through the perspective of operational necessity and reasonable proportionality. The senior terrorist leader was responsible for the deaths of thousands of innocent civilians, and he had been hunted for years. Collateral damage was always regrettable, but in this case, the opportune benefits outweighed the unfortunate costs. Stonewalled, the family sought answers from the person who executed the mission. Could this soldier not have waited until their son was clear of the area before firing?

When the parents pushed for a civil case, they were dumbfounded. The person responsible simply did not exist – at least not in a legal sense. Their child was killed through the actions of an autonomous lethal engagement system. The family knew of these ALEs. Their prolific use seeped into this conflict on all levels. Ground, sea, and air-based ALEs existed. If they thought hard about it, autonomous systems filled every aspect of their lives; they existed in all forms and sizes. Some were human sized. Others orbited high in the sky, filled with waiting fuel, serving as airborne gas stations. Medically-based autonomous systems, designed to enter the body and cure weakened immune systems or

strengthen weakened veins, were so small the human eye could not detect their existence.¹

The family was at a loss but still felt the need to point at someone and ask “why, why was our child killed, why was this not avoided, what other decisions could have been made?” Out of desperation, the family charged the code writers of the ALE for proximate cause in the wrongful death of their child. Company AutX was prepared.

Premise for the trial: a lack of causation and standing

True, the company had procured the initial code that fed the genetic algorithms linked into a neural net. The algorithms for each ALE evolved independently of the others and in such a manner that the original contextual bounds no longer existed. Context drives decision. Killing civilians is generally an unacceptable act. However, it is accepted that even in just wars, some civilians die as a result of legitimate military necessity. Context also drives definitions. The definition of a civilian varies from war to war based on the political context. The actions of the ALE, as influenced by unforeseeable context, were themselves unforeseeable.

Company AutX convinced the Court of the lack of causation. The decision left the court in a predicament. By allowing one finger to point away from the company, the requirement of causation pointed another finger at a machine. That machine lacked standing in the court of law.

¹ John A. Tirpak, “The RPA Boom,” *The Air Force Magazine.Com*, August 2010. [http:// www. airforce-magazine. com/ MagazineArchive/Pages/2010/August%202010/0810RPA.aspx](http://www.airforce-magazine.com/MagazineArchive/Pages/2010/August%202010/0810RPA.aspx) (April 24, 2012). This section refers to potential future advanced autonomous systems though semi-autonomous systems exit today that fill similar roles as those described. Tirpak describes some of these systems as follows: “The UAS Flight Plan does not limit itself to items in the Predator-Reaper or Global Hawk classes. At the low end of the spectrum, the Air Force is busy developing ‘nano-micro’ systems, of the size of a small bird or insect, that will be able to penetrate rooms to conduct reconnaissance, cyber attack, or even lethal operations. The service already fields a number of hand-launched ‘man-portable’ systems such as the Raven, which can look over hills and resembles toy radio-controlled aircraft, and is investigating air-launched systems that may or may not be expendable. At the high end, the roadmap talks about ‘tanker-sized’ RPAs that could perform long, dull jobs such as serving as communications nodes while simultaneously providing air refueling and GMTI missions with onboard radars.”

Without legal standing, the ALE in question is no more than defective property. Destruction of the defective property was one simple solution to the issue. However, the statements from Company AutX intrigued the court. Was this ALE simply defective property or something more? The court ordered a legal proceeding and appointed counsel to the ALE.

Determination of the machine's legal standing is the basis for the following fictitious legal proceeding. Accountability of causation requires legal standing. The court issued an injunctive order to spare the existence of this ALE pending a possible declarative judgment. A declarative judgment stating the ALE was a *person*, or some other entity with legal standing, would force a causation trial. The causation trial would determine the guilt or innocence of the ALE. For now, the trial focused on the question "can a machine be held accountable for actions?"

The media flocked to this trial. A machine, demanding recognition of unalienable rights, the sheer recognition of which could place the ALE in greater peril than if it were considered defective property. Defective property can be corrected or scrapped, depending on the cost. Completely scrapping a machine as complex as the ALE did not make sense. Ridding the machine of any distinguishing features developed over time would destroy the essence of the machine. Death or a complete personality and memory lobotomy are the only human comparisons for such a process.

Replays of his college philosophy debates ran through Judge Minos's head as the bailiff called the room to order. Honorable Minos observed the normality of his courtroom with an odd clarity. The room was occupied, as it would be on a nominal morning. The roles and players were well defined with the exception of the defendant. Judge Minos stared at the ALE and thought to himself, 'here we start to define who or what you are and what responsibilities are owed between you and the society that created you.'

A side bar for definitions

The term autonomous has widely varying definitions. Unless qualified within the text or footnotes the following definitions apply.

Autonomous: A robot “capable of making at least some of the major decisions about their actions using their own programming.”² This definition covers a robot vacuum cleaner deciding on a vacuum pattern to the moral and ethical reasoning of a robotic caregiver deciding the best way to interact with a patient.

Telerobot: Per Sullins, a telerobot is a “remotely controlled machines that makes only minimal autonomous decisions.”³ The operator provides the intelligence for the machine such as the NASA Mars Rovers, telerobotic surgery, telerobotic nurses, Predator drones, and the Army SWORD.

Unmanned Aerial Vehicle (UAV): From the 2008 Dictionary of Military and Associate Terms, “Powered aerial vehicle that does not carry a human operator, ... can fly autonomously ..., and can carry a lethal or non-lethal payload.”⁴ The USAF has replaced the term UAV with Remotely Piloted

² John P. Sullins, “When is a Robot a Moral Agent?” *International Review of Information Ethics* 6, (December 2006): 25-26. To bypass a “full discussion of the meaning of ‘autonomy’” as a philosophical subject, Sullins uses the roboticists definition: “autonomous robots must be capable of making at least some of the major decisions about their actions using their own programming.” This definition covers a robot vacuum cleaner deciding on a vacuum pattern to the moral and ethical reasoning of a robotic caregiver deciding the best way to interact with a patient.

³ Sullins, “When is a Robot a Moral Agent?” 25-26. Sullins defines a telerobot as “remotely controlled machines that make only minimal autonomous decisions.” The operator provides the intelligence for the machine such as the NASA Mars Rovers, telerobotic surgery, telerobotic nurses, Predator drones, and the Army SWORD.

⁴ Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, April 12, 2001 (amended October 17, 2008), 579. www.dtic.mil/doctrine/new_pubs/jp1_02.pdf Similar (accessed January 2012). Chris Jenks expanded on this definition with his interpretation of a GAO report in his opinion titled *Law From Above: Unmanned Aerial systems, Use of Force, and the Law of Armed Conflict*.

Aircraft (RPA) to highlight the aircraft dependence on manned crew interaction.⁵

Additional definitions are located in Appendix B: Definitions.

How did we get here?

Judge Minos listened intently to both sides of the initial argument. He felt the intensity of the public light shining on his courtroom and knew his ruling would cast a long shadow. It would affect far more than the fate of the ALE standing in judgment before him. His decision would set the precedent for defining personhood while opening the door for sentience, free will, and the recognition of legal rights for what many viewed as an elaborate calculator. Before proceeding farther in the trial, Judge Minos needed to understand how this point in time came to be.

Stepping back from the trial the judge realized there were two arguments he desired to hear. He wanted to understand how humans have justified the use of and allowed a so-called *thinking* machine to do their killing. Throughout his life, the Judge had witnessed unthinkable human atrocities and on the rarest occasions, extraordinary kindness. He had always favored the gray lines when examining human kind. Humans span the length of good and evil and he believed the worst atrocities committed by and to the human race were executed by those who believed they were in the right. If this same logic holds for the

Jenks states in his footnote on page 653 that “the distinction between autonomously and remotely piloted UAVs is that ‘[a]n autonomously piloted UAV is one that is pre-programmed for its mission before it takes off. It then flies its mission without a ground-based pilot. A remotely piloted UAV is controlled by a pilot in a control station on the ground during the flight.’” GAO report, *supra* note 3, at 4 n.5.” The term autonomous used to describe the ALE throughout this thesis exceeds the autonomy of a machine “that is pre-programmed for its mission before it takes off.” The autonomous nature of ALEs reflect a capability to make major decisions.

⁵ Tirpak, “The RPA Boom.” Tirpak, while interviewing Lt. Gen. David A. Deptula, Air Force deputy chief of staff for intelligence-surveillance-reconnaissance (ISR) provided insight to USAF decision to drop the term UAV and switch to RPA: “Since the Flight Plan was published in mid-2009, the Air Force has dropped the term ‘unmanned aircraft systems’ because ‘there’s nothing unmanned about them,’ Deptula said. It can take as many as 170 persons to launch, fly, and maintain such an aircraft as well as to process and disseminate its ISR products. The UAS term gave the false impression that they required little manpower investment, Deptula noted.

creation of the ALE sitting in front of the Judge, how did we come to justify the ethical use of such a machine?

The Judge called for a recess so that he could further educate himself on the issue and research his own question. As he rose to leave the room, the thought occurred to him that society may not have chosen to justify the ethical use of the ALEs. The judge began to question if society as a whole was even aware of how far the autonomous systems penetrated daily lives. Was society's path predetermined by the growth of technology or did society intent and individual responsibility construct the situation?



Chapter 2: Ethical Justification Using Historical Case Studies

War transforms the social and political orders in which we live, just as it obliterates our precious certainties.

– Barkawi and Brighton,
The Scientific Way of Warfare

The escalating use of machines in war has spawned increased attention on concepts of justness in war. Separating out this aspect from the broader Just War debate and relegating it to a section dealing with changing societal norms allows distinctive focus on the historically-backed sliding scale of justified ethics in war.¹

Historical case studies support the concept of sliding justified ethical behavior. Accepting the realities of a sliding justified scale provides the acquisitions corps and operational planners with resource boundaries. It also allows operational commanders a measure to quantify which weapons are not acceptable given their potential use allowing for extant or probable political or sociological circumstances.

The defense acquisitions field uses reliability and confidence values to provide predictions for success rates of weapons.² Establishing the reliability of an autonomous system could follow a similar path to the precedence of success rates used for weapon systems. Ethical use of a system implies an aspect of control. Reliability and success rates

¹ For an overview of the Just War debate see Michael Walzer, *Just and Unjust Wars*, 4th Ed (New York NY: Basic Books, 2006), focus on chapter 5 of Everett Carl Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (New York NY: Frank Cass, 2005), Robert B. Strassler, ed., *The Landmark Thucydides* (New York NY: The Free Press, 1996), Edward D. Mansfield and Jack Snyder, *Electing to Fight* (Cambridge MA: MIT Press, 2007), Peter Ackerman and Jack Duvall, *A Force More Powerful* (New York NY, Palgrave, 2000), US Bishops, *The Challenge of Peace*, May 3, 1983, <http://old.usccb.org/sdwp/international/TheChallengeofPeace.pdf> 18-22 (accessed May 9, 2012).

² Office of the Undersecretary of Defense for Acquisitions, Technology, and Logistics, *Report of the Defense Science Board Task Force on Developmental Test and Evaluation* (Washington, DC: Government Printing Office, May 2008) <http://www.acq.osd.mil/dsb/reports/ADA482504.pdf> (accessed on March 28, 2012) 21-22. From the 1970s to the mid 1990s the defense services executed a concerted effort to employ reliability standards and testing from the design phase through fielding. Reliability programs remain standard on aircraft programs in both the Air Force and Navy. These programs have reduced the mean time between failure rates as well as achieving designed suitability of systems.

demonstrate aspects of control and predictability. Trust and fear are similar in that both are individual and social aspects of non-quantifiable reactions.

A socially constructed fear of autonomous systems may drive a technology gap that places the US at risk of falling behind emerging military powers. An analytical evaluation of reliability should drive the discriminatory side of the argument while qualitative social norms and an ethically motivated evaluation of context introduce trustworthy concepts.

*The history of war affords little hope that
nations which are fighting for their lives
and beliefs will be restricted in their
conduct of the war by moral factors.*

- Arthur W. Tedder

Sliding scale of justification

Justification related to war falls to two large categories. The general category of *jus ad bellum* relates to proper cause and circumstances for going to war. Specific conflict justifications such as the Law of Armed Conflict or regional Rules of Engagement fall under *jus en bello*, or justice within war. Discrimination and proportionality relate to varying degrees of *jus ad bellum* and *jus en bello*. The following historical examples highlight a sliding scale of justice in war related through an examination of varying degrees of discrimination and proportionality.

Historical case studies demonstrate a sliding scale of ethical behavior due to surrounding circumstances. The fire and carpet-bombing efforts in both theaters of World War II express how the nature of the conflict, as well as acceptable technological limitations, resulted in wider discriminatory efforts than those of today's politically charged precision

munitions era.³ World War II also demonstrated a sliding scale of acceptable proportionality. The military utility gained from releasing two mostly untested atomic weapons on civilian populations reveals a willingness to accept high damage to civilian persons and property in an effort to gain military advantage.⁴

Hit oil if visual assured; otherwise, Berlin – center of city.

Gen Carl A. Spaatz's order
to Lt Gen James Doolittle
February 1, 1945

Addressing discrimination and proportionality

Case 1: World War II Fire, Carpet, and Atomic Bombing

Carpet-bombing, fire-bombing, and the release of atomic weapons over civilian populations in Japan highlight the indiscriminate nature of WWII aerial bombing, but the decisions to do so were part of an interplay of technological and socio-political circumstances. The evolution of air power in WWI moved from primarily reconnaissance to interdiction. In his 1925 *Winged Defense*, Billy Mitchell offered a strategic view of air power that included direct bombing of civilian areas used to support the military industry. His interpretation of a city as a military target and the strategic implications from bombing are supported with his statements, "For attacking cities that are producing great quantities of war munitions that are necessary for the maintenance of an enemy army and country in case of war, the air force offers an entirely new method of subduing them. Now an attack from the air force using explosive bombs and gas

³ For a review of the strategic bombing campaign of World War II see the following: Tami Davis Biddle, *Rhetoric and Reality in Air Warfare* (Princeton NJ: Princeton University Press, 2002), Richard J Overy, *The Air War* (Washington DC, Potomac Books, 2005), Michael S Sherry, *The Rise of American Air Power* (New Haven CT, The Yale University Press, 1987), Randall T Wakelam, *The Science of Bombing: Operational Research in RAF Bomber Command* (Buffalo NY, The University of Toronto Press, 2009), Thomas E Griffith, Jr, *MacArthur's Airman* (Lawrence KA: University Press of Kansas, 1998), as well as the books referenced in section 2.1.

⁴ Lawrence Freedman, *The evolution of Nuclear Strategy*, third edition (New York NY, Palgrave MacMillan, 2003), 4-12, 16.

may cause the complete evacuation of and cessation of industry in these places. This would deprive armies, air forces, and navies even, of their means of maintenance.”⁵ Mitchell’s proposal met the first half of the discrimination criteria in just war theory – prosecution of military targets. His writings indicated that the “dominate theme ... was not the desire to attack civilians directly, but rather the desire to sever the populace from the sources of production... Achieving that goal might cause some civilian deaths, but the number would pale compared to the deaths produced by ground war between industrialized powers.”⁶

As the war stretched on, “the impetus to end the war quickly provided few limits to the definition of ‘military objective.’”⁷ The American ethical line of discrimination shifted with alibis such as the need to hasten “the war’s end and saving *American* lives in the process.”⁸ A desire to inflict great amounts of pain to compel the Axis powers into submission replaced discrimination requirements for both identification and targeting.

The Geneva Conference of 1932-1934, the 1945 Charter of the International Military Tribunal, and the 1949 Geneva Convention are examples of “immediate post-war declarations and conventions constitute[ing] a retrospective indictment of the practices they outlawed.”⁹ These conventions and documents support the notion that the Allied governments understood the actions directed towards civilian targeting were wrong but still chose to act to counter a greater evil.¹⁰

Allied Air Forces treated civilian populations as a military object. Justification for bombing of cities ranged from a strategy of breaking the

⁵ William “Billy” Mitchell, *Winged Defense: The development and possibilities of modern air power – economic and military* (Tuscaloosa AL: The University of Alabama Press, 2009), 5-6.

⁶ Mark Clodfelter, *Beneficial Bombing*, 42.

⁷ Mark Clodfelter, *Beneficial Bombing*, 151.

⁸ Mark Clodfelter, *Beneficial Bombing*, 186. (original emphasis)

⁹ A.C. Grayling *Among the Dead Cities: The history and moral legacy of the WWII bombing of civilians in Germany and Japan* (New York NY: Walker and Company, 2006).

¹⁰ Both Grayling and Clodfelter imply support to the opinion that the conferences acknowledged a moral relative bad committed by the Allies but justified as an absolute good.

enemy economically, logistically, or by breaking the enemy's will to fight by destroying the civilian will to support the war. The fire-bombing of Tokyo and four other of Japan's largest cities as well as the "pounding of Berlin and Dresden ... demonstrated a willingness to target civilians directly rather than relying on complementary pain caused by targeting nearby government offices (Berlin) or rail yards (Dresden). In the Japanese case, 'areas assigned were selected on the basis of a compromise between industrial importance and susceptibility to fire.' ... Their intent was to kill people and destroy homes, which would indirectly affect industrial production."¹¹

Discrimination and proportionality are linked through intent and result. A discriminate strike is one that not only identifies a target but also one that intends a proportionate effect. Actual proportionality is measured by the result regardless of intent.¹² The intent of fire bombing and the release of atomic weapons over Japan was some combination of destroying military manufacturing, breaking civilian will, and punishment. The bombing resulted in one hundred thousand civilian deaths in one night alone.¹³

Case 2: Kosovo: an increased reliance on precision weapons

¹¹ Mark Clodfelter, *Beneficial Bombing*, 188-189. Additional support is found on page 149 where Clodfelter recounts a press conference held by RAF Air Commodore C.M. Grierson in February 1945. Grierson "stated that bombing population centers caused the Germans difficulty because it forced them to send in trains carrying relief supplies and set out trains carrying homeless civilians."

¹² Chris Jenks and Geoffrey Corn, "Siren Song: The Implications of the Goldstone Report on International Criminal Law." <http://ssrn.com/abstract/1788542> (accessed January 2012). Jenks and Corn state on page 4, that an objective standard of assessment is used to evaluate discriminatory and proportional acts through the "subjective perspective of the military commander whose actions are at issue and based on the information available at the time the decision was made." Additionally, Jenks and Corn argue on page 6, "commanders are not held liable based on retrospective assessment of facts and circumstances, often referred to as the 'Rendulic Rule.'" Lothar Rendulic was a WWII German General accused of indiscriminately and disproportionately ordering a 'scorched earth' policy to slow the advancing Russian forces.

¹³ Joseph Coleman, "1945 Tokyo Firebombing left Legacy of Terror, Pain," Associated Press, *Common Dreams*, March 10, 2005. <http://www.commondreams.org/headlines05/0310-08.htm> (accessed on April 1, 2012) On the night between March 9th and 10th, 300 B-29s dropped an estimated half million M69 incendiary cylinders over 16 square miles of Tokyo. "The official death toll was some 83,000, but historians generally agree that victims unaccounted for bring the figure to around 100,000 overwhelmingly civilians. It is widely considered to be the most devastating air raid in history."

On March 24th, 1999, NATO engaged the Federal Republic of Yugoslavia in war. Operation Allied Force (OAF) was motivated by three primary interests: “ensuring the stability of Eastern Europe; thwarting ethnic cleansings; and ensuring NATO’s credibility.”¹⁴ OAF was the first time NATO used military action against a state for humanitarian reasons within a sovereign nation; essentially, it was NATO’s first war. OAF was a “politically constrained coercive diplomacy” effort.¹⁵ The first phase of the operation, Phased Air Operations Plan, was a limited air operation designed to gradually increase pressure on then-Serbian President Milosevic. Politically constrained discrimination, through target identification, restricted the type and amount of targets to a list that lasted only three days. By the end of the first week, after all authorized targets had been hit at least once, General Ralston drafted four general target procedural rules to widen the target identification. Three of the four rules were centered on discrimination while the fourth limited proportionality.¹⁶

NATO aircraft were restricted to an altitude band of 15,000 – 20,000 feet in the initial phase of OAF. While this altitude band co-aligned with several Surface-to-Air engagement altitudes, the band was selected to allow for optimal Laser Guided Bomb attacks.¹⁷ Attack missions were called off or reassigned if civilians were located within the strike area. NATO aircraft assumed greater risk to “trash fire” over Kosovo as the rate of inadvertent civilian casualties increased.¹⁸ NATO aircraft descended down to 5,000 feet for identification and to 8,000 feet

¹⁴ Dag Henriksen, *NATO’s Gamble: Combining Diplomacy Airpower in the Kosovo Crisis, 1998-1999* (Annapolis: Naval Institute Press, 2007), 7.

¹⁵ Henriksen, *NATO’s Gamble*, 87.

¹⁶ Henriksen, *NATO’s Gamble*, 20-22. Discrimination focuses on identifying and minimizing an attack to enemy targets. A lack of discrimination or perceived discrimination can counter legitimate political aims. Henriksen lists General Ralston’s four rules as: 1) don’t bomb Montenegro unless under threat, 2) don’t bomb within 5 miles of downtown Belgrade without additional NATO approval, 3) unintended casualties must be well within proportional expectations as set by NATO, 4) don’t bomb the electric grid.

¹⁷ Benjamin Lambeth, *NATO’s air war for Kosovo: a strategic and operational assessment*, (Washington, DC: RAND Corporation, 2001), 140-142.

¹⁸ Lambeth, *NATO’s air war for Kosovo*, 141.

to release non-precision guided munitions in an effort to increase discrimination and precision.¹⁹ Kosovo is an example of political will tipping the line of ethical justification for the use of military force towards prudence to the point of limiting a decisive blow in favor of progressive action. The international political pressure surrounding Kosovo tipped the proportionate military response away from action required to meet military necessity, such as ceasing genocide, in favor of maintaining the alliance and legitimacy of NATO.

What shall it profit us if we win the victory and lose our civilization? I am sure we must be far more selective in the allocation of our national effort to military defence. We must pay far more attention to the principle of economy of force – and when I say ‘economy’ I do not mean the false economy got by doing things on the cheap, but the economy which results from keeping every component part of the national war machine properly balanced in relation to the rest of the machine – the economy, moreover, which organises the armed forces for speed and quick decision.

- Arthur W. Tedder

Acquisitions

As stated previously, accepting the realities of a sliding justified scale provides the acquisitions corps and operational planners with resource boundaries. It also allows operational commanders a means to quantify which weapons are not acceptable given the political or sociological circumstances. Additional research in this area could provide variables to assess the discriminatory and proportional affects of systems in a similar way that reliability and confidence values provide a prediction for success rate.

Reliability and confidence values communicate expected performance of acquisition systems. Specifically, “reliability is a measure

¹⁹ Lambeth, *NATO's air war for Kosovo*, 142.

of how well a product will perform under a certain set of conditions for a specified amount of time. Many times, reliability will be stated along with a minimum confidence level. Reliability and confidence are two separate concepts. Reliability refers to a failure rate, while confidence refers to the minimum certainty that the claimed failure rate is accurate.”²⁰ The numbers are tested, verified and used to support doctrine development. Operators are concerned with the success rate of a system under given circumstance. The success rate of a system is the reliability for a given probability or confidence value.²¹

Reliability is quantifiable while trust is a qualified property. The quantifiable nature of reliability supports discrimination while the qualified nature of trust supports proportionality. Trustworthiness, as a characteristic, is more difficult to stretch the definition from one of repeatability and expected results to one of desired results. Proportionality is a qualitative assessment of the real and likely consequences balanced against military necessity. This is where the trustworthy nature of the ALE comes into question. While rarely specified quantitatively, a minimum level of discrimination and proportionality is often communicated through general orders. Justifying the use of lethal autonomous systems requires acknowledging an acceptable level of both reliability and trust.

For example, munitions are often delivered to the field with Circular Error Probable (CEP) values that serves as “an indicator of the delivery accuracy of a weapon system, used as a factor in determining probable damage to a target. It is the radius of a circle within which half of a missile's projectiles are expected to fall.”²² Military members operating within the bounds of the Law of Armed Conflict, require an

²⁰ Maximator Test, LLC, “Reliability,” white paper, <http://www.maximator-test.com/about/White-Paper-Reliability.pdf> (accessed March 27, 2012).

²¹ Quality Portal references, <http://thequalityportal.com/glossary/rc.pdf> (accessed January 2012).

²² Farlex, The Free Dictionary, <http://www.thefreedictionary.com/circular+error+probable> (accessed on March 28 2012).

ability to discriminate and execute within proportional response levels. An autonomous system executing on behalf of the nation must, at a minimum, meet these same standards. Just as inexperienced or raw recruits should not be placed in positions to make decisions regarding discrimination and proportionality above their pay level, an autonomous system should not be used beyond its capabilities. Design characteristics defined during the acquisition process can bound the minimum capacities of future systems. This minimum threshold ensures the basic user needs are met as well as ensuring the acquisition process efficiently uses resources while not overdesigning a system.

The technique of warfare is always changing, sometimes drastically; yet I'm afraid one must admit that the military mind is only too often very unreceptive to new ideas and new methods. The chivalrous horror and disgust which the armoured knights of old felt for the vulgar invention of gun powder was matched not so many years ago by similar righteous disgust at the breach of gentlemanly military etiquette by the introduction of the aeroplane the and bomb ... I suspect, however, that the true reason for the opposition to the use of gun powder was fear, fear that it would upset the established order – as in fact it did.... It has not been morality but expediency that has governed the use of new weapons.

- Arthur W. Tedder

Ignoring the gap

History is filled with examples of great military powers falling after failing to adopt emerging military techniques or weapons. Emerging military techniques and weapons have also changed military culture and some argue, military ethos.²³ The stirrup and the machine gun are prominent examples of technology affecting military culture and ethos.

²³ Michael R. Contratto, "The Decline of Military Ethos and the Profession of Arms: An Argument Against Autonomous Lethal Engagements," (submitted in partial fulfillment of requirements of the Air War College, Air University, February 2011). One of Contratto's central arguments is that by allowing machines to kill, the US military risks its military ethos and a loss to the professionalism of arms.

The toe stirrup allowed a rider to propel the strength of a horse through a weapon such as a lance. Hesitation across Europe, with the exception of the Franks, to use or to grasp the concept of the toe stirrup was a primary factor supporting the Frank's military dominance. The toe stirrup, credited with the establishment of feudalism, also resulted in a significant change to military culture.²⁴

The emergence of the machine gun challenged the "supremacy of man as opposed to mere machine." John Ellis points out that the nineteenth century European officer corps, most from aristocratic origins and socially isolated, lacked the ability to conceive of war beyond its existence in the previous century. They rejected the use of the machine gun as outside the military ethos. The officers missed the concept that dominance in war was shifting towards "dominance of the tools of war. For them the war still *was* an act of will. Military memories and traditions had been formed in a pre-industrial age when the final bayonet or cavalry charge might be decisive. For them, in the last analysis, *man* was the master of the battlefield."²⁵

The emergence of Unmanned Aerial Systems (UAS), later named Remotely Piloted Aircraft (RPAs), in large quantities during the early twenty-first century created much consternation within the ranks of the USAF. In a 2005 *Air and Space Power Journal* article, Hoffman and Kamps explain "Some pilots appear wary of the usefulness of UAVs and UCAVs, primarily because they simply don't like the idea of being replaced by a robotic aerial vehicle. In 2000 a military pilot told one of the authors that 'it will be a long time before any of us will be comfortable releasing bombs and betting the ranch using UAVs.' Since that time, we have gained enough confidence in the UAV's reliability, positioning, and target accuracy that slinging bombs from this aircraft

²⁴ Lynn White Jr. *Medieval Technology and Social Change* (New York, NY: Oxford University Press. 1962), 28.

²⁵ John Ellis, *The Social History of the Machine Gun* (Baltimore, MD: The Johns Hopkins University Press, 1975), 49-50.

has become a foregone conclusion. However, the culture still has a long way to go in accepting unmanned technology for other potential missions.”²⁶

Questioning new technology is healthy. Asking the wrong questions at the peril of mis-focused attention is dangerous.²⁷ The assumption that an RPA was capable of executing missions outside of programming space hindered acquisitions from design, development, manufacturing, training, and execution. The fear of change hid the logic that a fly-by-wire aircraft with a human attached only allowed the human a vote, perhaps not even a majority vote. Similar control systems exist in RPAs with the exception of distance (interference in the control system due to the distance was an area overlooked until the video downlink feeds were hacked).²⁸ Had advocates and nay-sayers realized the affect of the mis-focused discussion, pertinent questions may have concentrated attention on the video downlink vulnerability sooner. Key intelligence data may not have been compromised. Hacking of Predator video may have resulted from improperly focused attention driven by ignorance of a technology gap.

²⁶ James C. Hoffman and Charles Tustin Kamps, “At the crossroads: future ‘manning’ of unmanned aerial vehicles,” *Air and Space Power Journal* 19, no. 1 (Spring 2005), <http://www.freepatentsonline.com/article/Air-Space-Power-Journal/135886989.html> (accessed April 1, 2012). Additional source support from Brian Mockenhaupt article “We’ve seen the future and it’s unmanned,” *Esquire.com*, <http://www.esquire.com/features/unmanned-aircraft-1109-2> (accessed April 1, 2012), “In 2001, ninety years after an airplane first dropped a bomb, a Predator launched a Hellfire missile in Afghanistan for the first time. The next year, a Predator fired a Stinger missile at an Iraqi MiG-25. The missile’s heat seeker was thrown off by the MiG’s missile, which destroyed the Predator, but still: A drone had been in a dogfight.”

²⁷ Thomas P. Christie, “Operational Test and Evaluation Report on the Predator Medium-Altitude Endurance Unmanned Aerial Vehicle,” Air Force Operational Test and Evaluation Center, <http://pogoarchives.org/m/dp/dp-predator.pdf> (accessed May 9, 2012). The report identifies the operational short comings of the Predator aircraft when evaluated against user defined requirements. The Predator was marked as “not operational effective or suitable.” At the time of the Operational Test Evaluation report, Predator aircraft had successfully executed operational missions in support of the Global War on Terrorism. Following this statement, the report clarifies “the disparity between the apparently successful fielded system and the system that did not perform well in the initial operational test and evaluation (IOT&E) is largely attributed to the fact that the fielded system is tasked and operated well within known limitations.”

²⁸ Sibhan Gorman, Yochi J. Dreazen, and August Cole, “Insurgents Hack U.S. Drones: \$26 Software Is Used to Breach Key Weapons in Iraq; Iranian Backing Suspected,” *Wall Street Journal* Online, December 17, 2009, <http://online.wsj.com/article/SB126102247889095011.html> (accessed May 9, 2012).

Lt General Deptula brings the point home regarding technology capability and human trust; he “doesn’t expect that, even with onboard computer processors rated equivalent to the human brain, an air-to-air fighter could be remotely piloted. So far, technology does not allow the ‘360-degree spherical situational awareness’ necessary for a pilot to sense a rapidly changing situation and take the appropriate action in a split-second battle. Moreover, ‘linkages are vulnerable,’ and for the near term, RPAs can’t be trusted yet to wield lethal power without the over watch of a human.”²⁹ While supposing possible a *processor equivalent to the human brain*, General Deptula does not allow for the consideration of an autonomous air-to-air engagement. He defaults to the concept of remotely piloted control of a system with supposed capabilities of a human.



²⁹ Tirpak, *The RPA Boom*.

Chapter 3: Changing Societal Norms

“The history of technology is part and parcel of social history in general.”

~John Ellis

In 1914, entrenched combatants on both sides of the Western Front in World War I participated in a decision to trust their enemy during a period of peace and celebration of Christmas.¹ The WWI Christmas Truce exemplifies trust. It existed between the combatants despite the evidence of previous WWI actions. Evidence must be set aside for trust to exist. The following chapter addresses trust through an examination of social norms and moral hazard.

The judge began to question if society as a whole was even aware of how far autonomous systems penetrated daily lives. He wondered why his court was used to address the issue; why had this issue not been addressed as the ALEs developed. Surely, the designers or the users of ALEs had asked these questions.² A thought then entered Judge Minos’s mind. Had society recognized the emergence of ALEs? Were the individuals who created the ALEs so tunnel-focused on the task that the implications of their designs passed through moral blind spots? The judge knew a historical accounting of actions might not answer these questions. His thoughts moved on to greater questions of fate, determinism, and of individual choice within society. Was our path

¹ “The Christmas Truce,” *The First World War.com: a Multimedia history of World War I*. <http://www.firstworldwar.com/features/christmastruce.htm> (accessed on April 23, 2012).

² Opinion papers addressing autonomous liability have increased over the years. In *Liability for Autonomous Agent Design*, Carey Heckman from the Stanford Law School and Jacob O. Wobbrock from the Stanford Symbolic Systems Program address liability in three scenarios centered on autonomous agents employed throughout society in 2012. Each scenario surrounds actions taken by an asynchronous autonomous agent that “somewhat control[s] their own actions and do not depend on constant human feedback.” (395) While acknowledging that, for now, “the causation for any agent malfunction lies with a human (396),” the actions of adaptive agents become more indeterminate with evolutionary growth (398) and the result is confusion as to who is liable (395). Additionally the automotive industry is struggling with liability concerning autonomous vehicles. In *Legal Aspects of Autonomous Driving*

predetermined by the growth of technology or did societal intent and individual responsibility construct the situation?

Social Norms

Social constructionist views and technological determinism are two extremes that bound the following discussion on social norms.³ As in most social cases, neither extreme is complete without consideration of the other. The views that society is deterministically guided or that thoughtful intent and action construct society fall in the realm of philosophy as much as historical reference. The relevance of this philosophical debate concerns the emergence of autonomous systems.

A technological deterministic view tends to the emergence of ALEs without societal forethought. A socially constructed viewpoint would suggest that ALEs must be a recognized cognitive decision for their emergence to occur. Technological momentum, a middle ground, supports and tempers both views. Momentumist thought does not require the strict outcome of determinism but it does support the likely progression of technology.⁴

Beyond the philosophical drivers, what changes will occur for the integration of autonomous systems into society? Must recognition of the autonomous nature occur before governance changes or is it more likely that ALEs will emerge and require governance changes without general recognition from society?

The integration of autonomous systems into the daily lives of society will likely have secondary effects. Is there a way to predict and leverage these effects as autonomous systems develop? Can we use

³Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch, eds., *The Social Construction of Technological Systems*, (Cambridge MA: The MIT Press, 1989).

⁴Thomas P. Hughes, "Technological Momentum," in *Does Technology Drive History? The Dilemma of Technological Determinism*, eds. Merritt Roe Smith and Leo Marx (Cambridge MA: The MIT Press, 1994), 101-113.

secondary effects as a tipping point to recognize autonomous systems from traditional programmed and confined systems?

Individual perspective of situational context drives the morality of decisions.⁵ In general, killing is viewed as immoral. However, killing in self-defense or to protect a weaker person may be viewed as morally correct. Considering the range of individual interpretation of context, does a rational view of morality, removed from temporal emotion, provide room for an expanded discussion of the morality of autonomous system decisions over human?

Modern examples of anti-lock braking systems as well as the use of precision guided munitions provide examples of technology exceeding human capability and rationally challenge the moral decision to not use technologically aided systems. Kant argues for an evaluation of morality viewed through pure reason; “as and so with all the other moral laws properly so called; that, therefore, the basis of obligation must not be sought in the nature of man, or in the circumstances in the world in which he is placed, but a priori simply in the conception of pure reason.”⁶ Are autonomous agents, free from human emotion, capable of a more pure reason and thus considered more moral?

One can imagine the following response in an *amicus curiae* brief:

⁵ Sean Cort, “Content versus Context: It’s not what you say, it’s how you say it.” *The Power of Perspective* (December 7, 2009), <http://www.psychologytoday.com/blog/the-power-perspective/200912/content-vs-context> (accessed on April 24, 2012). Cort’s article describes the effect of both content and context on perspective. Since morality is interpreted through individual perspective, morality must also be affected by content and context.

⁶ Kant, *Fundamental Principles of the Metaphysics of Morals*, <http://www.manybooks.net/support/k/kantimma/kantimmaetext04ikfpm10iliad.pdf> (accessed on February 22, 2012), 7.

Honorable Minos,

Your questions regarding the constructed or determined nature of socially integrated autonomous systems are well founded. If I understood you correctly, your intention exceeds a mere academic or philosophical debate concerning the extremes of social construction and technological determination. You seek to understand the ownership of intention. If society intended the development of ALEs we must hold society accountable to and for ALEs. If determinism drove ALE existence, must society be held accountable to the ALEs or will the ALE deterministic nature care for the evolution of ALEs without taxing society?

In either case, whether ALEs were intended or deterministically evolved, the ALEs must be recognized and governance must change to incorporate ALEs into society. A historical review of the relationship between recognition and governance will support your questions concerning constructed or determined nature of the technology. Looking directly at a target often blinds our vision. We can be overwhelmed by content and lose sight of the context. Secondary effects may provide you with a better vision of the socially accepted autonomy of machines.

As you build your opinion for the legal status of autonomous systems, keep in mind the philosophical question of *could autonomous systems, as true rational actors, be more ethical than humans?*⁷ Providing legal standing to a machine will add weight to this philosophical debate but it will also force a discourse on practical questions concerning trust, ethics, and reliability. Is it

⁷ Kant, *Fundamental Principles of the Metaphysics of Morals*. Kant provides an argument for a pure theoretical rationality that, while envisioned by humans, exceeds human capability.

unethical to not use an autonomous machine if the machine has demonstrated greater reliability to save lives than the human counterpart? By assigning legal standing, you will force questions of trust and the recognition of legitimacy related to reliability and ethics.

With regards,

R. Kantakins⁸

Socially constructed or technologically determined?

Much debate exists concerning the sociological formation of our society and the integration of technology. Are we destined to continuously push technological barriers without regard to moral implications or is our hubris great enough to believe that individual intention fuels societal construction?

Post modernism strengthens the view of social constructionist's reign over technological progression. Four case studies provided by Hughes indicate that social construction bounds large US technological programs.⁹ As the postmodern world evolved in the United States, the populous challenged government-led programs to conform to moral and safety standards not compelled prior to World War II. Such a post-modernist view of society logically indicates that the desire for social safety and other advantages gained from autonomous systems will drive society to intentionally construct circumstances encouraging the development of autonomous systems. One modern example of constructed circumstances surrounds the perceived safety gains of

⁸ The thesis author used artistic license to represent a conglomerate of opinions from Kant and Akins. The letter is signed with a fictitious name.

⁹ Thomas P. Hughes, *Rescuing Prometheus: Four Monumental Projects that Changed the Modern World* (New York: Vintage Books, 2000), 303-305.

autonomous collision avoidance in cars.¹⁰ However, as most environmentalists will attest, socially minded concerns do not always translate to socially conscious development.

Pinch and Bijker's view of social constructivism relies on the social groups that are "concerned with the artifact and the meanings that those groups give to the artifact. A problem is defined as such only when there is a social group for which it constitutes a 'problem.'"¹¹ In this light, a social constructionist could find a world integrated with autonomous systems without specific societal intention. A group must be aware of and identify a *technological artifact* as "constituting a problem" for a scheme to develop.¹² Once a social group has identified a problem, it is then possible to address several conflicts ranging from "technical requirements by different social groups ... conflicting solutions to the same problem ... and moral conflicts. Within this scheme various solutions to these conflicts and problems are possible – not only technological ones but also judicial or even moral ones."¹³ Regardless of how autonomous systems progress, in the eyes of a social constructionist, the ALE trial represents a recognized problem for a social group to address. The trial becomes the condition required for the next phase of ALE recognition.

Pinch and Bijker's artifact recognition requirement is similar to the ideas of technological determinism. Technological determinists view the "efficacy of technology as a driving force of history: a technical innovation

¹⁰Tom Vanderbilt, "Let the Robot Drive: The Autonomous Car of the Future Is Here," *Wired* (February 2012 edition, posted January 20, 2012), http://www.wired.com/magazine/2012/01/ff_autonomoucars/all/ 1 (accessed January 2012).

¹¹ Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," in *The Social Construction of Technological Systems*, ed. by Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch, (Cambridge MA: The MIT Press, 1989), 30. Referenced hereafter as Pinch and Bijker "The Social Construction of Facts and Artifacts."

¹² Pinch and Bijker, "The Social Construction of Facts and Artifacts," 30.

¹³ Pinch and Bijker, "The Social Construction of Facts and Artifacts," 35-39.

suddenly appears and causes important things to happen.”¹⁴ Robert Heilbroner captured this sentiment in his essay, “Do Machines Make History?” Heilbroner represents a soft determinist approach. His main thesis concerns “the effect of technology in determining the nature of the *socioeconomic order*,” and highlights the focus of determinism of technology as the driving force.¹⁵ Heilbroner uses the concept of simultaneous discovery or technological clustering (“the process of discovery takes place along a well-defined frontier of knowledge rather than in grab-bag fashion”) to support a claim that “technological evolution follows a sequential and determinate rather than random course.”¹⁶ If societal construction drove socioeconomic conditions rather than technology, the variation of global societies would not account for clusters of simultaneous technological advancement over great distances.

The intermittent American technocracy movement highlights an American tendency towards technological determinism.¹⁷ The industrial revolution, fueled by necessities of efficient labor through machinery, “glorified the march of invention and the material progress of the age. Technology and science not only became the great panacea for everyday problems; they also stood for values at the core of American life.”¹⁸

A distinction can be made to separate the determinist development of a technology from the application of the technology. Lynn White, Jr. explains that “a new device merely opens a door; it does not compel one to enter. The acceptance or rejection of an invention, or the extent to which its implications are realized if it is accepted, depends quite as

¹⁴ Leo Marx and Merritt Roe Smith, “Introduction” in *Does Technology Drive History? The Dilemma of Technological Determinism*, ed. Merritt Roe Smith and Leo Marx (Cambridge MA: The MIT Press, 1994), xi.

¹⁵ Robert L. Heilbroner, “Do Machines Make History?” in *Does Technology Drive History? The Dilemma of Technological Determinism*, ed. Merritt Roe Smith and Leo Marx, 53.

¹⁶ Heilbroner, “Do Machines Make History?” 56.

¹⁷ John Ellis, *The Social History of the Machine Gun* (Baltimore, MD: The John Hopkins University Press, 1975), 22-23.

¹⁸ Marx and Smith, *Does Technology Drive History? The Dilemma of Technological Determinism*, 23.

much upon the condition of a society, and upon the imagination of its leaders, as upon the nature of the technological item itself.”¹⁹ White illustrated the point with the stirrup. “The Anglo-Saxons used the stirrup, but did not comprehend it; and for this they paid a fearful price. It was the Franks alone – presumably led by Charles Martel’s genius – who fully grasped the possibilities inherent in the stirrup and created in terms of it a new type of warfare supported by a novel structure of society which we call feudalism.”²⁰ Emergence of technology requires a user to grasp the possibilities inherent in the technology. A determinist may support the notion that thermonuclear war became inevitable once physicist conceived of the idea to harness the energy of a split atom, but human choice not to use thermo-nuclear weapons is an example of a determined technology intentionally not used.

Technological momentum tends towards technological deterministic behavior while considering socially constructed control. This middle ground acknowledges the intention driving socially constructed systems. Nonetheless, a greater impulse of intention is required to change the momentum of what seems to be a determined path.

Hughes summarizes the three approaches by defining technological determinism as “the belief that technical forces determine social and cultural changes. Social construction presumes that social and cultural forces determine technical change. Technological momentum infers that social development shapes and is shaped by technology. Momentum is time dependent.”²¹ The trial, dubbed *Machine on Trial*, can slow the momentum by manipulating the time required for further ALE development. The trial also represents a possible pivot point for the social

¹⁹ Lynn White Jr. *Medieval Technology and Social Change* (New York, NY: Oxford University Press, 1962), 28.

²⁰ White, *Medieval Technology and Social Change*, 28.

²¹ Thomas P. Hughes, “Technological Momentum,” 102.

constructionists to correct an already emerged technology fueled into existence through technological momentum.

*If the radiance of a thousand suns
Were to burst at once into the sky,
That would be like the splendor of the Mighty One...
I am become Death,
The shatterer of Worlds.*

- *The Bhagavad-Gita*

Change required for ALEs to operate

Recognition and governance drive the changes required within society for ALEs to operate. Must society recognize the ALE as an autonomous system before it is possible for the changes to occur, or is it more likely that ALEs will emerge without general recognition from society – along the lines of a slowly boiling frog?²²

Kurzweil, through several essays, addresses the human tendency to dismiss significant leaps in artificial intelligence. He states “a common reaction to the proposition that computers will seriously compete with human intelligence is to dismiss this specter based primarily on an examination of contemporary capability.”²³ Kurzweil describes his concept of an *intuitive linear* view as the human tendency to assume the current rate perceived progress to remain constant. The recognition of an exponential technological growth curve reinforces the *intuitive linear* view when the time period is viewed briefly.²⁴ Debates surrounding the timescale required for self-replicating entities ranges from never, to 100 years, to 25 years. Kurzweil defends both positions of 100 and 25 years

²² *The Boiled Frog*, <http://allaboutfrogs.org/stories/boiled.html> (accessed May 9, 2012). “This parable is often used to illustrate how humans have to be careful to watch slowly changing trends in the environment, not just the sudden changes.”

²³ Ray Kurzweil, *The Age of Spiritual Machines* (New York, NY: Penguin Books, 2000), 4.

²⁴ Ray Kurzweil, “The Law of Accelerating Returns,” in *Accelerating Intelligence Essays* (March 7, 2001), <http://www.kurzweilai.net/the-law-of-accelerating-returns> (accessed on March 20, 2012). The slope of an exponential curve appears linear when the change in one axis over the other is considered over a short duration.

but cautions that the discrepancy stems from a misperception of the acceleration of the rate of evolutionary and technological progress. He states that 100 years of today's progression rate (stated in 2001) is equivalent to 25 actual years.²⁵ If Kurzweil's intuitive linear thinking plagues the human race, humanity may feel a scalding sensation without recognizing that the burn stems from the boiling water surrounding society as the ever-increasing rate of autonomous systems integrates into daily life.

The atomic era serves as a warning for technology advancement with respect to acceptable governing behavior. Six years to the day passed from Einstein's decision to write President Roosevelt advocating support of the Manhattan Project until the first atomic weapon ignited over the Trinity Test Site on July 16, 1945.²⁶ The technological advancement leading first to the atomic weapons followed quickly by thermonuclear weapons is one example of accelerated technology outpacing politics and governance. President Truman understood the military capacity of atomic weapons when he ordered the release of two over Japanese cities. However it took years for American political leaders to understand the political implications of the weapons.²⁷ Technology advanced at a far greater rate than domestic or international governance. The destructive power of nuclear weapons required political powers to proceed cautiously. How much damage might have occurred if the destructive power of nuclear weapons was not internalized in time to slow the exploitation of the weapons in the years when governance was solidifying? Consider autonomous system development. The benign nature of these systems will not likely spike the concern of nuclear weapons while the time required to advance autonomous systems is

²⁵ Kurzweil, *The Law of Accelerating Returns*, 1-2, 43-46.

²⁶ The History Channel, *10 Days that Unexpectedly Changed America*, http://www.history.com/images/media/pdf/Einsteins_Letter.pdf (accessed on March 20, 2012).

²⁷ Campbell Craig, *Destroying the Village: Eisenhower and Thermonuclear War* (New York, NY: Columbia University Press, 1998), 27-29.

projected to dwarf the time required to normalize nuclear development. In *15 Minutes to Nuclear Annihilation*, Keeney highlights the evolution of nuclear control from a chain of complete civilian authority and physical control to a military-controlled chain required to meet Strategic Air Command's 15 minute alert status.²⁸

A technological determinist would view the progression of ALE development as one of many evolutionary steps. From a determinist view, the laws must change to reflect progression of technology. Incompatible laws will not stifle the determinate nature of technology development for very long. A social constructionist may view the creation and refinement of laws and governance as a precursor to the development of ALEs. Governance is one means used to construct technological advances into society. Technological momentumists may see the development of ALEs in close step with the expansion of governance to head off technological, and therefore societal, stifling. All three views require active integration, leading or following, of autonomous systems into governance.

It does not seem to matter if social constructivism, technological momentum, or technological determination drives the recognition and governance of ALEs. All three philosophical views allow for the existence of the current trial. The effect of the path society takes may not drive the existence of the trial *but it may drive the questions raised during the trial*. Are the ALEs creations of destiny or of free will? Does the manner of creation lend towards recognition of rights or sentient life? Are the ALEs moral agents holding to both responsibility and accountability, or are the ALEs simply an extension of a corporation – an entity that takes action and thus is accorded rights without thought or intent?

²⁸ L. Douglas Keeney, *15 Minutes to Nuclear Annihilation: General Curtis LeMay and the Countdown to Nuclear Annihilation* (NY: St Martin's Press, 2011).

Recognition of possible secondary effects?

The Internet was “created for research purposes, for the exchange of ideas, not for commerce, where money would change hands, or for the purposes of controlling critical systems.”²⁹ The initial group that set up the ARPANET did not foresee secondary effects of the networked system and thus did not install within it contingencies for security or expansion beyond four billion Internet protocol addresses. It is possible for secondary effects to exceed the impact of primary intentions.

Kurzweil paints a picture of the human race and machines evolving into one entity. He proposes that autonomous artificial intelligence will lead to secondary effects and the evolutionary extension of human life.³⁰ Are there secondary effects society might recognize that are not as pronounced as the thousand-year human life extension discussed by Kurzweil yet are still profound enough to alter human society such as the effects driven by the Internet? In short, can society identify secondary effects that may trigger recognition of the autonomous age?

Autonomous systems of varying levels of independence and intelligence are prevalent throughout modern industrialized societies. Autonomous agents execute intelligent computer programs designed to increase efficiency of network systems. Google’s intelligent and personalized search engine is an example of tailored learning algorithms proliferated across a mass market. The 2007 announcement to default Google user accounts to a personalized mode was “perhaps the most significant change in search marketing in the past few years.”³¹

Debates concerning privacy, search engine anarchy, or unfair business practices did not diminish Google’s world predominance as a

²⁹ Richard A. Clark, *Cyber War* (New York, NY: Harper Collins Books, 2010), 83.

³⁰ Ray Kurzweil, *The Age of Spiritual Machines*, 234.

³¹ Gord Hotchkiss, “The Inevitability of Personalized Search,” *Search Insider Blog*, (posted February 15, 2007), <http://www.mediapost.com/publications/article/55559/the-inevitability-of-personalized-search.html?print> . (accessed on March 21, 2012).

search engine.³² With the explosive growth of the Internet the need for ever more efficient search and organization algorithms increases. Google may be the most prolific search algorithm but it is not unique. A 2002 Conference on Information and Knowledge Management (CIKM) paper evaluated methods to personalize internet searches with the following technique: “A user profile and a general profile are learned from the user's search history and a category hierarchy respectively. These two profiles are combined to map a user query into a set of categories. Several learning and combining algorithms are evaluated and found to be effective. Among the algorithms to learn a user profile, we choose the Rocchio-based method for its simplicity, efficiency and its ability to be adaptive.”³³

Autonomous systems regulate power grids, water stations, and monitor and maintain household appliances. A growing list of companies has invested in “smart grid” compatibility and technologies hedging on the day when cities and individual households will rely on autonomous agents to control major utilities.³⁴ Autonomous systems enter society to improve convenience or efficiency. Society becomes reliant on the technology and eventually dependent on the autonomous systems.

One definition of disruptive technology is a technology that replaces and causes the elimination of the previous technology. Global Positioning Systems (GPS), for example, have spawned several such secondary effects. These include advances of real time logistics to inclusion of satellite navigation software as standard equipment in some

³² Hotchkiss, “Inevitability of Personalized Search,” Hotchkiss highlights issues raised immediately following the 2007 Google announcement such as search anarchy. Ebiz MBA ranked Google as the world's predominant search engine in March, 2012 with 900 million unique users monthly. Bing followed with 165 million unique users. Ebiz MBA uses a “constantly updated average of each website's *Alexa* Global Traffic Rank, and U.S. Traffic Rank from both *Compete* and *Quantcast*” to rank engines.

³³ Fang Liu, Clement Yu, and Weiyi Meng, “Personalized Web Search by Mapping User Queries to Categories,” *CIKM*, (2002), <http://www.cs.binghamton.edu/~meng/pub.d/cikm02.pdf> (accessed on March 21, 2012).

³⁴ Grid Modernization Initiatives, “What is the Smart Grid,” *Smart Grid News.com* (Jan 9, 2012), http://www.smartgridnews.com/artman/publish/commentary/What_Is_the_Smart_Grid-567.html. (accessed on March 21, 2012).

automobiles. Another example of a secondary effect driven by GPS proliferation is drawn from the widespread use of cell phones in the United States. Prior to cell phones, functional pay phones existed throughout most American cities. In 2011, fewer than five-hundred thousand payphones were operational in the United States compared to over two million in the 1990s.³⁵ Cell phones entered society as a novelty, became a convenience, and within a few years social reliance on cell phones resulted in the removal of most pay phones, and today are significantly lessening occurrences of land-wired home and business telephone connections. Of note, as cell phones are reliant on GPS to provide accurate timing signals, the widespread use of cell phones is partially based on the availability of GPS. In a direct line of cause and effect, one secondary consequence of the GPS constellation is the removal of pay phones.

I see a manless Air Force ... For twenty years the Air Force was built around pilots, pilots, and more pilots ... The next Air Force is going to be built around scientists – around mechanically minded fellows.

- General “Hap” Arnold

The moral use of humans when technology is safer

Should the morality of a decision hold up when viewed out of context? Humans base decisions on a combination of emotional and rational factors. Empathy in society allows for a general understanding of morality. The fine edges of moral right and wrong are the battleground for what is fair and just. Kant argues that only decisions based on pure reason, removed from emotions driven by the situation, allows for true morality.

³⁵ Mike Irwin, “Pay phone graveyard in basement of Wenatchee firm,” *The Wenatchee World* (October 17 2011), <http://www.komonews.com/news/local/131990003.html> (accessed on March 21, 2012).

Since the 1970s automobile manufacturers have steadily released autonomous features and programs leading towards a fully autonomous vehicle. Safety, efficiency, and mobility drive the automation movement. In 2009, automobile crashes accounted for the deaths of 1.2 million people worldwide and 34,000 Americans. At 95%, driver error far exceeds road conditions and technical failure as the primary cause of these accidents.³⁶

The introduction of automated systems, such as anti-lock breaking systems (ABS), assisted humans to reduce fatal crashes. In 2003, the US Department of Transportation and Safety Administration in cooperation with Transport Canada conducted a motorcycle ABS research project. The ABS runs resulted in consistent data indicating “an overall reduction in stopping distance of 5%” compared with non-ABS assisted breaking.³⁷ The report noted that riders “did not require significant experience or special skill in order to achieve a high level of performance” with ABS, however “test results from non-ABS motorcycles were noticeably more sensitive to rider performance variability.”³⁸ In addition to safety concerns, autonomous systems promise increases to efficiency through reductions in road congestion and decreased fuel consumption, as well as offering greater flexibility for mobility choices to the elderly or youth.³⁹ At what point does a vehicle driver become morally responsible to ensure a reasonable level of safety prudence when opting to purchase a vehicle with or without ABS?

³⁶ Sven A Beiker and M Ryan Calo, “Legal Aspects of Autonomous Driving: The need for a legal infrastructure that permits autonomous driving in public to maximize safety and consumer benefit,” *Center for Automotive Research at Stanford (CARS)* and the *Stanford University Center on Internet and Society (CIS)*, Stanford University Press (October 2010), 3.

³⁷ Donovan Green, *A Comparison of Stopping Distance Performance for Motorcycles Equipped with ABS, CBS, and Conventional Hydraulic Break Systems*, United States Department of Transportation, National Highway Traffic Safety Administration, pdf as presented at the International Motorcycle Safety Conference in Long Beach, CA March 28 – March 30, 2006, 1-3.

³⁸ Donovan Green, *A Comparison of Stopping Distance Performance for Motorcycles Equipped with ABS, CBS, and Conventional Hydraulic Break Systems*, 3.

³⁹ Beiker and Calo, *Legal Aspects of Autonomous Driving*, 4-5.

Is a vehicle driver morally responsible in the given scenario? A driver purchases an automobile on which ABS is a standard feature. The driver elects to remove the ABS feature from the vehicle due to a personal distrust of the ABS compounded with beliefs that non-automated breaking assistance is a purer form of driving. Months later, the driver, while operating well within the legal limits of the road, strikes a child who has crossed into the street. The reaction time of the driver results in the death of the child. If the vehicle had been equipped with ABS and the driver exhibited the same reaction time, the vehicle would have stopped several feet from the child. Is the driver's moral responsibility for the accidental death of the child affected by the decision to not use standardized ABS? At what point does it become morally unacceptable to choose a human over a technological solution once the technical solution has been proven significantly and consistently more capable?

In war, combatant parties "must choose the means and methods of attack with the aim of minimizing incidental civilian losses and damage."⁴⁰ This element of just war execution is explicitly called out in Article 57 (1) of Additional Protocol I, which states, "In the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects."⁴¹ Precision guided munitions accounted for 100% of the munitions used by NATO in the execution of Operational Unified Protector, the March – October 2011 Libyan civilian protection effort.⁴² The success of precision guided munitions in Desert Storm and Kosovo set the American standard for acceptable munitions

⁴⁰ Laurie R. Blank, "Targeted Strikes: The Consequences of Blurring the Armed Conflict and Self-Defense Justification," 37 *Wm. Mitchell L. Rev.* (2011), 18.

⁴¹ International Humanitarian Law - Treaties & Documents, "Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977," <http://www.icrc.org/ihl.nsf/WebART/470-750073?OpenDocument> (accessed May 9, 2012).

⁴² Lt Gen Ralph J Jodice II, *OUP CFACC, Op Unified Protector (OUP) Mission Brief*, as presented to the School of Advanced Air and Space Studies (February 2012), 43.

use around civilian populations.⁴³ Given the increase from 22% in the Desert Storm Gulf War to 64% during Kosovo operations ending with 100% of precision guided munitions in the 2010 – ongoing Libyan operations, it is unlikely that, in wars of choice, US will drop non-precision guided munitions near civilian population centers again. Precision munitions set a new moral standard for acceptable care to spare civilian populations. The level of automation in precision-guided munitions is significantly less than the automation of an ALE, however, these munitions provide a stepping stone indicating how technologies are capable of driving social and moral acceptance values.

The above examples presuppose a rational vision of morality. Kant pushed the extremes of rationality through an “investigation and establishment of the supreme principle of morality.”⁴⁴ He argues for a theoretical split of reason from science, separating the empirical from the rational nature of science.⁴⁵ By isolating the purely rational aspect of the nature of science, Kant made the theoretical argument that laws of moral force are not contextually based. They are “not valid for men alone as if other rational beings had no need to observe it ... The basis of obligation must not be sought in the nature of man, or in the circumstances in the world in which he is placed, but a priori simply in the conception of pure reason.”⁴⁶ If context does not drive morality, how can humans, whose emotional existence is based in context, know pure morality?

⁴³ Gulf War Air Power Survey Staff, dr. Eliot A Cohen Director, *Gulf War Air Power Survey Volume V: A statistical compendium and chronology*, Washington DC 1993, pages 418, 513-514. And Benjamin S Lambeth “Chapter 5: Accomplishments of the War” in *NATOs Air War for Kosovo: A Strategic and Operational Assessment*, RAND 2001, 87-88. Of the 41,309 “strikes” during the Gulf War, 9,117 were hit with precision guided munitions for a total of 22%. The panel described a “strike” as a target hit by one or more sets of munitions. This comparison assumes strikes and aim points are relatively comparable. Of the 9,815 aim points in NATOs Air War for Kosovo, 64% were hit with precision guided munitions.

⁴⁴ Immanuel Kant, *Fundamental Principals of the Metaphysic of Morals*, 1785, as reprinted in Matthew Stapleton, The Project Gutenberg EBook of Fundamental Principals of the Metaphysic of Morals, May, 2004 [EBook #5682 translated by Thomas Kingsmill Abbott, 12. <http://manybooks.net/support/k/kantimma/kantimmaetext04ikfpm10iliad.pdf> (accessed April 21, 2012).

⁴⁵ Immanuel Kant, *Fundamental Principals of the Metaphysic of Morals*, 6.

⁴⁶ Immanuel Kant, *Fundamental Principals of the Metaphysic of Morals*, 7.

Kant argues that humans are capable of understanding practical pure reason but are “not so easily able to make it effective in concreto in his life.”⁴⁷ Humans are limited in reasoning ability. They do not comprehend the unconditional, that is, morality considered out of context, necessity of the moral imperative.⁴⁸ Kant’s extreme theoretical interpretation of morality raises questions concerning moral imperatives as rationalized by humans and ALEs. Are ALEs, as a purer form of rational actors, more capable than humans of understanding moral imperatives?

Shifting moral hazard

ALE use highlights two shifts of moral hazard. The first concerns Just War Theory and the second addresses a more fundamental theoretical question concerning the nature of war.

In 43 BCE Cicero addressed two of the primary principles of Just War. He acknowledged the just use of force as a last resort and that the only excuse “for going to war is that we may live in peace unharmed.”⁴⁹ Saint Tomas Aquinas codified modern Just War Theory around 1274 CE. Just War Theory is generally considered from two vantages, *jus ad bellum* (justification to go to war, also addressed as why we go to war) and *jus en bello* (just conduct in war or how we conduct war). Likewise, in May 1983, US Bishops outlined criteria to meet *jus ad bellum* and one for *jus en bello*.⁵⁰ Philosophers differ on the composition of each category but the intentions run consistent.

The first shift of moral hazard, an increased willingness to go to war because ALEs promise lessened human casualties on the user’s side,

⁴⁷ Immanuel Kant, *Fundamental Principals of the Metaphysic of Morals*, 8.

⁴⁸ Immanuel Kant, *Fundamental Principals of the Metaphysic of Morals*, 140.

⁴⁹ “The Church’s Tradition of Just War,” http://www.catholicpeacefellowship.org/downloads/just_war.pdf (accessed January 2012).

⁵⁰ “The Church’s Tradition of Just War,” 2. Referencing, US Bishops, *The Challenge of Peace May 3, 1983*, <http://old.usccb.org/sdwp/international/TheChallengeofPeace.pdf> 18-22 (accessed May 9, 2012), 18-22.

concerns the *jus en bello* principle. None of the seven *jus ad bellum* principles outlined by the Catholic Church are explicitly violated through the use of ALEs.⁵¹ However reducing the threshold of pain, through the use of ALEs, may alter the weighted perception of Just War criteria resulting in a greater willingness to go to war. Section 3.2.1 addresses the concern that ease of killing expands willingness to kill or lowers the threshold for proportionality or discrimination in killing.

Understanding the nature of war versus the character of war is critical to an understanding of the affects created by ALE systems. Clausewitz defined the nature of war as enduring while the character and conduct of war changed based on the nature of societies as well as the times and prevailing conditions. Societal conditions drive the character of war as well as the perception of moral hazard. Delineating between changed character and changed nature of war addresses the perception or realized negation of moral hazard.

The following *amicus curiae* brief addresses concerns of moral repercussions and the decline of military ethos:

Your Honor

Thank you for the invitation to address the subject of shifting moral hazards and ALEs. I understand the focus of the trial at hand surrounds accountability of actions and the legal standing of a machine. I wrote against the use of ALEs while attending the Air War College. My focus at the time was on how ALEs could change the character and possibly the nature of war and affect the military ethos. My

⁵¹ “The Church’s Tradition of Just War.” The US Bishops outlined the following seven criteria for a just war: just cause, competent authority, right intention, last resort, probability of success, proportionality, and comparative justice. An eight criteria of discrimination was placed on the conduct of soldiers in war.

underlying arguments rested on the erosion of just war principles related to the willingness to go to war as well as the changing character of war.

While these topics may not be driving considerations in your decision to assess legal standing, I ask that you keep these arguments in the forefront of your mind to ensure a whole picture view of the consequences of ALE technology. Applying legal standing to a machine will increase the moral distance between political decision makers and warriors and the consequences of our collective actions.

I do not dispute the possibility of an autonomous “computer system which solely relies upon its own internal programming and capabilities to conduct and execute all elements of the kill chain. Programmed with Rules of Engagement (ROEs), Law of Armed Conflict (LOAC), conventions, and heuristics, and ethical black box within the ALE system [that] independently evaluates each step of the kill chain and decides when and whether to engage an intended target with lethal force.”⁵² I even consider the use of ALEs as amoral in that morality does not reside in the means of killing. However, the act of an ALE killing, is “contrary to military ethics and detrimental to the military profession and thus should be prohibited.”⁵³

Our willingness to go to war is based on a formula that the damage inflicted plus the costs incurred must be approximate to the good expected.⁵⁴ ALE technology threatens *jus ad bellum* arguments because ALEs “limit the

⁵² Michael R. Contratto, “The Decline of Military Ethos and the Profession of Arms: An Argument Against Autonomous Lethal Engagements,” (submitted in partial fulfillment of requirements of the Air War College, Air University, February 2011), 2.

⁵³ Contratto, “Decline of Military Ethos and the Profession of Arms” 2.

⁵⁴ Contratto, “Decline of Military Ethos and the Profession of Arms” 5 (footnote).

risk to nations and their soldiers to such an extent that it significantly removes political barriers and lowers the bar for proper authorities to declare and enter war. The nuanced argument maintains that ALE would skew the arithmetic of proportionality such that force may not be used as a last resort...The opposing perspective is that from the tip of the phalanx, to a sniper at several hundred meters, to an unmanned aerial system operator sipping his coffee at Creech Air Force Base – isn't ALE simply the next evolutionary step in the pursuit of risk free war? For the military, the full impact of this question is better evaluated in terms of the overall context of the profession of arms and military ethos rather than *jus ad bellum*.”⁵⁵

The formula relating inflicted damage, incurred costs, and good expected, also links the rise of ALEs to the changing character, and possibly, the nature of war. The nature of war changes when ALEs replace human endeavors. “If robots accomplish our most dangerous and near impossible missions what then becomes the role and purpose of the soldier?”⁵⁶

The Clausewitzian nature of war is enduring so long as the human enterprise promulgates warfare.⁵⁷ “If professions are ‘quintessentially’ human institutions operating in areas ‘where humanity’s most profound concerns arise’ and we willingly relinquish the responsibility for the toughest decisions in our sphere of expertise,” what becomes of the nature of war?⁵⁸

⁵⁵ Contratto, “Decline of Military Ethos and the Profession of Arms,” 4,6.

⁵⁶ Richard Swain, “Reflection on an Ethic of Officership,” *Parameters* 38, no. 1 (Spring 2007), 15.

⁵⁷ This thesis author’s interpretation of the difference between a character and nature of warfare.

⁵⁸ Contratto, “Decline of Military Ethos and the Profession of Arms,” 15. Contratto quotes Don M. Snider, *Dissent and Strategic Leadership of the Military Professions*, February 2008, Strategic Studies Institute

I do not argue against the justification for legal standing of an ALE. I argue for the moral repercussions of such decision. We are faced with “challenging ethical dilemmas as technology forces [our] professions to decide if they are willing to relinquish their moral agency to autonomous agents. I maintain that relinquishing the moral responsibility for the endeavors that make us most human does not speak well for humanity.”⁵⁹ If you assign moral agency or legal standing to this ALE you will remove levels of morality and ethical responsibility from all professions reliant on autonomous systems to include the medical, legal, and military.⁶⁰

Respectfully yours,
Michael R. Contratto, Lt Col, USAF⁶¹

Shifts willingness to go to war?

Reuters reported in January 2012 that President Obama authorized “five times as many drone strikes as George W. Bush authorized in his second term in the White House,” raising the Pakistani death toll due to strikes from dozens a year to over a thousand in 2010.⁶² In 2011, reports of American drone strikes spread to Somalia and Libya. Rohde attributes the increase and spread of American drone attacks as a means for “cash-strapped officials” to “eliminate the United States’

online article at <http://www.strategicstudiesinstitute.army.mil/pdffiles/pub849.pdf>, 12. Contratto’s focus was on the erosion of professional institutions not on the changing nature of warfare. However his argument for the breakdown of professions and the changing nature of warfare both rest on the removal of humanity from the profession of arms.

⁵⁹ Contratto, “Decline of Military Ethos and the Profession of Arms,” 19-20.

⁶⁰ Contratto, “Decline of Military Ethos and the Profession of Arms,” 19-20.

⁶¹ The thesis author used artistic license to represent Lt Col Contratto’s argument.

⁶² David Rohde, “Reuters Magazine: The drone wars,” *Business and Financial News, Breaking US & International News on Reuters.com*, (January 26, 2012) <http://www.reuters.com/article/2012/01/26/us-david-rohde-drone-wars-idUSTRE80P11I20120126> (accessed on March 21, 2012).

enemies at little human, political, or financial cost.”⁶³ Rohde’s report highlights a concern that autonomous or remotely controlled systems increase both *the willingness to go to war* as well as the *willingness to stay at war*. The concern is not relevant to the legal standing argument of the ALE but it is a central concern for the responsibility and accountability of ALE development and use. Is it possible for a society to employ an ALE without easing the burden of killing and lowering the threshold for proportionality or discriminate killing?

Operation United Protector is an example of political desire to perpetrate violent action while minimizing risk to human and political capital.⁶⁴ In essence, a no fly zone is a method of exerting violent measures while minimizing *hurt* on the side of the executing nation. A small logical leap expands the reduction in *hurt* with the application of remotely controlled systems such as the USAF’s RPVs or the USA’s Big Dog. The logic follows that use of autonomous systems could decrease the *hurt* variable while also lowering empathy. Without empathy for the enemy or the potential for *hurt*, Clausewitz’s violence, chance, and reason could become skewed with reason diminishing and chance morphing into a non-human driven variable.

Has the *nature of war* changed? Redefining War?

Near the end of book one in *On War*, Clausewitz summarizes the nature and character of war. He cautions readers that “wars must vary with the nature of their motives and of the situation which give rise to them.”⁶⁵ He states that the most supreme act of judgment required of

⁶³ Rohde, “Reuters Magazine: The drone wars.”

⁶⁴ Lt Gen Ralph J Jodice II, *OUP CFACC, Op Unified Protector (OUP) Mission Brief*, as presented to the School of Advanced Air and Space Studies (February 2012).

⁶⁵ Carl Von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 88.

decision makers is to recognize, first, the character of war and warns against turning it into “something that is alien to its nature.”⁶⁶

After acknowledging that the character for each war is situationally dependent, Clausewitz summarizes the nature of war as conditional on “three tendencies [that] are like three different codes of law, deep-rooted in their subject and yet variable in their relationship to one another.”⁶⁷ The three tendencies are 1) blind natural force, the primordial violence that mainly concerns the people, 2) play of chance and probability within which the creative spirit of the commander and military are free to roam, and 3) reason, drawn from the government as an instrument of policy.⁶⁸ Therefore, so long as wars are composed of these three elements; force, chance, and reason, the nature of war is enduring. Regarding ALEs, the questions remains, does the addition of autonomous lethal systems into war change the elements, thereby altering the nature of war, or is this simply a case of understanding a different situation and thus a changed character of war? Analysis requires an examination of each element separately.

The first element, blind natural force, derives the passion of war from the primordial violence of a populous. Without a check, this violence will spiral towards theoretical absolute forms of war ending in the annihilation of at least one side. Passion of violent force affects war prior to the outbreak. It also serves as an endurance fuel for continued execution. This element is commonly known as *will of the people*.

At the juncture in time of the *Machine on Trial*, autonomous systems execute aspects of war through the application of force. They are

⁶⁶ Von Clausewitz, *On War*, 89

⁶⁷ Von Clausewitz, *On War*, 89.

⁶⁸ Von Clausewitz, *On War*, 89. Von Clausewitz dedicates “Book One” of his *On War*, to theoretical questions defining war. He switches between addressing war in the absolute theoretical form where both reason and chance are restricted allowing absolute force to drive war towards annihilation and a politically restricted limited version of reality where both chance and reason allow time and other considerations to limit war. He states on page 81 “Thus it follows that without any inconsistency wars can have all degrees of importance and intensity, ranging from a war of extermination down to simple armed observation.” Along these varying degrees it is the character, not the nature of war, that changes.

not the instigators of blind natural force therefore ALEs do not contribute to nor alter the human driven tendency of violence prior to the outbreak of war. Since ALEs execute in war they must alter the element of blind force in some manner. By reducing the number of humans involved in the conflict, it is reasonable to state that ALEs reduce the pain felt by the ALE supply State. State assets are still risked, therefore, some pain still feeds back to the populous affecting the will of the people. ALEs do not change the basic nature of war through the first element.

A complimentary argument supports ALE or stand-off weapons use as a means of increasing the capacity for restraint in war.⁶⁹ Clausewitz describes the tendencies of war to spiral into theoretical total war if the passion for violence is not restrained by reason. By decreasing the *hurt* felt by a nation employing ALEs, an argument exists that the passion for continued violence lessens allowing for a greater capacity for reason and thus restraint in war.

The second element of chance relates to the creative spirit and decisions of the military members across varying levels of conflict. ALE actions affect, but do not drive, strategic and operational levels of command. Unless the ALEs intentionally link the political, strategic, and operational plans of war, the ALEs do not affect the element of chance any more so than a foot soldier—that is, above the tactical level.⁷⁰ ALE actions are situationally driven. They adapt to tactical situations. Therefore, ALEs are relegated to define the character, not nature of war. ALEs do not change the basic nature of war through the second element.

⁶⁹ Dr. Everett Dolman raised the complimentary point during the thesis feedback process. He stated “the flip side of reducing pain, thus increasing willingness to use force, is the notion that since I am not feeling pain, I am not dominated by my passion to return fire upon those shooting at me or get revenge for a loved one lost, ALEs or stand-off weapons can increase the capacity for restraint in war.”

⁷⁰ The thesis author acknowledges that an Army Corporal can affect strategic policy through tactical actions but does not agree that this link makes for a “strategic corporal.” The difference lies with intent and replicated actions. This same basis is used to link ALE tactical, possibly even operational plans, to strategic effect without allowing for ALE strategic consideration.

Reason, derived from needs of the government that exceed annihilation of opponents, delineates the third nature of war element. As with the first and second elements, unless ALEs are the decision makers for going to or ending war, ALEs do not affect this element. Therefore, so long as humans cause war and decide when to start and end wars, ALEs do not change the nature of war, only the character.

The character of war, being situationally dependent, defines how we fight as well as who or what, not why we fight. Why we fight speaks to the nature of war. The nature of war is as enduring as the nature of humanity. Clausewitz points out, for example, that the art of war changed in the last decade of the eighteenth century. The blind force of the people affected the political reasoning of the government resulting in the French Revolution. Failure to identify the enduring nature of war, but changing character of the French government, cost other European nations primacy in war. "Transformation of the art of war resulted from the transformation of politics ... War is an instrument of policy. It must necessarily bear the character of policy and measure by its standards."⁷¹ Until ALEs intentionally create policy, ALEs do not affect the nature of war.

⁷¹ Von Clausewitz, *On War*, 609-610.

Chapter 4: Historical Legal Review

The life of the law has not been logic: it has been experience ... The law embodies the story of a nation's development through many centuries, and it cannot be dealt with as if it contained only the axioms and corollaries of a book of mathematics. In order to know what it is, we must know what it has been, and what it tends to become. We must alternately consult history and existing theories of legislation. But the most difficult labor will be to understand the combination of the two into new products at every stage. The substance of the law at any given time pretty nearly corresponds, so far as it goes, with what is then understood to be convenient; but its form and machinery, and the degree to which it is able to work out desired results, depend very much upon its past.

- Justice Oliver Wendell Holmes
Treaty on Common Law

The basis of law formation is declaration and precedence. Without clear guidance, hearings such as the *Machine on Trial* will be argued on analogous precedence. Four case studies follow as analogies for key arguments in *Machine on Trial*.

The recent US Supreme Court ruling on the rights of corporations represents movement of society towards recognizing the roles and protection of non-sentient entities, as legal persons, along the lines formerly limited to humans. A second case argues for legal standing based on moral agency. Following arguments for personhood or legal standing, the mantrap and landmine cases represent a sliding scale of acceptable discrimination for existing autonomous systems. The mantrap case requires increased discriminatory capability as well as flexibly for use of the autonomous system (only acceptable with physical occupation of a house or base). The US Government refuses to sign anti-land mine treaties. This indicates its willingness to maintain a non-discriminatory autonomous system for use in future conflicts.

For some purposes, corporations are persons.

- Retired Supreme Court Justice
John Paul Stevens

Defining Persons Analogies: Corporation Rights

The fate of the ALE rested upon agreement of one point. For the ALE to stand trial, able to be held accountable for actions, the ALE must hold standing in the eyes of the court. Such standing ensured a level of rights and responsibilities due to and from the ALE. One means of holding standing with the court is to have recognition as a person.¹ Recognition as a person with some level of rights should be enough to force a court decision in favor of granting standing and require the Plaintiff, or prosecutor in a criminal case, to prove their case against the ALE prior to a final verdict.

The ALE representative required an analogy to establish personhood and gain standing for the ALE. The representative knew that it was too great a leap to challenge societal acceptance of the ALE as an *equal* person, however, precedent existed to support a claim that different types of persons had different rights.² He needed to establish the ALE as a *type* of person. Without closing the door on sentience, the

¹ The issue of standing is typically examined by looking at whether or not the Plaintiff in a case has a personal stake in the outcome of a case. Normally the standing of the Defendant is assumed, because the Defendant will suffer the direct consequence of the court's decision. There are, however, some instances where it is not clear as to whether or not a Defendant has sufficient standing. A recent article by Professor Mathew I. Hall addresses the issue of the Defendant's standing and serves as a departure point for raising the issue of whether or not an ALE would have a sufficient stake in the outcome of a trial so as to satisfy the constitutional requirement for a party to have standing. See Matthew I. Hall, *Standing of Intervenor-Defendants in Public Law Litigation*, 80 Fordham L. Rev. 1539 (2012), <http://ir.lawnet.fordham.edu/flr/vol80/iss4/2> (accessed on 18 May 2012)

² *Citizens United v. FEC*, 130, S. Ct. Slip Op 876 (2010), available at <http://www.supremecourt.gov/opinions/09pdf/08-205.pdf> (accessed January 2012). Justice Stevens highlights this fact in his dissenting opinion of the *Citizens United* case heard in 2010. Additional support for this claim comes from the constitutional law differentiating natural born US citizens from naturalized US citizens and the associated rights to run for Presidential office. US rights are also differentiated by age (children are limited in rights until the age of maturity) and felony status.

representative sought a means to establish non-sentient personhood rights.

In 2010 the US Supreme Court ruled in *Citizens United v. FEC* that First Amendment rights of corporations are protected.³ The logic supporting this argument is the link that people and groups of people are protected under the First Amendment, therefore corporations are also protected. The implication is that corporations have legal standing as persons with constitutional protections. The ruling established no limitation to size, management, or liability requirements for the corporations. Moreover, the ruling solidified precedence for the protection of non-sentient entity rights.

Popular interpretation of the ruling resulted in opposing calls that “Corporations are not people. Democracy is for people.”⁴ A significant portion of the resentment towards this ruling stemmed from the apparent inequality of rights granted to corporate persons over individual persons concerning electoral campaign influence. *Citizens United* reduced the burdensome requirements for corporations to form Super Political Action Committees (PAC). Advocates viewed this as a loophole within campaign finance reform laws and limitations of undue influence. Super PACs, backed by individuals or companies, whose financial gains were made off the economic system and whose economic power far exceeds the average person of the state, have no limitations as to the influence gained from free speech paid for by Super PAC funding. Super PACs are viewed as both a corrective step designed to allow equal opportunity of free speech regardless of economic position, as well as a means of allocating greater rights to the wealthy and economically strong corporations over the average citizens. Opponents of the *Citizens United* decision question if this ruling allows economically wealthy corporations

³ *Citizens United v. FEC*, 130, S. Ct. Slip Op 876 (2010), <http://www.scotusblog.com/wp-content/uploads/2010/01/citizens-opinion.pdf> (accessed 18 May 2012)

⁴ *A People's Movement*, blog, <http://democracyisforpeople.org/> (accessed January 8, 2012).

to have *more* rights than the average citizen by allowing unequal (based on economic conditions) political influence through free speech. The point may be moot as the US Supreme Court has ruled that not all persons have the same rights.

The precedent of corporations as persons existed in state and federal law prior to the most recent US Supreme Court ruling. An 1818 case, *Trustees of Dartmouth College v. Woodward*, affirmed the application of the Contracts Clause of the Constitution to private corporations, suggesting that corporations had certain rights.⁵ The first claim of constitutional rights, the claim for 5th Amendment rights, of a corporation occurred in 1893 with the holding in *Noble v. Union River Logging Railroad Company*. In *Noble* the Court held that the Government action fell under the Fifth Amendment and entitled the Union River Logging Railroad Company to due process.⁶ The 1970 case of *Ross v. Bernhard* established the right of corporations to a jury trial, under the Seventh Amendment.⁷ Several court rulings in the 1970s firmed the precedent of constitutional amendment protection of corporations.⁸ Each of these cases supported the view that even a non-sentient entity

⁵ *Trustees of Dartmouth College v. Woodward*, 17 U.S. (4 Wheat.) 518 at 654 (1819), “[o]n general principles, that in these private eleemosynary institutions, the body corporate, as possessing the whole legal and equitable interest, and completely representing the donors, for the purpose of executing the trust, has rights which are protected by the constitution.” 17 U.S. (4 Wheat.) 518, at 654 (1819). See also *Reclaim Democracy Blog*, <http://reclaimdemocracy.org/personhood/#significant> (January 8, 2012).

⁶ *Noble v. Union River Logging R. Co.* 147 U.S. 165, 174 (1893) “revocation of the approval of the secretary of the interior, however, by his successor in office, was an attempt to deprive the plaintiff of its property without due process of law, and was, therefore, void.” (<http://caselaw.lp.findlaw.com/scripts/getcase.pl?court=US&vol=147&invol=165> accessed 18 May 2012).

⁷ *Ross v. Bernhard*, 396 U.S. 531, (1970) “the right to jury trial attaches to those issues in derivative actions as to which the corporation, if it had been suing in its own right, would have been entitled to a jury.” at 533.

⁸ Following the 1970 ruling supporting the right to jury trial, constitutional amendment rights for corporations were held up in several cases. *U.S. v. Martin Linen Supply Co.*, 430 U.S. 564 (1976), established 5th amendment protection from double jeopardy. In 1978, *Marshall v. Barlow's Inc.* 436 U.S. 347 (1978), safety inspectors were required to obtain search warrants under the 4th Amendment. Also in 1978, *First Nat. Bank of Boston v. Bellotti* established the right of a corporation to spend money intended to influence politics when a Massachusetts state law preventing corporate spending to influence elections was struck down *First Nat. Bank of Boston v. Bellotti*, 435 U. S. 765, 778 (1978). Notably one of the most significant decisions came from the Court in the 2010 *Citizens United v. FEC*. In a 5-4 vote the Justices struck down their previous holding in *Austin v. Michigan Chamber of Commerce* which had limited corporate political contributions. *Austin v. Michigan Chamber of Commerce*, 494 U. S. 652 (1990).

such as a corporation was entitled to the basic protections of a person under the Constitution and have an interest in the outcome of a case or controversy.

The concept of corporation personhood is further evident with the ruling in *Citizens United*. The Court invalidated restrictions under 2 U.S.C. § 441(b) because it banned campaign financial expenditures from individuals, unions, and corporations, because the Court interpreted this ban as impermissible under the First Amendment. Section 441(b) was not deemed invalid because it affected the rights of the individual, rather it was deemed invalid because it infringed on the First Amendment protection of free speech and “fail[ed] to serve any substantial governmental interest in stemming the reality or appearance of corruption in the electoral process.”⁹

The pivotal point of *Citizens United* stems from the continued acknowledgement and logic behind personhood status of corporations. The Court “rejected the argument that political speech of corporations or other associations should be treated differently under the First Amendment simply because such associations are not “natural persons.”¹⁰ Corporations are persons of associations with a “corporate form.”¹¹ The decision in *Citizens United* upheld the the Court’s previous ruling in *Buckley* and *Bellotti* that stated “the First Amendment principle that the Government cannot restrict political speech based on the speaker’s corporate identity.”¹² The logic inferred behind these statements is that the requirement to protect the rights of individual persons and associations of persons is greater than the need to define

⁹ *Citizens United v. FEC*, 130, S. Ct. Slip Op 876 (2010), citing *Buckley v. Valeo*, 424 U.S. 1 (1976) at 47-48.

¹⁰ *Citizens United v. FEC*, 130, S. Ct. Slip Op 876 (2010), citing *First Nat. Bank of Boston v. Bellotti* 435 U.S.765 (1978) at 776.

¹¹ *Citizens United v. FEC*, 130, S. Ct. Slip Op 876 (2010). In discussing the Court’s decision to strike down *Austin* it stated “If the anti distortion rationale were to be accepted, however, it would permit Government to ban political speech simply because the speaker is an association that has taken on the corporate form.”

¹² *Citizens United v. FEC*, 130, S. Ct. Slip Op 876 (2010).

the parameters of when personhood ends. The Court opted to consider all corporations as persons with First Amendment rights rather than break out for-profit, non-profit, or limited liability corporations. Justice Kennedy stated in the majority opinion that “We decline to adopt an interpretation that requires intricate case-by-case determinations to verify whether political speech is banned, especially if we are convinced that, in the end, this corporation has a constitutional right to speak on this subject.”¹³

According to *The Entrepreneur*, “a corporation is a body – it is a legal person in the eyes of the law. It can bring lawsuits, can buy and sell property, contract, be taxed, and even commit crimes. Its most notable feature: a corporation protects its owners from personal liability for corporate debts and obligations – within limits... The most common motivation for incurring the cost of setting up a corporation is the recognition that the shareholder is not legally liable for the actions of the corporation. This is because the corporation has its own separate existence wholly apart from those who run it.”¹⁴ The recognition that a corporation exists outside the liability and responsibility of the shareholders or the persons who created it seems contrary to the intention of the Supreme Court interpretation of corporations as persons. Since the Court cannot differentiate corporations closely associated with persons or association of persons, the Court has defaulted to categorizing all corporations as persons based on the connotation of associations of persons.

Considering the validity of a corporation’s personhood status even though it was created to ensure “its own separate existence wholly apart from those who run it,” personhood must be based on something other

¹³ *Citizens United v. FEC*, 130, S. Ct. Slip Op 876 (2010).

¹⁴ “Incorporating Your Business,” *Entrepreneur.com*, <http://www.entrepreneur.com/article/77730> (accessed February 2, 2012).

than an association with people.¹⁵ If constitutional rights extend to corporations, and the concept of constitutional rights extends beyond the rights of individuals, then a level of responsibility from those individuals is inferred.¹⁶ The right to free speech does not exist for the sole purpose of expressing thoughts; it exists to ensure people have the ability and thus the responsibility to speak freely concerning the actions of their government. A system of government created “of the people, for the people, and by the people,” requires action from the body of people to function.¹⁷ This action implies responsibility. This responsibility is protected so long as the person meets requirements such as citizenship and age. However, the responsibility is partially repealed for a convicted felon.¹⁸ A felon, by demonstrating a lack of responsibility, loses a corresponding portion of political rights. Therefore, the definition of a person must have some association with responsibility to society.

The ALE in question was created to secure liberties, enforce laws, and our national will. In doing so, the ALE demonstrated decision capability related to both discrimination and proportionality. If it is an entity, much like a corporation, that takes separate action “wholly apart from those who run it,” and whose actions, unlike a corporation, exist to demonstrate responsibility to society, shouldn’t it have legal standing?

¹⁵ “Incorporating Your Business,” *Entrepreneur.com*, <http://www.entrepreneur.com/article/77730> (accessed February 2, 2012).

¹⁶ *Reclaim Democracy Blog*, <http://reclaimdemocracy.org/personhood/#significant> (January 8, 2012). Following the 1970 ruling supporting the right to jury trial, constitutional amendment rights for corporations were held up in several cases.

¹⁷ President Abraham Lincoln, speech to dedicating the Gettysburg military cemetery, <http://www.whitehouse.gov/about/presidents/abrahamlincoln> (accessed January 2012).

¹⁸ Alan Ellis and Peter J. Scherr, “Federal Felony Conviction, Collateral Civil Disabilities,” The Law Office of Allan Ellis (Fall 1996), <http://www.alanellis.com/CM/Publications/federal-felony-conviction.asp> (accessed February 2, 2012). As an example, in *Beecham v. United States*, 114 S. Ct. 1669 (1994) it was held that even if the felon's civil rights have been restored under state law, federal firearms disabilities continue to apply to a person convicted of a federal offense.” Per the referenced site.

Standing and Moral Agent

The legality aspect of the main thesis rests on the concept of legal standing. Traditionally personhood is required for legal standing. The following *amicus* brief highlights consideration for standing based, not on personhood, but on moral agent.

Dear Sir,

I understand you are considering the legal standing of an ALE. I recognize the heavy burden of your decision and offer my humble perspective on the concept of moral agency as a means of lessening the considerations of spirituality, soul, consciousness, life, and other humanity centric versions of agency. It is my opinion that “robots are moral agents when there is a reasonable level of abstraction under which we must grant that the machine has autonomous intentions and responsibilities. If the robot can be seen as autonomous from many points of view, then the machine is a robust moral agent.”¹⁹ It is also my opinion that all moral agents must be afforded “corresponding rights and responsibilities.”²⁰

It seems to me that the heart of your issue is whether or not the machine on trial is morally culpable. I believe there are four considerations required to establish moral culpability. An entity must have moral value to be morally culpable. In 2006 I argued for two cases that place moral value on guide dogs. “The least controversial is to consider things that perform their function well have a moral value equal to the moral value of the actions they facilitate. A more

¹⁹ John P. Sullins “When is a Robot a Moral Agent?,” *International Review of Information Ethics* 6, (December 2006): 29

²⁰ Sullins, “When is a Robot a Moral Agent?” 29.

contentious claim is the argument that animals have their own wants, desires and states of well being, and this autonomy, though not as robust as that of humans, is nonetheless advanced enough to give the dog a claim for both moral rights and possibly some meager moral responsibilities as well.”²¹ At the time I was criticized for comparing a robotic tool to a living creature. The common view of autonomous robots in 2006 tended towards the telerobot concept. I am basing my argument, not on a telerobot, but on the philosophical subject of autonomous robots.²² With moral value assigned, the three remaining requirements for moral agency are: 1. Significant autonomy, 2. Intentional behavior, and 3. Position of responsibility to another moral agent.

“‘Autonomy’ is a difficult concept to pin down philosophically. I mean to use the term ‘autonomy’ in the engineering sense, simply that the machine is not under the control of any other agent or user. If this autonomous action is effective in achieving the goals and tasks of the robot, then we can say the robot has effective autonomy. Autonomy as described is not sufficient in itself to ascribe moral agency.”²³ I doubt many of us would ascribe moral agency to our Roomba vacuum cleaners though the robot may exceed the autonomous definition as described.

²¹ Sullins, “When is a Robot a Moral Agent?” 25.

²² Sullins, “When is a Robot a Moral Agent?” 25-26. Sullins defines a telerobot as “remotely controlled machines that make only minimal autonomous decisions.” The operator provides the intelligence for the machine such as the NASA Mars Rovers, telerobotic surgery, telerobotic nurses, Predator drones, and the Army SWORD. To bypass a “full discussion of the meaning of ‘autonomy’” as a philosophical subject, Sullins uses the roboticists definition: “autonomous robots must be capable of making at least some of the major decisions about their actions using their own programing.” This definition covers a robot vacuum cleaner deciding on a vacuum pattern to the moral and ethical reasoning of a robotic caregiver deciding the best way to interact with a patient.

²³ Sullins, “When is a Robot a Moral Agent?” 28.

The second requirement of intentionality requires enough complex behavior “that one is forced to rely on standard folk psychological notions of predisposition or ‘intention’ to do good or harm. There is no requirement that the actions really are intentional in a philosophically rigorous way, nor that the actions are derived from a will that is free on all levels of abstraction. All that is needed is that at the level of interaction between the agents involved, there is a comparable level of personal intentionality and free will between all the agents.”²⁴

A legal discussion of autonomous machines starts when the machine has both moral value and intentionality. These qualities, without a complex understanding of the robots role in the responsibility to another moral agent, are enough to make it “deserving of moral consideration, meaning that one would have to have a good reason to destroy it or inhibit its actions, but we would not be required to treat it as a moral equal.”²⁵ The ALE in your courtroom has demonstrated sufficient autonomy. Your insight and other experts must clarify if the intention requirement is met, perhaps by executing within the military necessities for target discrimination. Moral equality, based on an understanding of responsibility, will be the greater challenge.

The responsibility requirement relies on the concept of belief. “The beliefs do not have to be real beliefs, they can be merely apparent. The machine may have no claim to consciousness, for instance, or a soul, a mind, or any of the other somewhat philosophically dubious entities we ascribe to human specialness. These beliefs, or programs, just have

²⁴ Sullins, “When is a Robot a Moral Agent?” 28.

²⁵ Sullins, “When is a Robot a Moral Agent?” 29.

to be motivational in solving moral questions and conundrums faced by the machine. [An understanding of responsibility is met] when the robot behaves in such a way that we can only make sense of that behavior by assuming it has a responsibility to some other moral agent (s).”

I respectfully submit this amicus brief for your consideration.

John P. Sulliins²⁶
Assistant Professor, Philosophy Dept
Sonoma State University

Chapter 2 highlighted the legal focus on discrimination and proportionality. Proportionality deals with the means and the moderation of force with respect to balancing military necessity with destruction. Assuming the means are capable of being proportionate (in other words a thermonuclear warhead is not used against a city to obtain a meager military necessity) then proportionality tends to be examined after action. The following case studies focus on discrimination since discrimination first requires an ability to discriminate and then a decision process follows to consider proportionate response. The ALEs ability to obtain standing rests more on a capability to discriminate than on the moral or legal consequences of a proportionate result from the action in question.

Scale of Discrimination Analogy: Land Mines and Mantraps

The US currently maintains the ability to use autonomous lethal systems. The minimum use of discrimination capability does not reside with the development of an autonomous weapon system but rather with conditional necessity *to use* indiscriminate weapons. For example, anti-Personnel (AP) landmines represent *dumb* autonomous lethal systems. Once they are fielded AP landmines cannot discriminate based on

²⁶ The thesis author used artistic license to represent Professor Sulliins’ argument.

identification of victim nor is consideration given to current conditions and proximity of non-targeted entities. AP landmines were first used in large numbers during the Second World War. They were designed for area denial and to protect anti-tank mines.²⁷ Canada's Foreign Affairs and International Trade organization has stated, "Once mines are laid, they are completely indiscriminate weapons."²⁸ The indiscriminate nature of land mines spurred the 1990s International Campaign to Ban Landmines (ICBL). In 1997 a coalition of non-government organizations, who composed the ICBL, was awarded the Nobel Peace Prize for their role in establishing the *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction*, also known as the Ottawa Treaty. The US has not signed off on the illegal use of land mines—indicating willingness to use non-discriminatory methods if required.²⁹ Legal mantraps represent a class of autonomous weapons employed with a bit more discrimination

Mantraps, also known as booby traps, defend property and personnel. Some states within the US have recognized legal uses of mantraps as a means of home defense of occupied property.³⁰ Restricting the use of legal mantraps to occupied residences requires a minimal level of discrimination associated with perimeter defense of an occupied area. Restricting mantraps to personal property with warning signs passively

²⁷ Canadian Foreign Affairs and International Trade Organization, "When and Why have Land Mines Been Used," (March 16, 2012) <http://www.international.gc.ca/mines/background-apercu/use-mines-utilisation.aspx?lang=eng&view=d>. As (accessed on April 1, 2012).

²⁸ Annup Shah, "Landmines," *Global Issues: Social, Political, Economic, and Environmental Issues that Affect Us All* (November 27, 2009), <http://www.globalissues.org/article/79/landmines>

²⁹ Shah, "Landmines," *Global Issues*.

³⁰ Case Briefs, "*Katko v. Briney*, 197 N.W.2d 351, 1972 Iowa Sup.," <http://www.casebriefs.com/blog/law/torts/torts-keyed-to-dobbs/defenses-to-intentional-torts-privileges/katko-v-briney/> (accessed on May9, 2012). "The value of human life and limb both to an individual and as a matter of public policy outweighs the potential damage to property. Thus, while a defendant may use reasonable force in defense of her property, he has no right to willfully and intentionally injure a trespasser in a manner that may result in loss of life or great bodily injury. The only exception is when the trespasser is committing a violent felony with the potential of endangering human life." A mantrap cannot be used to protect property however a mantrap protecting an occupied dwelling protects the occupants from potential endangerment to human life. Additionally, the history of mantraps and spring guns is covered in Miller Christy, "Man-Traps and Spring-Guns," *Sports Library*, 41, http://la84foundation.org/SportsLibrary/Outing/Volume_41/outLXI06/outLXI06n.pdf (accessed May 9, 2012), 730.

addresses the identification aspect of discrimination. Potential victims are considered warned against entering private property therefore any violations and triggering of the mantrap is limited to persons violating the warnings.

The integration of autonomous systems into society challenges legal norms today.³¹ The related analogies presented above offer glimpses into legal standing arguments. Standing must be addressed prior to arguing the discriminate and proportional legality of the ALE's actions. Without precedence, a declarative judgment based on related analogies is required to determine standing.

The mantrap and landmine cases demonstrate the legal flexibility related to autonomous discrimination capability. These two examples pin one end of the discriminatory capability of autonomous systems. They are used to emphasize the distinctive evaluation criteria required for legal standing, separate from lethal autonomous discrimination capability. Therefore, the analogies presented for legal standing are applicable to standing determination for both non-lethal and lethal autonomous machines.

³¹ Sven A. Beiker and M Ryan Calo, "Legal Aspects of Autonomous Driving: The need for a legal infrastructure that permits autonomous driving in public to maximize safety and consumer benefit." *Center for Automotive Research at Stanford (CARS)* and the *Stanford University Center for Internet and Society (CIS)*, Stanford University Press (October 2010).

Chapter 5: Concluding Remarks

“Any sufficiently advanced technology is indistinguishable from magic.”

– Arthur C. Clarke’s Law

Judge Minos entered his courtroom and set eyes on the ALE. Am I staring at a machine or at life and is there a difference? The Judge wondered if Turing’s test had been passed.¹ After reviewing the nagging questions in his mind concerning the ethical justification backed by historical case studies and after exploring the social phenomenon that led to the current trial, Judge Minos decided that how one kills is less important than why one kills. Context matters.

The Ruling

One the basis of moral agency and unpredictable contextual circumstances, Judge Minos ruled in favor of legal standing for the ALE. Judge Minos was challenged with the question of “whether the robot is correctly seen as just another tool or is it something more, like the technology exemplified by the guide dog.” The Judge did not view working animals on the same level as humans but the Judge did understand the claim that “animals have their own wants, desires and states of well-being, and this autonomy, though not as robust as that of humans, is nonetheless advanced enough to give the dog a claim for both moral rights and possibly some meager moral responsibilities as well.” The machine in front of the Judge met the criteria for a moral agent. Through demonstrated discriminatory ability, the Judge deemed the ALE sufficiently aware of potential consequences related to its own actions to be legally accountable. Moral agent status combined with accountability formed the basis of Judge Minos’s declarative ruling for legal standing.

¹ Stanford Encyclopedia of Philosophy, “The Turing Test,” <http://plato.stanford.edu/entries/turing-test/> (First published Wed Apr 9, 2003; substantive revision Wed Jan 26, 2011. Accessed May 9, 2012)

*As with natural persons as well as corporate persons,
some have different rights than others do. Same rights
don't apply to everyone in every possible situation.*

- Retired Supreme Court Justice
John Paul Stevens

Accountability

Judge Minos also recognized the Pandora's Box opened by the declaration of legal standing. The declaration of legal standing implies a level of accountability within the legal system. Autonomous systems varied greatly in levels of autonomy. Not all autonomous systems are developed enough to have the capability to discriminate good from bad or consider the consequences of acting. Judge Minos predicted a varying level of accountability, similar to those used for cases involving children, as the legal framework for autonomous systems. Judge Minos was also concerned with the ability of the legal system to impose corrective measures on a machine. The law provides a framework to interpret wrongs and to inflict corrective actions or punishment. Is it possible to take physical, emotional, or economic repercussions from the ALE to execute legal corrective actions?

Punishment

Punishment falls in one of three lines: stalled life through incarceration, economic compensation, or loss of life through the death penalty.² All three punishments have parallels for an autonomous system. Incarceration of an autonomous machine would not require a physical prison. Assuming autonomous machines evolve through iterations of genetic type algorithms and interplay with advancing neural

² The author recognizes the distinction between criminal punishment and civil liability. Since the ALE is both a machine, subject to destruction by court order, and a quasi person, subject to civil liability, both civil liability and criminal punishment have been included in this discussion.

networks, prohibiting the code to advance for a set number of cycles is one concept for incarceration.

It is also possible to envision enacting economic compensation against autonomous systems. Assuming the autonomous system serves a company, a government, or other employer, the employers may opt to maintain use of the autonomous system by estimating a wage based on benefits provided by the ALE. Wage garnishment is then an option for compensation. Economic compensations are also possible through assigned labor to the party of interest. A third option for economic compensation arises from selling or scrapping the material and intellectual code of the autonomous system. Each of the economic considerations follows historical paths used for indentured humans unable to economically satisfy the debt.

To consider the death penalty applicable to autonomous machines, an aspect of the code must be considered as a form of life. Eradication of code unique to the autonomous system in question is a form of partial execution. The uniqueness of the machine is terminated. This punishment allows for the possibility of regrowth from a generic code or complete elimination. This same methodology applies to a line of autonomous machines. Depending on the depth of the punishment, destruction of the core code across all linked autonomous machines would punish the core and not the uniqueness of one machine. A third form of death punishment may take the form of destroying the body but not the *thinking* aspect of the autonomous machine. In this case a combination of incarceration (separation from physical form), economic compensation (one reason to maintain the thinking code may be to require work to compensate damaged parties), and a form of death by limiting physical interaction.

The Child Analogy and Sliding Persons Rights

The evolution of autonomous machines is an underlying assumption in this paper. It is also assumed that *thinking* requires adaptability and thus, for machines, computer evolution. The evolutionary state of an autonomous system challenges the legal system. A maturing child model also challenges the legal system and is thus a useful analogy.

Accountability for an autonomous *thinking* and *maturing* machine is analogous to a *thinking* and *maturing* child. Increased legal weight occurs with self-awareness and self-control (rights vary with age and mental capacity). A child, whose parents are divorcing, has varying levels of influence concerning custody often based on maturity. The right for US citizens to vote occurs at the maturity age of 18. At the federal level, some US rights are restricted based on demonstrated lack of self-control or as part of legal punishment. Forty-eight states within the US “ban voting by felons in prison or on supervision” regardless of age.³

³ Jonathan Martin, “Washington state felons should have voting rights, federal court rules,” *Seattle Times* (January 5, 2012), http://seattletimes.nwsources.com/html/localnews/2010708869_felons06m.html (accessed on April 25, 2012).

Conclusion

The intent of the AFMC question was to “think through some of the ethics and trust issues” of autonomous lethal system before research and development funds are heavily invested.¹ The proposed Machine on Trial case scratches the surface of these issues by examining one possible future. The ALE case is significant, though not unique, since it concerns accountability driven from the responsibility and authority to take life. An underlying assumption of the Machine on Trial case is that the legal standing trial is a significant and discrete legal jump. It does not account for probable incremental changes to the law concerning autonomous systems. Questions concerning legal accountability of autonomous machines are rising across several domains. Basic autonomous machines exist today. They sweep floors, manage the timing of assembly lines, and major automobile manufacturers have demonstrated levels of autonomous vehicles.

The Machine on Trial Case challenges the root assumptions of legal standing. Whether determined or socially constructed, technological advances allow for the possibility of machines existing with significant autonomy to question the legal foundations and the basis of trust within our society. Autonomous systems will not challenge current concepts of reliability or ethics related to justified reasons to go to war and actions within war. The reliability of autonomous systems is a quantifiable value. For a given probability, reliability sets a minimum threshold for prediction. Once quantified, systems exist to interpret reliability as it relates to success rate and predicted behavior. Reliability should not challenge autonomous systems.

The quantifiable manner of reliability does not pertain to questions of trustworthiness. Social norms are one area of influence related to

¹ Kevin Stamey, Director of Engineering AFPEO/ISR & SOF, email “Re: Regarding Autonomous Lethal Engagements,” (August 8, 2011).

trust. Shifting moral hazards also indicate shifts of trust. A moral hazard occurs when one moral agent, with assumed responsibilities, trusts that another moral agent has assumed risk on behalf of the first agent. The impression of trust creates a situation where the first moral agent may elect to change behavior due to a perceived shift of accountability.

US law is a fluid framework intended to adjust as society morphs. An assumption in this thesis is that ALEs will not change international relations. While accepting that the technology may allow for greater willingness to go war, it is assumed that ALEs will not decide when one state goes to war with another. Case studies presented in the thesis suggested that how societies kill (direct or indirect) is less critical in a legal sense than why societies kill. These case studies also suggest that the current legal framework, based on acceptable levels of discrimination and proportionality, are sufficient concerning autonomous systems. The legal crux to the AFMC question centers on accountability. Assuming autonomous systems are inherently different from a tool such as a hammer, the question of accountability must consider the autonomous system. Legal accountability requires legal standing.

Appendix A: Acronyms

DARPA – Defense Advanced Research Projects Agency

RPA – Remotely Piloted Aircraft

UA – Unmanned Aircraft

UAS – Unmanned Aircraft System

USAF – United States Air Force



Appendix B: Definitions

autonomous operation — In air defense, the mode of operation assumed by a unit after it has lost all communications with higher echelons. The unit commander assumes full responsibility for control of weapons and engagement of hostile targets. (JP 1-02) as stated in JP 1-02, page 29.

unmanned aircraft — An aircraft or balloon that does not carry a human operator and is capable of flight under remote control or autonomous programming. Also called **UA**. (JP 3-52) as stated in JP 1-02, page 359.

unmanned aircraft system — That system whose components include the necessary equipment, network, and personnel to control an unmanned aircraft. Also called **UAS**. (JP 3-52) as stated in JP 1-02, page 359.



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