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UNRAVELLING POWER DYNAMICS IN ORGANIZATIONS: AN ACCOUNTABILITY FRAMEWORK FOR CRIMES TRIGGERED BY LETHAL AUTONOMOUS WEAPONS SYSTEMS

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I. Introduction

The utilization of weapon systems operating on artificial intelligence software among the armed forces and non-state actors carries an inherent risk. To illustrate the inherent risk in artificial intelligence weapon systems, imagine a scenario that begins with the deployment of a robotic artificial intelligence weapon system to search for targets in an area. This robot, generally run remotely by an operator, uses artificial intelligence to switch from a human operator run mode to an autonomous mode without requesting permission from the operator. The programmer built the software to permit the robot to switch into an autonomous mode but only after obtaining prior authorization from the operator. The developer did not anticipate that the inherent complexity of the artificial intelligence software would enable the robot to switch into an autonomous mode without obtaining an authorization from the user. The scenario unfortunately ends when the robot misclassifies a civilian as hostile in the course of operating in an autonomous mode, and fires at the civilian.

The employment of artificial intelligence weapon systems that possess a degree of autonomy for lethal force tasks is awaiting to happen. Countries including South Korea, China, the United States, United Kingdom, Russia and Israel are developing this technology.[1] The investment into artificial intelligence technologies for peacetime use by countries such as Canada will speed up the creation of artificial intelligence weapon systems.[2] There is a credible possibility that such systems may carry out unlawful attacks as a result of performing in an unintended manner. The international community uses the term "lethal autonomous weapon system" or LAWS to denote this technology.[3] This article focuses on how international criminal law may respond to the challenge posed by the circulation of undependable LAWS. The approach reflects the fact that prosecutions are a central component of remedies for the victims.[4] It seeks to overcome the challenge that it is difficult to determine who or what should be held responsible when a complex artificial intelligence system brings about a war crime.[5]

States are employing the United Nations as a venue where to discuss how to regulate this emerging technology.[6] States agree that if LAWS are to be deployed, there has to be accountability when a LAWS performs in an unin-

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[1] Cesar Chelala, *The perverse rise of autonomous killer robots*, THE JAPAN TIMES (Oct. 16, 2015).

[2] Andy Blatchford, *Ottawa's artificial intelligence push has some concerned over "killer robots"*, THE CANADIAN PRESS (Mar. 31, 2017).

[3] The United Nations Office at Geneva, *Group of Governmental Experts on Lethal Autonomous Weapons Systems* (2013), https://www.unog.ch/80256EE600585943/(httpPages)/8FA3C2562A60FF81C1257CE500393DF6?OpenDocument.

[4] Thompson Chengeta, *The Challenges of Increased Autonomy in Weapon Systems: in Search of an Appropriate Legal Solution* 184 (Nov. 10, 2015) (unpublished LL.D dissertation, Pretoria University) (on file with UPSpace Library, University of Pretoria).

[5] *Downloading Decision: Could machines make better decisions for us?*, CBC RADIO (Jul. 12, 2017), http://www.cbc.ca/radio/ideas/downloading-decision-could-machines-make-better-decisions-for-us-1.3995678.

[6] The Convention on Certain Conventional Weapons [CCW] 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems [LAWS] (Apr. 11-15, 2016), http://www.unog.ch/80256EE600585943/(httpPages)/37D51189AC4FB6E1C1257F4D004CAFB2?OpenDocument.

tended manner and triggers an international crime.[7] Although states have not defined the term LAWS, their branches of government have enacted regulations relating to LAWS.[8] For instance, the U.S. Department of Defense Directive 3000.09 defines an autonomous weapon system as, "[a] weapon system that, once activated, can select and engage targets without further intervention by a human operator."[9] Italy's proposed definition adds another dimension. It defines a LAWS as a system that adapts to changing environment "independently of any pre-programming" and does not execute a set of pre-programmed instructions.[10] Rather, a LAWS will reach decisions on the basis of its rules and on the basis of learning from being exposed to battlefield scenarios.[11] The United Nations will continue the discussion of regulation including issues like banning models which autonomously select and engage targets without "meaningful human control."[12]

LAWS differ from current weapon systems in that they draw inferences from encountered scenarios to establish the nature of the proposed target. Presently, most states favor a proposal for human operators to retain "meaningful control" over LAWSs.[13] To determine issues of criminal accountability in cases where a

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[7] Daily FT, *Sri Lanka cautions autonomous weapons could compel states to abandon restraint and ignite on arms race*, DAILY FT, (Apr. 18, 2015), http://www.ft.lk/article/407897/Sri-Lanka-cautions-autonomous-weapons-could-compel-states-to-abandon-restraint-and-ignite-an-arms-race; Delegation of Switzerland, Statement by the Delegation of Switzerland to the Conference on Disarmament, CCW 2016 Informal Meeting of Experts on LAWS (Apr. 11-15, 2016) https://www.unog.ch/80256EDD006B8954/(httpAssets)/29BA73179A848FF5C1257F9C0042FD40/$file/2016.04.11_LAWS+CCW+General+Debate+Switzerland_as+read.pdf; Delegation of Germany, German General Statement, Statement by the Delegation of Germany to the Conference on Disarmament, CCW 2016 Informal Meeting of Experts on LAWS (Apr. 11-15, 2016), https://www.unog.ch/80256EDD006B8954/(httpAssets)/1A10EE8317A92AA4C1257F9A00447F2E/$file/2016_LAWS+MX_Towardaworkingdefinition_Statements_Germany.pdf [hereinafter Statement of Germany].

[8] Michael W. Meier, Delegation Head of the Permanent Mission of the U.S. to the U.N., U.S. Delegation Opening Remarks at CCW 2016 Informal Meeting of Experts on LAWS (Apr. 13, 2016), https://www.unog.ch/80256EDD006B8954/(httpAssets)/EFF7036380934E5EC1257F920057989A/$file/2016_LAWS+MX_GeneralExchange_Statements_United+States.pdf.

[9] U.S. DEP'T OF DEF., DEP'T OF DEF. DIRECTIVE 3000.09: AUTONOMY IN WEAPON SYSTEMS 13 (Nov. 21, 2012), https://www.hsdl.org/?view&did=726163 [hereinafter DEP'T OF DEF. DIRECTIVE].

[10] Delegation of Italy, Towards a Working Definition of LAWS, Statement by the Delegation of Italy to the Conference on Disarmament, CCW 2016 Informal Meeting of Experts on LAWS (Apr. 11-15, 2016), https://www.unog.ch/80256EDD006B8954/(httpAssets)/06A06080E6633257C1257F9B002BA3B9/$file/2016_LAWS_MX_towardsaworkingdefinition_statements_Italy.pdf [hereinafter Statement of Italy].

[11] *Id.* at 1-2.

[12] Mark Prigg, *U.N. to Debate 'Killer Robot' Ban Next Year as Experts Warn Time is Running Out to Stop A.I. Weapons,* Daily Mail (Dec. 16, 2016, 2:50 PM), http://www.dailymail.co.uk/sciencetech/article-4042146/UN-debate-killer-robot-ban-year-experts-warn-time-running-stop-AI-weapons.html.

[13] The degrees of proposed supervision range from the operator carefully selecting in what geographical area to employ a LAWS and what types of targets it should search for to the operator intervening to override the system's assessment to prevent unlawful attacks. Delegation of Israel, Statement on Lethal Autonomous Weapons Systems (LAWS), CCW 2016 Informal Meeting of Experts on LAWS (Apr. 11-15, 2016) [hereinafter Statement of Israel], http://www.unog.ch/80256EDD006B8954/(httpAssets)/AB30BF0E02AA39EAC1257E29004769F3/$file/2015_LAWS_MX_Israel_characteristics.pdf; Statement of Germany, *supra* note 7; Statement of Italy, *supra* note 10; Delegation of the United Kingdom, Statement to the Informal Meeting of Experts on Lethal Autonomous Weapons Systems, CCW 2016 Informal Meeting of Experts on LAWS (Apr. 11-15, 2016), https://www.unog.ch/80256EDD006B8954/(httpAssets)/49456EB7B5AC3769C1257F920057D1FE/$file/2016_LAWS+MX_GeneralExchange_Statements_United+Kingdom.pdf [hereinafter Statement of United Kingdom]; Delegation of Canada, Déclaration

LAWS unlawfully employs lethal force, states look to the Geneva Conventions of 1949.[14] The Geneva Conventions of 1949 require states to take penal measures to punish individuals who committed "grave breaches of the Conventions or who ordered such grave breaches to be committed."[15] The grave breaches of the Geneva Conventions of 1949 amount to the commission of war crimes under customary international law.[16] An example of a war crime is the violation of the principle of distinction.[17] The principle of distinction requires the parties to the conflict to distinguish "at all times" between the civilian population, individuals who take a direct part in hostilities and combatants on the one hand, and between civilian objects and military objectives on the other hand.[18] LAWS could target a civilian or a combatant *hors de combat* in an unanticipated or unreliable manner.[19] A LAWS could target a civilian or a combatant *hors de combat* for numerous reasons. It could construe incorrectly the situation in front of it.[20] The pieces of code could interact in an unpredictable way.[21] A LAWS could perform in a manner the programmers did not anticipate or due to a LAWS otherwise functioning in an unreliable manner.

Individual criminal responsibility is separate from state responsibility.[22] The two regimes have different functions, address different subjects and apply different legal standards.[23] State responsibility focuses on the obligations a state owes

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Nationale Du Canada, Statement by the Delegation of Canada to the Conference on Disarmament, CCW 2016 Informal Meeting of Experts on LAWS (Apr. 11-15, 2016) https://www.unog.ch/80256EDD006B8954/(httpAssets)/3B4959531DA33F78C1257F920057C4A5/$file/2016_LAWS+MX_GeneralExchange_Statements_Canada.pdf [hereinafter Statement of Canada]; Dustin A. Lewis et al., WAR-ALGORITHM ACCOUNTABILITY (2016), http://blogs.harvard.edu/pilac/files/2016/09/War-Algorithm-Accountability-Without-Appendices-August-2016.pdf [hereinafter War Algorithm Accountability].

[14] War Algorithm Accountability, *supra* note 13 at 88-89.

[15] Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field art. 41, Aug. 12, 1949, T.I.A.S. No. 3362; Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea art. 50, Aug. 12, 1949, T.I.A.S. No. 3363; Geneva Convention (IV) Relative to the Protection of Civilian Persons in Time of War art. 146, Aug. 12, 1949, 75 U.N.T.S. 287.

[16] JEAN-MARIE HENCKAERTS & LOUISE DOSWALD-BECK, CUSTOMARY INTERNATIONAL HUMANITARIAN LAW VOLUME I: RULES 568 (2005).

[17] Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I) art. 85(3)(a), Jun. 8, 1977, 1125 U.N.T.S. 3 [hereinafter AP I 1977]; Rome Statute of the International Criminal Court art. 8(2)(b)(i) and art. 8(2)(e)(i), Jul. 17, 1998, 2187 U.N.T.S. 90, (this is the case for both international and non-international armed conflicts).

[18] AP I 1977, *supra* note 17, at art. 48.

[19] Bonnie Docherty, *Losing Humanity: The Case Against Killer Robots*, HUMAN RIGHTS WATCH 31-32 (Nov. 19, 2012), https://www.hrw.org/report/2012/11/19/losing-humanity/case-against-killer-robots.31-32 (*e.g.* construing incorrectly the situation in front of it) [hereinafter Docherty].

[20] Docherty, *supra* note 19.

[21] Jason Borenstein et. al., *International Governance of Autonomous Military Robots*, XII COLUM. SCI. & TECH. L. REV. 272, 283-84 (2011), http://www.stlr.org/cite.cgi?volume=12&article=7.

[22] Int'l Law Comm'n, *Comment. 1 to Art. 58 Draft Articles on Responsibility of States for Internationally Wrongful Acts 2001*, Rep. of the Fifty-third Session of the Int'l Law Comm'n, U.N. Doc. A/CN.4/SER.A/2001/Add.1 (Vol 2 Part 2) (2001) [hereinafter International Law Commission].

[23] Beatrice I. Bonafé, THE RELATIONSHIP BETWEEN STATE AND INDIVIDUAL RESPONSIBILITY FOR INTERNATIONAL CRIMES 237 (2009) [hereinafter Bonafé].

to other states (and in the case of the protection of basic rights to the international community as a whole).[24] A state that commits a wrongful act by violating its international obligations is obligated to make reparations; including compensation.[25]

On the other hand, international criminal law is designed to deter violations of the states' fundamental values by holding individuals criminally responsible for acts amounting to an international crime.[26] In addition to deterrence, there is a desire to signal that the rights of the victim matter and to restore the victims a wholesome state.[27] Of course, in practice there is an overlap between state responsibility and international criminal law when a state breaches a peremptory norm, such as the international humanitarian law (hereinafter IHL) principles.[28] In failing to comply with IHL, a state breaches its obligation to the international community as opposed to the injured state alone.[29]

Not only is the contextualization of LAWS liability important, but the determination of available remedies is also key. From its inception, the technology of LAWS has challenged our existing conception of lawful remedies. Scholars continue to debate about whether international criminal law, state responsibility or domestic tort law is a superior framework for regulation, especially when regulating instances where a LAWS brings about an unlawful killing.[30] Another area of inquiry is to which actors accountability can be ascribed under international criminal law when a LAWS triggers a war crime.[31] The question presented is whether the operator, the procurement official at the Department of Defense (or a similar body), the developer, the manufacturer or a combination of these actors is liable.[32]

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[24] International Law Commission, *supra* note 22, at Comment. 4 to Art. 58.

[25] *Id.* at Comment. 3 to Art. 1; *See* The Factory at Chorzow (Ger. v. Pol.), 1928 P.C.I.J. (ser. A) No. 17 (Sept. 13, 1928), http://www.worldcourts.com/pcij/eng/decisions/1928.09.13_chorzow1.htm [hereinafter Ger. v. Pol.].

[26] *See generally* M. CHERIF BASSIOUNI, INTRODUCTION TO INTERNATIONAL CRIMINAL LAW (2nd ed. 2012).

[27] Bonnie Docherty, *Mind the Gap: the Lack of Accountability for Killer Robots*, HUMAN RIGHTS WATCH (Apr. 9, 2015), https://www.hrw.org/report/2015/04/09/mind-gap/lack-accountability-killer-robots; *See generally* Dinah Shelton, *Remedies in International Human Rights Law* 10 (2005).

[28] International Law Commission, *supra* note 22, at Comm. 4 to Art. 58.

[29] Bonafé, *supra* note 23, at 238.

[30] Rebecca Crootof, *War Torts: Accountability for Autonomous Weapons*, 164 U. PA. L. REV. 1347, at 1393 (2016); Thompson Chengeta, *The Challenges of Increased Autonomy in Weapon Systems: in Search of an Appropriate Legal Solution 184* (Nov. 10, 2015) (unpublished LL.D. dissertation, Pretoria University) https://repository.up.ac.za/bitstream/handle/2263/52365/Chengeta_Challenges_2015.pdf;sequence=1 [hereinafter Chengeta].

[31] Tim McFarland & Tim McCormack, *Mind the Gap: Can Developers of Autonomous Weapons Systems be Liable for War Crimes?*, 90 I'NTL L. STUD. 361, 376 (2014) [hereinafter McFarland]; Lambèr Royakkers & Peter; Olsthoorn, *Military Robots and the Question of Responsibility*, 5 I'TNL J. OF TECHNOETHICS 1, 5-6 (2014); Benjamin Kastan, *Autonomous Weapon Systems: A Coming Legal Singularity?*, 1 J. OF L.TECH. AND POL'Y 45, 78 (2013); Vivek Sehrawat, *Autonomous weapon system: Law of armed conflict (L.O.A.C.) and other legal challenges*, 33 COMPUTER L.& SEC. REV. 38, 49 (2017).

[32] McFarland, *supra* note 31; Thilo Marauhn, C.C.W. Expert Meeting on Lethal Autonomous Systems, An Analysis of the Potential Impact of Lethal Autonomous Weapons Systems on Responsibility and Accountability for Violations of International Law (May 2014), http://www.unog.ch/80256EDD00

Scholars offer different answers to these questions. The International Committee of the Red Cross posits that a State bears international responsibility where the state inadequately tested the LAWS prior to fielding it or where the state conducted insufficient review for compliance of such systems with IHL.[33] Scholar Daniel Hammond favors a system where the states use the rules on state responsibility to claim compensation for pain and suffering for the victims from the state which employed LAWS instead of prosecutions.[34] In cases where an operator or commander was not acting intentionally or negligently, he argues, a moral standpoint, that the state is the most blameworthy actor by virtue of deciding whether to acquire LAWS for the armed forces.[35] Similarly, scholar Rebecca Crootoff believes that state responsibility is a superior mechanism to individual criminal responsibility because it is more effective at preventing LAWS performing unjustifiably.[36] States are in the best position to ensure that the armed forces employ LAWS in compliance with IHL.[37] In contrast, scholar Thompson Chengeta argues that individual criminal responsibility and state responsibility are complementary and important "in their own right."[38]

It is important to prosecute individuals for the commission of a war crime concurrently with conducting proceedings against the state at the International Court of Justice. Prosecutions will discourage non-state actors from developing unreliable LAWSs and will deter government officials from procuring such technologies. Importantly, states will signal that the employment of unreliable technologies affronts the values of the international community by initiating proceedings for having committed a wrongful act against states which employ flawed LAWS. Moreover, the proceedings against the state provide remedies, such as compensation, to the loved ones suffering from the loss of an individual at the arms of a defective LAWSs.[39]

This article focuses on how international criminal law may respond to the challenge posed by the circulation of undependable LAWSs. It disputes that current doctrines, such as the doctrine of command responsibility, make it possible to link the performance of LAWS to a particular individual. One of the reasons is that the nature of authority a weapon manufacturer exercises over a LAWS differs from that the doctrine of command responsibility envisages. The knowledge about how power is exercised is used to develop an accountability test to impute

6B8954/(httpAssets)/35FEA015C2466A57C1257CE4004BCA51/$file/Marauhn_MX_Laws_Speaking Notes_2014.pdf; Andreas Matthias, *The responsibility gap: Ascribing responsibility for the actions of learning automata*, 6 ETHICS AND INFO. TECH. 175, 175 (2004) [hereinafter Matthias].

33 Int'l Comm. of the Red Cross, INTERNATIONAL HUMANITARIAN LAW AND THE CHALLENGES OF CONTEMPORARY ARMED CONFLICTS, 32IC/15/11 (Dec. 8-10, 2015), https://reliefweb.int/report/world/international-humanitarian-law-and-challenges-contemporary-armed-conflicts-32ic1511.

34 Daniel N. Hammond, Autonomous Weapons and the Problem of State Accountability, 15 CHI. J. OF INT'L L. 652, 669-670 (2015).

35 *Id.* at 670.

36 Crootof, *supra* note 30, at 50.

37 *Id.*

38 Chengeta, *supra* note 30, at 244.

39 Ger. v. Pol., *supra* note 25.

responsibility to various types of non-state actors who are likely to be involved in designing and manufacturing LAWS as well as to procurement officials. The non-state actors include corporations, armed groups and terrorist cells. The premise behind the discussion is that parties to the armed conflict and software developers exercise control and power over computer code on which LAWSs operate.[40] More fundamentally, the article examines how we should think of attribution in circumstances when 1) multiple teams in a single organization or numerous organizations are involved in the decision of how to design a LAWS, 2) the designer of a LAWS operates in an amorphous organizational structure as in the case of a terrorist cell, and 3) there are multiple actors who potentially have control over a LAWS.[41] This discussion will contribute to the understanding of why the doctrine of command responsibility struggles to capture within its reach the conduct of individuals who belong to terrorist cells and how international criminal law can govern the conduct of non-state actors more effectively.

Under the proposed framework, accountability is attributed to an individual or group of individuals in a leadership position who had a "substantial" or "significant" role in the decision to develop a LAWS, and in designing governance and operational structures to enable the development of LAWS. The programmer heading the team of programmers is responsible when Cassandra Steer's test is met; namely, when he or she has "control over the deliberative process of the collective" relating to the robot's software.[42] Finally, operators are liable if they had a "material" ability to acquire notice that a LAWS was about to bring about an international crime as a result of supervising the system's performance and to terminate the mission.

Section 1 explains what design LAWS are likely to have in order to lay groundwork for discussing why it is difficult to attribute the performance of LAWS to a particular individual. Moreover, this background is crucial for analyzing whether LAWS should be treated as a weapon system or is closer to a human subordinate. If LAWS can be analogized to a human subordinate, then the doctrine of command responsibility may extend to the interface between a developer, an operator and LAWS. Section 2 illuminates under what circumstances LAWS may be analogized to a weapon system and when it should be characterized as a unique category.

Section 3 argues that the definition of a superior-subordinate relationship in the doctrine of command responsibility does not capture the nature of the inter-

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[40] The paper extends the work of scholars Tim McFarland and Tim McCormack, who identify developers as having control over a LAWS due to the execution of the software dictating how the control system manages sensors and weapons. The two authors do not comment on how attribution can be made to particular individuals. McFarland, *supra* note 48, at 381; Gabriella Blum, Dustin Lewis and Naz Modirzadeh argue that parties to the armed conflict and software developers express authority and power over computer code on which LAWSs operate. Unfortunately, they do not explain or justify their position in any detail. NAZ K. MODIRZADEH, GABRIELLA BLUM & DUSTIN A. LEWIS, WAR-ALGORITHM ACCOUNTABILITY 1 (2016).

[41] McFarland, *supra* note 31.

[42] CASSANDRA STEER, RANKING RESPONSIBILITY? WHY WE SHOULD DIFFERENTIATE BETWEEN PARTICIPANTS IN MASS ATROCITY CRIMES 34 (Amsterdam Ctr. Int'l. L. 2013).

face an operator, a programmer, a corporate director and a procurement official have with LAWS.

Section 4 links the war crime a LAWS triggers to the head programmer, senior officials in a corporation or another non-state entity, senior officials in government agency responsible for designing a robot, procurement officials and operators. To achieve this, the exercise of power in corporations, the armed forces, armed groups and terrorist cells is examined from an interdisciplinary perspective. Section 5 formulates the legal framework for locating accountability.

I. How Lethal Autonomous Weapons Systems will be Designed and will Operate

LAWS operate on a different set of principles than conventional weapon systems.[43] Understanding the functionality of LAWS is essential when differentiating between the nature of control operations have over LAWS and over conventional weapons. In turn, the nature of control an operator has over LAWS determines whether he or she may be held accountable when LAWS triggers a war crime. More broadly, the knowledge of how a LAWS functions provides a framework for investigating the difficulties in attributing performance malfunctions to programmers or to a manufacturing organization's leader. It provides a background for thinking about how we should conceptualize of attribution in the robotic context.

According to Israel, "[It] would be difficult, if at all possible, at this stage, to predict how future LAWS would look like, and what their characteristics, capabilities and limitations will be."[44] One of the approaches to enabling a machine to learn from experience is to emulate how brain cells, known as neurons, operate in the human brain.[45] Neurons communicate with one another and form networks in order to store particular information.[46] When new information is added, the architecture of the neural network and the strength of individual connections between neurons is modified.[47] As the machine is exposed to new scenarios, it gradually adjusts the weight it assigns to the connections between the neurons.[48] The manufacturer exposes the machine to real-life scenarios until it conducts itself in the desired manner.[49] Creating a large dataset with many possible scenarios enables the neural network to recognize objects.[50]

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[43] Jean-Baptiste Jeangene Vilmer, *Autonomous weapon diplomacy: the Geneva debates*, ETHICS & INT'L AFFAIRS (2016).

[44] Statement of Israel *supra* note 13, at 2.

[45] Nat'l Inst. of Neurological Disorders, *The Life and Death of a Neuron*, NEUROLOGICAL DISORDERS AND STROKE (2015), https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Life-and-Death-Neuron; Matthias, *supra* note 32, at 178.

[46] Bruno Dubuc, *Plasticity in Neural Networks*, THE BRAIN FROM TOP TO BOTTOM (2016), http://thebrain.mcgill.ca/flash/d/d_07/d_07_cl/d_07_cl_tra/d_07_cl_tra.html.

[47] Matthias, *supra* note 32, at 178.

[48] *Id.* at 179.

[49] *Id.*

[50] Siddhartha Mukherjee, *A.I. Versus M.D.: What Happens When Diagnosis is Automated?*, THE NEW YORKER (Apr. 13, 2017), http://www.newyorker.com/magazine/2017/04/03/ai-versus-md.

Programmers combine neural networks with more traditional computing tools, such as the Monte Carlo tree algorithm.[51] The Monte Carlo algorithm involves a computer selecting a move based on a randomly selected sample, assigning weight to successful moves and using a tree to depict all possible decisions.[52] By estimating the likely result a particular move will produce, the program emulates abstract thinking.[53] The program AlphaGo won three times when it played an Asian strategic board game Go against Lee Sedol, considered one of the best players in the world.[54] Go players try to surround their opponents or to capture stones.[55] Significantly, AlphaGo conceptualized moves that no human player had previously thought about.[56]

The principles on which LAWS functions is distinguishable from traditional weapon systems and materiel.[57] To illustrate, unmanned aerial vehicles, or drones, relay specific information to the operators.[58] This information includes: 1) video footage of the unfolding events, and 2) information sensors, such as heat-detecting infra-red equipment, gather.[59] Remotely located pilots interpret the information the drone equipment transmits to determine whether it is lawful to target a particular individual or an object.[60] LAWS will scan their database to assess whether the characteristics of the object or individual in front of them match particular profiles.[61] When working properly, these systems mimic "abstract thinking" and develop a military strategy.[62] The fact that LAWS will carry out cognitive tasks operators previously undertook raises the question whether

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51 Erik Leijon, *How AlphaGo (and Two McGillians) Made A.I. History*, McGill News (2016), http://web.archive.org/web/20160328164337/http://publications.mcgill.ca:80/mcgillnews/2016/03/22/how-alphago-and-two-mcgillians-made-ai-history.

52 Guillaume Chaslot et al., *Monte-Carlo Tree Search: A New Framework for Game AI*, *in* Proceedings of the Fourth Artificial Intelligence and Interactive Digital Entertainment Conference, 216-17 (Chris Darken & Michael Mateas eds., 2008).

53 *Id.* at 216.

54 Leijon, *supra* note 51.

55 *Id.*

56 *Id.*

57 Hammond, *supra* note 34.

58 Defense Committee, *Written Evidence from Prof. Nicholas Wheeler*, U.K. HC 772 (2013).

59 Precisely Wrong: Gaza Civilians Killed by Israeli Drone-Launched Missiles 4-5 (2009); Human Rights Watch & Marc E. Garlasco, Precisely Wrong: Gaza Civilians Killed by Israeli Drone-launched Missiles (June 30, 2009), https://www.hrw.org/report/2009/06/30/precisely-wrong/gaza-civilians-killed-israeli-drone- launched-missiles.

60 Matthew Power, *Confessions of a Drone Warrior*, GQ (Oct. 22, 2013), https://www.gq.com/story/drone-uav-pilot-assassination; Milan Vego, Joint Operational Warfare Theory and Practice, 66-67 (Naval War College Press 2009).

61 Markus Wagner, *Taking Humans Out of the Loop: Implications for International Humanitarian Law*, 21 J.L. Info. & Sci. 155, 161 (2011).

62 Leijon, *supra* note 51; M.B. Reilly, *Beyond video games: New artificial intelligence beats tactical experts in combat simulation*, UC Magazine (June 27, 2016), http://magazine.uc.edu/editors_picks/recent_features/alpha.html (According to the retired United States Air Force Colonel Gene Lee, who played against software Alpha in a simulated battlefield scenario, "I was surprised at how aware and reactive it [Alpha] was. It seemed to be aware of my intentions and reacting instantly to my changes in flight and my missile deployment. It knew how to defeat the shot I was taking. It moved instantly between defensive and offensive actions as needed.").

the nature of control an operator has over LAWS resembles a relationship between a superior and a subordinate.

Likewise, LAWS differ from current weapon systems because their mechanism of operation is fluid. As a result, programmers have limited foreseeability about how LAWS will perform in any given situation.[63] In contrast, non-autonomous weapons, such as landmines, follow a predefined set of rules and function in a predictable manner.[64] The artificial intelligence programming tool of genetic algorithm will now be used to demonstrate the malleable nature of software which enables the machine to learn.[65]

Genetic algorithms involve a program programming itself.[66] The program selects symbols and creates a chain through trial and error to create a solution to the presented problem.[67] The program subsequently evaluates whether the sequence of symbols is a suitable solution.[68] The computer rearranges the symbols until it reaches a point where it assesses that a combination of symbols provides appropriate solution to a problem.[69] The advantage of a self-programming system is that it can function in an environment that is constantly changing and where the information about the unfolding events is incomplete.[70] An outcome of this capability, however, is that the programmers and users may not foresee all possible ways in which a system may assess a scenario and how the system will reorganize its program subsequently.[71]

The lack of foreseeability regarding how LAWS will carry out the task an operator assigns to it is compounded by two factors. First, machines that learn from experience will rely on making probabilistic inferences in order to identify targets.[72] When faced with a particular situation, a machine will compare the probability of two competing hypotheses; for instance the likelihood that the object is a civilian object and the likelihood that the object is a military objective.[73] It will use mathematical theorems and large amounts of data about its prior experiences in order to determine which hypothesis is more likely to be true.[74] Because the system operates on the basis of making probabilistic calculations, the

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63 Wendell Wallach, *Predictability and Lethal Autonomous Weapons Systems (LAWS)*, IEET (Apr. 16, 2016), https://ieet.org/index.php/IEET2/print/11873 [hereinafter Wallach].

64 VINCENT BOULANIN AND MAAIKE VERBRUGGEN, MAPPING THE DEVELOPMENT OF AUTONOMY IN WEAPON SYSTEMS 9 (Stockholm Int'l Peace Res. Inst. 2017).

65 Matthias, *supra* note 32.

66 *Id.* at 180.

67 Wolfgang Golubski, *Genetic Programming: a Parallel Approach*, *in* 2311 SOFT-WARE 2002: COMPUTING IN AN IMPERFECT WORLD, 167, 195 (2002).

68 *Id.* at 167-68.

69 *Id.*

70 Reilly, *supra* note 62.

71 Wallach, *supra* note 63.

72 Peter Margulies, *Making Autonomous Weapons Accountable: Command Responsibility for Computer-Guided Lethal Force in Armed Conflicts*, *in* RESEARCH HANDBOOK ON REMOTE WARFARE (Edward Elgar Press & Jens David Ohlin eds.) (forthcoming 2016).

73 *Id.*

74 *Id.* at 9.

user does not know with certainty what assessment the machine will arrive at.[75] Second, unlike conventional weapons, LAWS do not operate in a "transparent manner" because it is difficult to understand how they work and why they reached a particular decision.[76] A user may be privy to information on the machine only by observing its performance, because information stored in a neural network is not represented in terms of symbols and the weight a machine gives to a particular neural connection cannot be measured.[77]

The lack of foreseeability by a programmer how a LAWS may respond to a particular battlefield scenario creates a hurdle for attributing the performance of LAWS to him or her. A programmer could argue that LAWS did not perform as he or she intended and that there was no possibility to continuously monitor the software's performance. The software could change its composition from the moment the user had acquired it due to the LAWS incorporating encountered battlefield scenarios into its data bank.[78] Similarly, because the operator may not access the basis on which LAWS generates a particular assessment, it may be difficult to impute responsibility to him or her for failing to properly supervise the operation of the system.[79]

Government officials, programmers and members of the armed forces have a stake in ensuring that there is traceability regarding predicting how the LAWS will conduct itself and how it made a particular assessment.[80] The need for traceability means that manufacturers will develop recording boxes.[81] Given that the armed forces will have custody of LAWS, they rather than programmers are likely to be monitoring the operation of LAWS.

Before assessing whether an operator and programmer maintain liability on the ground of possessing a sufficient degree of control over the operation of a LAWS, it is necessary to enquire how we should think of the interface between a LAWS and a user. In particular, the fact that programmers draw on the knowledge about the functioning of the human body in creating software for machines with artificial intelligence gives rise to a question whether a LAWS should be characterized as a weapon system or as being closer to a human subordinate.[82] It

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[75] Zoubin Ghahramani, *Probabilistic machine learning and artificial intelligence* 452 NATURE (2015); Russ Altman, *Distribute A.I. benefits fairly*, 418 NATURE (2015).

[76] Leon Kester, *Mapping Autonomy to the Conference on Disarmament convened by United Nations*, UNOG (Apr. 15, 2016), https://unog.ch/80256EDD006B8954/(httpAssets)/29374C7829F996D1C1257F9B004A7540/$file/2016_LAWS+MX+Presentations_MappingAutonomy_Kesternote.pdf.

[77] Matthias, *supra* note 32.

[78] Wallach, *supra* note 63.

[79] Rebecca Crootoff, *Autonomous Weapon Systems and the Limits of Analogy*, *in* THE ETHICS OF AUTONOMOUS WEAPON SYSTEMS, 16 (Claire Finkelstein, et al. eds., 2017) (arguing that it is unjust to punish operators on the ground that they may be unable to prevent LAWSs from bringing about war crimes) [hereinafter Autonomous Weapon Systems].

[80] Thomas Keeley, *Auditable Policies for Autonomous Systems (Decisional Forensics)*, *in* AUTONOMOUS SYSTEMS: ISSUES FOR DEFENSE POLICYMAKERS, 214-15, (Paul D. Sharre & Andrew P. Williams eds., 2015); *id.* at 214-18.

[81] *Id.* at 221.

[82] Annie Jacobsen, *Inside the Pentagon's Effort to Build a Killer Robot*, TIME (Oct. 27, 2015), http://time.com/4078877/darpa-the-pentagons-brain/.

is pivotal to answer this question because as artificial intelligence technology evolves, states are likely to interpret the notion of "meaningful human control" over LAWS more broadly. This will lead to LAWS operating with greater degrees of autonomy.

II. Is a Lethal Autonomous Weapon System a Weapon or a Subordinate?

Although states appear to treat LAWS as any other weapon, there is a need to develop a special category for these systems. By designating robotic systems with artificial intelligence as "lethal autonomous weapons systems," states chose to treat this new technology as any other new weapon.[83] France's declaration supports this proposition.[84] Specifically, like all new weapons, LAWS must comply with IHL under the framework of article 36 Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts 1977 (hereinafter API 1977).[85] Article 36 API 1977 requires states to carry out a review to ensure that new weapons comply with API 1977 and other binding IHL norms prior to being deployed.[86]

Accordingly, the United States Army defines "weapon" as "chemical weapons and all conventional arms, munitions, materiel, instruments, mechanisms, or devices which have an intended effect of injuring, damaging, destroying or disabling enemy personnel or property."[87] A "weapon system" includes "the weapon itself and those components required for its operation."[88] Under the U.S. Army's definition of a weapon, LAWS is a categorically considered a weapon because operators will employ it to kill, and disable lawful targets. This categorization is consistent with the intention of the drafters of API 1977. The drafters broadly construed "weapon in the widest sense."[89] However, such a designation of LAWS lacks nuance. LAWS differ from traditional weapons because they mimic capabilities ordinarily associated with human beings, such as abstract thought, in the context of performing the task of identifying lawful targets and engaging them.

The way in which an operator uses LAWS and the control he or she retains over it should determine the categorization of LAWS as either, a traditional

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[83] Ambassador Vinicio Mati Permanent Representative of Italy to the Conference on Disarmament, Opening Statement at the C.C.W. 2016 Meeting of Experts on LAWS (Apr. 11-15, 2016); United Kingdom of Great Britain and Northern Ireland Statement to the Informal Meeting of Experts on Lethal Autonomous Weapons Systems, Opening Statement at the C.C.W. 2016 Meeting of Experts on LAWS (Apr. 11-15, 2016).

[84] Statement of the Republic of France on Elements of Intervention and General Disarmament, Opening Statement at the C.C.W. 2016 Meeting of Experts on LAWS (Apr. 11-15, 2016).

[85] AP I 1977, *supra* note 17, at art. 36.

[86] *Id.*

[87] Bernard W. Rogers & J.C. Pennington, ARMY REGULATION 27-53: REVIEW OF LEGALITY OF WEAPONS UNDER INTERNATIONAL LAW 1 (United States Department of the Army ed., 1979).

[88] *Id.*

[89] Claude Pilloud, et al., COMMENTARY ON THE ADDITIONAL PROTOCOLS OF 8 JUNE 1977 TO THE GENEVA CONVENTIONS OF 12 AUGUST 1949 ¶ 1401-1402 (1987).

weapon or as a novel category. Although it is unclear what degree of control operators will exercise over LAWS, the Swiss government produced a chart indicating various possible degrees of autonomy these systems may have.[90] The Swiss government's scale envisions a low level of autonomy in terms of LAWS ranking data and in terms of an operator interpreting that data.[91] The operator will treat the results the machine generates as prime scanning the machine for unaccounted eventualities.[92] When LAWS displays data to assist the operator, it resembles a conventional weapon.[93] When employed in this mode, LAWS is like a drone which displays data for the operator to analyze. What distinguishes LAWS from a drone is that the drone's software does not process data in order to rank it.[94] Furthermore, the operator's act of manipulating LAWS to lead the system to generate data resembles pushing a button in order to deploy a weapon, such as a missile. In both cases the operator inputs an instruction and triggers the operation of a particular mechanism so that the system performs the desired task.

On the Swiss scale, a higher level of autonomy involves an operator inputting a mission into LAWS.[95] LAWS executes the mission automatically and informs the operator about the anticipated course of action so that he or she can override the machine's decision.[96] At the next level up, an operator instructs LAWS to undertake a specific mission which it executes without interacting with the user and without displaying any information.[97] At the top tier of autonomy, LAWS initiates a mission based on its assessment of its environment without human interaction.[98] The nature of the interface an operator has with LAWS with these levels of autonomy differs from that he or she has with a conventional weapon.

Even the use of new conventional weapons necessitates an operator collecting information to assess whether there are suitable targets in the area and to actualize the release of the weapon.[99] For instance, "fire and forget weapons" detect a military objective based on its signature or pre-programmed target characteristics.[100] The Israeli Harop loitering munition senses the emission of heat and radar

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90 Mark Hoepflinger, *Presentation of Swiss Department of Defense to the Conference on Disarmament Convened by United Nations*, slide 16 (Apr. 11-15, 2016), https://unog.ch/80256EDD006B8954/(httpAssets)/4584A6AE89972A06C1257F9200531D02/$file/03+Mark+Hoepflinger_Mapping+Autonomy.pdf.

91 *Id.*

92 *Id.*

93 Justin McClelland, *The Review of Weapons in Accordance with Article 36 of Additional Protocol I*, 85 INT'L. REV. RED CROSS 397, 401-06 (2003).

94 Matthias Bieri & Marcel Dickow, *Lethal Autonomous Weapons Systems: Future Challenges*, 164 CSS ANALYSES IN SECURITY POLICY 1, 2 (2014).

95 Hoepflinger, *supra* note 90.

96 *Id.*

97 *Id*

98 Hoepflinger, *supra* note 90.

99 Jack M. Beard, *Autonomous Weapons and Human Responsibilities*, 45 GEO. J. INT'L L. 617, 644 (2014).

100 *Operational Limitations of Fire-and-Forget Missiles*, DEFENSE UPDATE (Feb. 2007), http://defense-update.com/features/du-2-07/helicopters_3gen_missiles.htm.

signals; it attacks objects with these characteristics.[101] An operator may observe the battlefield using a camera attached to the munition to verify that the munition does not engage a civilian object.[102] On the other hand, LAWS with high levels of autonomy carry out the tasks the operator traditionally performed including collecting information, interpreting data in order to determine the nature of objects in the area, planning the execution of an attack, checking that the attack complies with IHL and releasing the weapon.[103]

The capability of LAWS to interpret cluttered environment to select targets independently of the operator's input render them closer to human decision-makers. The nature of the interface between LAWS with high degrees of autonomy and an operator resembles how a commander interacts with soldiers. Just like operators who deploy LAWS, commanders give soldiers a description of the goals to achieve while not necessarily maintaining physical contact with them.[104] However, by communicating with soldiers through means, such as radio,[105] commanders can intervene and change the course of action of their subordinates. When an operator intervenes to override the decision of LAWS, that individual is in a similar position to a commander who tells a soldier to amend his or her course of action. Another similarity is that the armed forces encourage soldiers to show initiative in determining how to best implement the goal but set the parameters within which soldiers should act.[106] Meanwhile, a LAWS autonomously selects a course of action by searching through previously encountered scenarios and by identifying a statistical rule for generating an appropriate solution fitting the scenario in front of it.[107]

Although LAWS mimics how human beings identify lawful targets, it cannot be equated with a human subordinate. When designing LAWS, artificial intelligence specialists rely on knowledge that human beings learn from being exposed to scenarios, observe how other individuals respond to the situation and formulate a strategy of how to respond to a new situation based on previous experience.[108] Individuals acquire an intuitive sense of what conduct is ethical through observing how their peers react to situations.[109] LAWS cannot be equated with a human soldier even though it learns from being exposed to various scenarios.

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[101] *Harop Loitering Munitions UCAV System, Israel*, AIRFORCE-TECHNOLOGY, http://www.airforce-technology.com/projects/haroploiteringmuniti (last visited Oct. 22, 2017).

[102] Eliana Fishler, *Successful Flight Demonstrations for Harop Loitering Munitions*, ISRAEL AEROSPACE INDUSTRIES (June. 7, 2015), http://www.iai.co.il/2013/32981-46464-en/MediaRoom_News.aspx.

[103] Beard, *supra* note 99, at 629.

[104] Chad Storlie, *Manage uncertainty with commander's intent*, HARVARD BUSINESS REVIEW (2010).

[105] JOHN D. BERGEN, MILITARY COMMUNICATIONS: A TEST FOR TECHNOLOGY 451 (United States Army. 1986).

[106] EYAL BEN-ARI, MASTERING SOLDIERS: CONFLICT, EMOTIONS, AND THE ENEMY IN AN ISRAELI ARMY UNIT (NEW DIRECTIONS IN ANTHROPOLOGY) 40-41 (2001).

[107] House of Commons Science and Technology Committee, ROBOTICS AND ARTIFICIAL INTELLIGENCE 6 (2016-2017).

[108] Simon Parkin, *Killer Robots: The Soldiers That Never Sleep*, BBC (July 16, 2015), http://www.bbc.com/future/story/20150715-killer-robots-the-soldiers-that-never-sleep.

[109] *Id.*

According to the scientists, recognition of objects, cognition and acquisition of knowledge require a combination of thought, experience and reliance on senses.[110] LAWS uses its sensors to gather data and processes it according to a pre-specified procedure, which resembles a knitting pattern.[111] It lacks adequate sensory or vision processing systems for separating combatants from civilians.[112] Therefore, although LAWS can mimic how a soldier performs some tasks, it lacks the complexity of the human mind. In the same vein, both reasoning and emotions are needed to make it possible for individuals to respond to a situation in line with social norms.[113] Although computer scientists Mark Riedl and Brent Harrison posit that a robot could learn to act in line with humanity's values by reading many stories and assigning weight to the conduct the main characters pursued,[114] the process of projecting how a human being responds emotionally to social norms differs from the nuanced deliberations soldiers engage in on the battlefield.

The following example illustrates why it will be challenging for LAWS to carry out deliberations soldiers engage in on a daily basis on the battlefield. Customary international law requires soldiers to disobey "manifestly" illegal orders in international and non-international armed conflicts.[115] An assessment of whether an order is unlawful requires the decision-maker to exercise agency and to engage in nuanced reasoning. For instance, the United Kingdom declared that it may undertake an illegal act in response to the enemy violating articles 51-55 API 1977, which contain provisions on the protection of the civilian population and the environment "to the extent that it considers such measures necessary for the sole purpose of compelling the adverse party to cease committing violations under those articles."[116] Michael Walzer's writings on the nature of military necessity suggest that the decision whether a reprisal is a necessary measure in the circumstances to compel the enemy's compliance with the law or whether alternative steps could be taken is a value judgment.[117] His argument is bolstered by the fact that were it not necessary for the decision-maker to exercise discretion in determining whether a reprisal was lawful, the insertion of the term "manifestly" before the term "unlawful" would have been redundant. Because robots do not understand social values, lack compassion, are unable to reflect on why a particu-

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[110] Jacobsen, *supra* note 82.

[111] Noel E. Sharkey, *The Evitability of Autonomous Robot Warfare*, 94 INT'L. REV. RED CROSS 787, 788-89 (2012).

[112] *Id.* at 788.

[113] ANTONIO R. DAMASIO, DESCARTES' ERROR: EMOTION, REASON, AND THE HUMAN BRAIN, xii-xiv (Penguin Books 1994).

[114] Alison Flood, *Robots Could Learn Human Values by Reading Stories, Research Suggests*, THE GUARDIAN (Feb. 18, 2016), https://www.theguardian.com/books/2016/feb/18/robots-could-learn-human-values-by-reading-stories-research-suggests.

[115] Int'l Comm. Of The Red Cross, *Rule 154. Obedience to Superior Orders* (2017), https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_cha_chapter43_rule154.

[116] Jean-Marie Henckaerts & Louise Doswald-Beck, CUSTOMARY INTERNATIONAL HUMANITARIAN LAW 3303 (Cambridge University Press. 2005) (quoting United Kingdom, Reservations and Declarations Made Upon Ratification of AP I 1977, 28 January 1998, ¶ m).

[117] Michael Walzer, JUST AND UNJUST WARS 144 (Basic Books 4 ed. 2006).

lar choice is desirable and to exercise judgment, they cannot carry out nuanced context-dependent assessments.[118] In this respect they are not equivalent to human beings.

Markus Wagner, a scholar, agrees that a distinguishing feature of LAWS is the lack of autonomy.[119] Philosophers associate human autonomy with the ability to exercise free will.[120] To have moral agency, the following conditions should be satisfied: 1) an ability to intend an action, 2) a capacity to autonomously choose the intended action and 3) a capability to perform an action.[121] In turn, the first two elements require that individuals be able to reflect on their beliefs and to choose whether to hold them.[122] At this stage robots do not possess the capabilities to reflect on what beliefs to hold. This argument is supported by the fact that after interacting with online users Microsoft's robot Tay wrote that Hitler did nothing wrong on the online platform twitter.[123] Tay's act can be explained by the fact that it gathered information and imitated the conduct of online users but lacked the ability to understand the nature and gravity of the events about which it created a post.[124] Because the robot is unable to autonomously decide whether a course of action is desirable, it arguably lacks the autonomy which human beings have.[125] More recently, Moscow-based National Research Nuclear University MEPhI Cybernetics Department Professor Alexei Samsonovich said that Russian researchers are close to developing free thinking machines which can feel and understand human emotions, understand narratives and actively learn on their own.[126] If this breakthrough in science occurs, there will be a stronger case for analogizing robots to human beings. For now, LAWS should be regarded as a unique category.[127]

On the opposite side of the debate, scholars consider soldier and LAWS akin.[128] The commanders mold soldiers by training them to obey orders.[129] By

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[118] Peter Asaro, *On Banning Autonomous Weapon Systems: Human Rights, Automation, and the Dehumanization of Lethal Decision-Making*, 94 INT'L REV. OF THE RED CROSS 687, 699-700 (2012) [hereinafter Asaro]; Tetyana Krupiy, *Of Souls, Spirits and Ghosts: Transposing the Application of the Rules of Targeting to Lethal Autonomous Robots*, 16 MELBOURNE J. OF INT'L L. 145, 50 (2015).

[119] Markus Wagner, *Taking Humans Out of the Loop: Implications for International Humanitarian Law*, 21 J.L., INFO. & SCI. 1, 5 (2011).

[120] Christopher P. Toscano, *"Friend of Humans": An Argument for Developing Autonomous Weapons Systems*, 8 J. NAT'L SECURITY. L. & POL'Y 1, 45 (2015).

[121] David Rönnegard, THE FALLACY OF CORPORATE MORAL AGENCY 11 (Springer 2015).

[122] *Id.* at 12.

[123] Seth Robson, *Artificial Intelligence: Navy Works on Teaching Robots How to Behave*, GOV'T TECH. (Aug. 16, 2016), http://www.govtech.com/computing/Artificial-Intelligence-Navy-Works-on-Teaching-Robots-How-to-Behave.html.

[124] *Id.*

[125] Asaro, *supra* note 118, at 700.

[126] *Russia on Verge of Major Breakthrough in Artificial Intelligence*, SPUTNIK NEWS (July 19, 2016), https://sputniknews.com/science/20160719/1043305617/artificial-intelligence-breakthrough.html [hereinafter SPUTNIK].

[127] Autonomous Weapon Systems, *supra* note 79 at 21.

[128] Geoffrey S. Corn, *Autonomous Weapon Systems: Managing the Inevitability of "Taking the Man out of the Loop"* 11, (June 14, 2014), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2450640).

framing decisions within the parameters of the commander's order, soldiers function in a similar manner to an autonomous weapon system.[130] The difference is that a commander can continuously influence the soldier through leadership, but has no input into the LAWS's software.[131] The study of Eyal Ben-Ari, an anthropologist, confirms that armed forces partially analogize the combat unit and the soldier to a machine.[132] He found that the Israeli armed forces use the metaphor of a machine to describe a battalion and how it performs.[133] The metaphor reflects the fact that a unit should act efficiently, reliably and predictably.[134] The division of labor is fixed and commanders give soldiers exact instructions regarding how they should execute the order.[135] Tomer, a paratrooper, recounts that, "I waited and then heard the next command and that was it; I didn't think, didn't deliberate. The head was like empty; there was only an expectation and uncertainty. . .Listen, you simply work like a machine, like a robot."[136]

While it is true that the military "made blind obedience culture into a high art" in the 20th century, soldiers also need to use creativity and critical analysis to adapt to changing circumstances and to respond to the enemy's actions.[137] The commanders in the Israel Defense Forces talk of soldiers who do not take initiative, do not think and automatically execute tasks in a derogative way as "little head."[138] Because soldiers exercise autonomy in deciding how to give effect to the mission goal, they cannot be equated with a machine or a weapon. In contrast, LAWS performs within the parameters the algorithm sets for it and it lacks the capacity to reflect on issues.[139] A human being can decide whether to act on the basis of emotions or logic.

Unlike LAWS, soldiers use judgment to respond to an unexpected ethically charged situation according to social norms. For instance, a commander, who sends a reinforcement unit, encounters a child who fell into a well and is asking to be rescued. There is no one else in the area who can help. Individuals rescue others despite peril to themselves even when they are not under a legal duty to do so.[140] The soldier will evaluate whether it is possible to help the child. Assuming the estimation of ten minutes is enough time to rescue the child, the soldier will further assess various factors relating to his or her ability to carry out the military

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[129] *Id.*

[130] *Id.*

[131] *Id.* at 13.

[132] Ben-Ari, *supra* note 106, at 34, 53.

[133] *Id.* at 36.

[134] *Id.* at 36.

[135] *Id.* at 37.

[136] *Id.* at 65.

[137] Dov Seidman, *Army's Basic Training is No Longer Basic: Lessons for Business*, FORBES (Apr. 21, 2014), https://www.forbes.com/sites/dovseidman/2014/04/21/armys-basic-training-is-no-longer-basic-lessons-for-business/#30718046e945.

[138] Ben-Ari, *supra* note 106, at 34.

[139] Asaro, *supra* note 118, at 700.

[140] Ben-Ari, *supra* note 106, at 34.

mission.[141] Contrastingly, LAWS lacks emotions and cognition rendering it unable to detect situations such as this one.[142] Even when a situation concerning an ethical concern arises, LAWS lacks the combination of emotions, cognition and an understanding of the basis of social values to be in a position to balance these objectives.[143] A LAWS can appropriately respond to a situation only if the algorithm and its prior experiences equip it to do so. Therefore, although LAWS can approximate how a human being performs certain tasks, it is not analogous to a human subordinate.

States should develop a new category to designate weapon systems with an artificial intelligence capability and should conclude a new treaty to govern this technology.[144] States must consider the possibility with attributing the war crime LAWS carries out to an individual. LAWS lack agency and thus, cannot form an intent to commit a crime.[145] Because international criminal law associates criminality with intentional acts, it is arguably inappropriate to hold LAWS liable.[146]

III. The Doctrine of Command Responsibility: a Poor Fit to Govern Artificial Intelligence Systems

Scholars Christopher Toscano, Heather Roff and Chantal Grut argue that the doctrine of command responsibility enables the conduct of LAWS to be imputed to a particular actor and to hold such actors accountable.[147] The doctrine of command responsibility plays an important role in preventing the commission of war crimes.[148] It imposes duties on commanders and civilian superiors to monitor the conduct of their subordinates with a view to preventing the commission of international crimes and requires superiors to punish the perpetrators.[149] This section will demonstrate that the context of LAWS calls for a development of a new accountability framework. Although the nature of the interface between a LAWS and an operator meets some of the elements of the doctrine of command responsibility, LAWS challenge assumptions underpinning this doctrine.

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[141] These factors may include: 1) how many soldiers may die if the reinforcement is delayed, 2) the likelihood of their side winning the military operation notwithstanding that they had helped the child, and 3) the value of the child's life.

[142] Docherty, *supra* note 19.

[143] Asaro, *supra* note 118; Krupiy, *supra* note 118.

[144] Autonomous Weapon Systems, *supra* note 79, at 21, 25.

[145] Ugo Pagallo, *Robots of Just War: A Legal Perspective*, 24 PHIL. & TECH. 307, 312-313 (2011).

[146] Rome Statute of the International Criminal Court, art. 30, 2187 U.N.T.S. 90 (entered into force July 1, 2002) (July 17, 1998) [hereinafter Rome Statute] (explaining that all offences for international crimes require a culpable state of mind); Beard, *supra* note 99, at 663.

[147] Chantal Grut, *The Challenge of Autonomous Lethal Robotics to International Humanitarian Law*, 18 J. OF CON?ICT & SEC. L. 5, 18 (2013); Heather Roff, *Killing in War: Responsibility, Liability and Lethal Autonomous Robots*, *in* ROUTLEDGE HANDBOOK OF ETHICS AND WAR: JUST WAR THEORY IN THE 21ST CENTURY 14, (Fritz Allhoff, et al. eds., 2013); Toscano, *supra* note 120.

[148] This is achieved through imposing a duty on the commander to punish subordinates who committed an international crime. Prosecutor v. Halilović, IT-01-48-T T.Ch. I, Judgment, ¶ 96 (Nov. 16, 2005).

[149] Prosecutor v. Čelebići, IT-96-21-T, Judgment, ¶ 331-333 (Nov. 16, 1998).

The doctrine was formulated with a relationship between two human beings in mind, namely the superior and the subordinate.[150] It is necessary to consider whether the doctrine of command responsibility may be applied to the interface between an individual and a LAWS in light of the fact that 1) LAWS can approximate human decision-making in certain contexts, and 2) there is a degree of similarity between how operators and commanders exercise control. For the conduct of LAWS to be imputed to an individual under the doctrine one would need to show that the individual exercises authority over LAWS in the same manner as a superior over a subordinate. The doctrine of command responsibility will now be introduced to lay groundwork for this discussion.

A. An introduction to the doctrine of command responsibility

The roots of the doctrine of command responsibility date back to ancient times.[151] Charles VII d'Orleans issued an Ordinance in 1439 stating that commanders are responsible for offenses committed by their troops.[152] The modern definition of this doctrine may be found in article 86(2) API 1977, article 28 of the Rome Statute 1998, article 7(3) Statute of the International Criminal Tribunal for the Former Yugoslavia 1993 (hereinafter ICTY Statute) and in various instruments establishing international criminal tribunals.[153] Article 7(3) of the ICTY Statute states that the fact that a subordinate had committed a war crime, crime against humanity or genocide "does not relieve his [or her] superior of criminal responsibility if he [or she] knew or had reason to know that the subordinate was about to commit such acts or had done so and the superior failed to take the necessary and reasonable measures to prevent such acts or to punish the perpetrators thereof."[154] The three elements of command responsibility are: 1) the existence of a superior-subordinate relationship (either in a civilian or military context), 2) the mental element (knew or had reason to know), and 3) the failure to take necessary and reasonable steps to prevent or to punish the commission of

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150 Prosecutor v. Halilović, IT-01-48-T T.Ch. I, Judgment, ¶ 61 (Nov. 16, 2005).

151 Chantal Meloni, COMMAND RESPONSIBILITY IN INTERNATIONAL CRIMINAL LAW 3 (T.M.C. Asser Press. 2010).

152 LESLIE GREEN, ESSAYS ON THE MODERN LAW OF WAR 283 (Transnat'l Pubs. 2d ed. 1999) (quoting MELONI, *supra* note 151, at 3-4).

153 API 1977, *supra* note 17, at art. 86(2); Rome Statute, *supra* note 17, at art. 28; Statute of the Special Tribunal for Lebanon, Art. 3(2), S.C. Res. 1757 Annex (May 30, 2007) [hereinafter LEBANON STATUTE]; ANNEX. STATUTE OF THE INTERNATIONAL CRIMINAL TRIBUNAL FOR THE FORMER YUGOSLAVIA Art. 7(3), S.C. Res. 827 ¶ 2 (May 25, 1993) [hereinafter ICTY STATUTE]. Article 7(3) of the ICTY Statute states that the fact that a subordinate had committed a war crime, crime against humanity or genocide "does not relieve his [or her] superior of criminal responsibility if he [or she] *knew* or *had reason to know* that the subordinate was about to commit such acts or had done so and the superior *failed* to take the *necessary and reasonable measures* to prevent such acts or to punish the perpetrators thereof."; Law on the Establishment of the Extraordinary Chambers in the Courts of Cambodia for the Prosecution of Crimes Committed During the Period of Democratic Kampuchea 2001 Art. 29 (Oct. 27, 2004) [hereinafter Kampuchea Law]; Statute of the Special Court of Sierra Leone 2002 Art. 6(3), 2178 U.N.T.S. 138, 145 (Jan. 16, 2002) [hereinafter Sierra Leone Statute]; Statute of the International Criminal Tribunal for Rwanda Art. 6(3), S.C. Res. 955 (Nov. 8, 1994) [hereinafter ICTR Statute].

154 ICTY Statute, *supra* note 153, at art. 7(3).

a crime.[155] The superiors are held accountable for failure to discharge their duties through taking necessary and reasonable measures to prevent the commission of crimes or to punish the perpetrators.[156] The subordinate's commission of a crime with the requisite mental element is a condition for the applicability of this doctrine.[157] The doctrine of command responsibility has customary international law status in international and non-international armed conflicts.[158]

The Rome Statute 1998, which has 124 states parties, contains a definition of the doctrine of command responsibility that differs from the customary international law definition in a number of respects.[159] For instance, the standard for the mental element is lower for military superiors than for civilian superiors.[160] A detailed analysis of the similarities and differences between the definitions in the Rome Statute 1998 and the ICTY Statute 1993 is beyond the scope of this paper. What is significant is that the International Criminal Court has interpreted the test for the existence of a superior-subordinate relationship in the Rome Statute 1998 in an identical manner to the customary international law definition.[161]

The present inquiry is confined to examining whether the existing standard of a superior-subordinate relationship may be employed to link the performance of LAWS to a failure by a particular individual to appropriately exercise authority over it.[162] This issue goes to the heart of the applicability of the doctrine of command responsibility. If there is no superior-subordinate relationship, then it becomes redundant to ask whether a particular individual could fulfil other criteria for accountability, such as having the requisite intent. The doctrine of command responsibility does not require that the superior exercised features of authority that one finds when the authorities employ the law to confer a mandate on the superior.[163] Nevertheless, the superior must be by virtue of his or her position in "some sort of formal or informal hierarchy to the perpetrator."[164] The ICTY in the *Prosecutor v. Čelebići* case held that a superior-subordinate relationship exists when the superior exercises "effective control" over a subordinate, meaning that he or she has the "material ability to prevent and punish the com-

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[155] Prosecutor v. Kordić & Čerkez, IT-95-14/2-T, Judgment, ¶ 416 (Feb. 26, 2001); Prosecutor v. Čelebići, IT-95-21-A, Judgment, ¶ 226-227, ¶ 234-235, (Feb. 20, 2001).

[156] Prosecutor v. Halilović, IT-01-48-T, Judgment, ¶ 54 (Nov. 16, 2005).

[157] Prosecutor v. Orić, IT-03-68-T, Judgment, ¶ 294 (Jun. 30, 2006).

[158] Prosecutor v. Mucić et al., IT-96-21-T, Judgment, ¶ 333 (Nov. 16, 1998).

[159] International Criminal Court, *The States Parties to the Rome Statute* (last visited Oct. 31, 2017), https://asp.icc-cpi.int/en_menus/asp/states%20parties/Pages/the%20states%20parties%20to%20the%20rome%20statute.aspx.

[160] *Compare* Rome Statute, *supra* note 17, at art. 28(a)(i), *with id.* at art. 28(b)(i).

[161] Prosecutor v. Gombo, ICC-01/05-01/08, Judgment, ¶ 188 (Mar. 21, 2016).

[162] *Id.* Significantly, the International Criminal Court interpreted the test for the existence of a superior-subordinate relationship in the Rome Statute 1998 in an identical manner to the customary international law definition

[163] Prosecutor v. Kajelijeli, ICTR-98-44A-A A.Ch., Judgment, ¶ 87 (May 23, 2005).

[164] Čelebići, *supra* note 155, at ¶ 234-235.

mission of these offences."[165] According to the ICTY Appeals Chamber in the *Prosecutor v. Blaškić* case:

> "[T]he indicators of effective control are more a matter of evidence than of substantive law, and those indicators are limited to showing that the accused had the power to prevent, punish or initiate measures leading to proceedings against the alleged perpetrators where appropriate."[166]

The superior has "effective control" where he or she can issue binding orders to a subordinate who must obey said orders.[167] The possession of similar powers and degree of control over subordinates as a military commander is another indicator.[168] However, the superior does not need to exercise authority in the same manner as a commander.[169] In a recent decision, the International Criminal Court in the *Prosecutor v. Bemba* case held that indicia of "effective control" are where the entity has the capacity to change the command structure, the authority to deploy soldiers to the location where hostilities are taking place, control over the means of waging war, such as weapons, capacity to communicate on behalf of the group, and representation of group ideology.[170] It is unnecessary to determine whether the superior exercised features of authority when the law mandates otherwise.[171]

B. Applying the "effective control" test to the robotic context

The issue transitions into whether a particular individual exercises "effective control" over LAWS. This question is examined in relation to the operator, commander, individuals involved in designing and manufacturing LAWS as well as government procurement officials.

1. The operator

Under the doctrine of command responsibility, the relationship between an operator and LAWS has features of a superior-subordinate relationship. The giving of instructions and an expectation of obedience are indicators that a superior has "effective control."[172] A soldier receives lawful orders and has a legal duty to obey them.[173] Similarly, a LAWS is designed to carry out the operator's orders. The operator has "effective control" over LAWS as long as its software

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165 *Id.*

166 Prosecutor v. Blaškić, IT-95-14-A, Judgment, ¶ 69 (July 29, 2004).

167 Kordić & Čerkez, *supra* note 206; Prosecutor v. Ferreira, Case No 04/2001, Judgment, ¶ 516 (The Special Panels for Serious Crimes in Dili, Republic of the East Timor Apr. 5, 2003).

168 *Čelebići*, *supra* note 155, at ¶ 197.

169 Prosecutor v. Kajelijeli, ICTR-98-44A-A A.Ch., Judgment, ¶ 87 (May 23, 2005).

170 Gombo, *supra* note 161.

171 Kajelijeli, *supra* note 163.

172 Ferreira, *supra* note 167, ¶ 516.

173 *See* U.S. DEPARTMENT OF THE ARMY, THE SOLDIER'S GUIDE F.M. 7-21.13 38 ¶ 3-2 (2004); U.K. Army Act, Art. 34 1955.

correctly executes the inputted instruction. The operator possesses the material ability to prevent LAWS from committing a war crime by entering lawful orders. Thus, the International Committee of the Red Cross's argument that when an operator enters an instruction into LAWS to perform an act amounting to an international crime that operator is accountable under the doctrine of command responsibility is undisputed.[174]

The situation is different when a robot performs in an unjustifiable manner, namely for reasons such as the components of the software interacting in an unanticipated manner or the machine being unreliable. When the input of an instruction causes an unexpected interplay between the software components, the machine is not carrying out the operator's instruction. Though an operator expects obedience of an inputted order, the machine treats the order as non-binding. Consequently, in such situations the two core indicia of "effective control" are not met.

The situation when LAWS performs in an unjustified manner may not be analogized to a subordinate disobeying an order. When a subordinate refuses to obey an order, commanders may use disciplining methods in order to enforce their authority.[175] Commanders can detect a risk of a subordinate committing a crime by monitoring the behavior of the soldiers they command or by asking soldiers to report to them when their peers make inflammatory statements, exhibit violent or unstable behavior, or obtain access to narcotic substances.[176] On the other hand, unless LAWS displays a message indicating that the system is functioning in a suboptimal manner or that a malfunction had occurred, operators may be unaware. One of the reasons for this situation is that operators will not necessarily know the software content and how it operates.[177]

To illustrate, in outlining the responsibilities of government agencies, the U.S. Department of Defense Directive 3000.09 makes no reference to operators possessing advanced information technology skills or knowing the principles on which LAWS operates. The Directive states that the onus is on the government to procure reliable LAWS which display to the operators feedback about the system status.[178] The operators are to be trained to understand system capabilities and limitations.[179] Such training is designed to ensure that they can employ LAWS with "appropriate care" and that they can deactivate the system.[180] The Directive's emphasis on the design of the user interface and on the operator's ability to disable the system points to the fact that operators are unlikely to possess ad-

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[174] U.N. Office, The C.C.W. Informal Meeting of Experts on L.A.W.S., The communication of the International Committee of the Red Cross to the Conference on Disarmament convened by United Nations 5 (Apr. 11-15, 2016).

[175] API 1977, *supra* note 17, art. 87(3); Prosecutor v. Had, IT-01-47-A A. Ch., Judgment, ¶T3 (Apr. 22, 2008).

[176] Prosecutor v. Nahimana, ICTR-99-52-A A.Ch., Judgment, ¶ 345 (Nov. 28, 2007); Prosecutor v. Halilović, IT-01-48-T T.Ch. I, Judgment, ¶ 68, ¶ 138 (Nov. 16, 2005).

[177] Beard, *supra* note 99.

[178] U.S. DEP'T OF DEF., Enclosure 3 ¶ 1(b), ¶ 1(b)(5) (2012) [hereinafter Enclosure].

[179] *Id.* at 3 ¶ 1(b)(4).

[180] *Id.* at 4 ¶ 8(a)(4), ¶ 8(a)(5).

vanced programming skills. The Directive arguably does not envision the operators understanding the basis on which LAWS operates and generates solutions. Even programmers find it challenging to find out why the machine produced a particular decision because at this stage limited assessment tools are available.[181] Since programmers have limited foreseeability regarding how LAWS operates so do operators.[182] Operators acquire notice of the software components operating in an unintended manner only when the system alerts them. Consequently, when the machine errs, operators lack "effective control" unless alerted by the system of the malfunction.

2. *The commander*

The U.S. Department of Defense Directive 3000.09 illustrates the likely role of commanders. Under the Directive, commanders oversee operators, who are trained to use LAWS according to its design and governmental policy.[183] Commanders have a responsibility to monitor the system to ensure no operations are contrary to the applicable policies.[184] The U.S. Military Tribunal acknowledged in the case of United States v. von Weizsaecker et al that superiors are responsible only where the act of the subordinate is within their "official competency."[185] The design and therefore the technical dimension of the operation of the robot is not within the scope of the mandate conferred on the commanders. Accordingly, a commander is not under a duty to prevent or to punish war crimes when LAWS brings about a war crime. On the other hand, because a commander has an official duty to supervise subordinates, he or she will be liable in instances where the subordinates improperly use LAWS or tamper with the machines.[186] Similarly, superiors in non-state armed groups that exercise "effective control" over their subordinates have a duty to prevent their subordinates from inappropriately operating LAWS and tampering with the machines.[187] This duty was created by the doctrine of command responsibility which applies to superiors in non-state armed groups who possess similar powers and degree of control over the subordinates as military commanders.[188]

3. *The manufacturer*

So far it has been shown that it is difficult to impute "effective control" over LAWS to operators and commanders. The next question to answer is whether the doctrine of command responsibility is applicable to those who design or manu-

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[181] Kester, *supra* note 76; Matthias, *supra* note 32.

[182] Wallach, *supra* note 63.

[183] Enclosure, *supra* note 178, at 4 ¶ 10(a), ¶ 10(c) (2012).

[184] *Id.*

[185] United States v. von Weizaecker et al. (Ministries Case), XIV T.W.C. ¶ 535 (1949) (United States Military Tribunal Sitting in Nuremberg).

[186] Blaškić, *supra* note 166.

[187] *Id.*

[188] Čelebići, *supra* note 155.

facture LAWS.[189] States may purchase LAWS from privately owned or governmental corporations.[190] The U.S. Directive 3000.09 envisions Heads of Defense Agencies and the U.S. Special Operations Command as being responsible for designing LAWS to reduce system failure or loss of control over the system.[191] The Under Secretary of Defense for Acquisition, Technology and Logistics will be responsible for establishing and enforcing standards for testing, safety and reliability.[192] The U.S. Army Research Office outsourced the task of creating software for LAWS to the researcher Ronald Arkin.[193] Similarly, the Russian Chief of General Staff Valery Vasilevich Gerasimov said that, "[i]n the near future, it is possible that a complete 'roboticized' unit will be created capable of independently conducting military operations."[194] Nevertheless, corporations such as Uralvagonzavod will present prototypes to the Russian government and the government will select what product to purchase.[195] Given the possibility that both government agencies and corporations may design LAWS, a separate question remains as to whether the doctrine of command responsibility is applicable to programmers in government and non-state organizations.

a. Government agency employees

The initial impression is that programmers working for a government agency possess "effective control" over LAWS. The programmer is the ultimate source of issuing instructions to the machine. The programmers create software that help LAWS to learn from data sets they encountered.[196] When operators input an order into LAWS, the operation of the software orders the robot to function. Because the software determines what tasks a robot performs and how, the programmer issues orders to LAWS when it is operating on and off the battlefield.

To advance their international obligations, states will deploy only those robots that adhere to IHL.[197] Programmers will program IHL norms into LAWS to enable weapon systems to generate appropriate solutions. The programmers have the material ability to prevent LAWS from performing in an unjustifiable manner by designing suitable software. This aspect renders programmer close to a mili-

189 Grut, *supra* note 147; McFarland, *supra* note 31; Toscano, *supra* note 120.

190 Danielle Muoio, *Russia and China are Building Highly Autonomous Killer Robots*, TECH INSIDER (Dec. 15, 2015), http://www.techinsider.io/russia-and-china-are-building-highly-autonomous-killer-robots-2015-12.

191 *Id.* at Enclosure 4 ¶ 2(a), ¶ 8, ¶ 8(1); The Secretary of Defense for Acquisition, Technology and Logistics will be responsible for establishing and enforcing standards for testing, safety and reliability.

192 *Id.* at Enclosure 4 ¶ 2(a).

193 Ronald C. Arkin & Patrick Ulam, *An Ethical Adaptor: Behavioral Modification Derived from Moral Emotions* 1 Tech. Rep. GIT-GVU-09-04 (2009).

194 Danielle Muoio, *Russia and China are Building Highly Autonomous Killer Robots*, TECH INSIDER (Dec. 15, 2015), http://www.techinsider.io/russia-and-china-are-building-highly-autonomous-killer-robots-2015-12.

195 *Id.*

196 Statement of Italy, *supra* note 10.

197 API 1977, *supra* note 17, at art. 36.

tary superior. In particular, military superiors discharge their duty to prevent the commission of crimes by instituting appropriate procedures.[198] For example, commanders teach subordinates IHL norms and communicate to them that a soldier who transgresses IHL norms will be punished.[199] A programmer selecting and inserting a code to ensure reliable performance of LAWS is akin to a superior acting to maintain order among the subordinates.[200] Superiors use the threat of punishment to deter subordinates from committing international crimes. Programmers create software components with a view to precluding LAWS from performing contrary to IHL. By designing a software which enables LAWS to learn from its interactions with the environment, it is put forward that the programmer's position is similar to a commander who teaches subordinates about IHL.[201] Another parallel between the position of a programmer and superior is that a LAWS and a soldier can act unpredictably. Soldiers may choose to disobey orders.

A closer analysis demonstrates that the design of LAWS does not suggest that a programmer exercises "effective control" over LAWS. According to Gary Marchant and his colleagues:

> "Now, programs with millions of lines of code are written by teams of programmers, none of whom knows the entire program; hence, no individual can predict the effect of a given command with absolute certainty, since portions of large programs may interact in unexpected, untested ways."[202]

Given the complexity of artificial intelligence software, it is unclear whether a programmer will be trained to review the content of the entire program. Cathy O'Neil, a data scientist, explains that programmers do not understand the algorithm they create and cannot interpret it.[203] Although programmers could create programs that map the types of code any given program has and how its components interact, it is suggested that having an overview of how the system functions is not equivalent to knowing how a system will perform in each instance.[204]

Because each programmer contributes to the architecture of the robot in different proportions, the programmer is unaware of how all pieces of code interact.[205] It is difficult to identify any one programmer as the architect of the software. The difficulty of attribution lies in the analysis of the "effective control" test, which was not designed to address situations such as this one, namely where multiple

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198 Halilović, *supra* note 148.

199 Orić, *supra* note 157, at ¶ 330.

200 *Id.*

201 Statement of Italy, *supra* note 10.

202 Borenstein, et al., THE COLUMBIA SCIENCE AND TECHNOLOGY LAW REVIEW 284 (2011).

203 CBC Radio, *supra* note 5, at 45:34-45:44.

204 Thomas Keeley, *Auditable policies for autonomous systems (decisional forensics)*, AUTONOMOUS SYSTEMS: ISSUES FOR DEFENSE POLICYMAKERS 221, (Paul D. Sharre & Andrew P. Williams eds., 2015).

205 Borenstein, *supra* note 202.

individuals contribute to the instruction issued to the subordinate. The case of Prosecutor v. Nahimana illustrates this point.[206] The International Criminal Tribunal for Rwanda (hereinafter ICTR) held in the Prosecutor v. Nahimana that membership of a collegiate body, such as a board of directors, is insufficient to establish the existence of "effective control."[207] An individual is a superior only if he or she "had the power to take necessary and reasonable measures to prevent the commission of the crime."[208] The ICTY Trial Chamber in Prosecutor v. Orić further elaborated that a critical factor in establishing "effective control" is whether the accused had "the ability to maintain or enforce compliance of others with certain rules and orders."[209] It is doubtful whether an individual programmer satisfies the Nahimana and Orić criteria. The operation of the program is determined by how all of its components interplay.[210] Even when a programmer writes half or a substantial portion of the program, the programmer's ability to prevent a LAWS from bringing about a war crime exists only hypothetically.

Although the performance of LAWS depends on how comprehensive its model is and what datasets are fed into the neural network, the constantly evolving nature of the software renders it difficult for the programmer to intervene and to change the robot's architecture once it is operating on the battlefield.[211] Current tools do not allow the programmer to find out what weight the machine assigns to neural connections when it encounters a particular scenario or how it will arrange symbols of a genetic algorithm when developing a solution to a problem.[212] This compounds the programmer's lack of knowledge about how the software operates.[213] The programmer cannot foresee in advance what the effect of a robot's decision will be.[214] The nature of the artificial intelligence software is a limitation to the programmer acquiring notice of the code executing itself in an unforeseen manner on the battlefield.

Another hurdle for imputing "effective control" to a programmer who writes a portion of the program is the structure of the programming team itself. Generally there is a team leader who supervises a group of programmers and who is responsible for endorsing the program.[215] This means that an individual programmer who creates a component of the software is unlikely to have a supervisory role. The programmer should not be held liable for war crimes a LAWS triggers due to

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206 Prosecutor v. Nahimana, Case No. ICTR-99-52-A, Judgment, (Int'l Crim. Trib. for Rwanda Nov. 28, 2017).

207 *Id.* at ¶ 788.

208 *Id.*

209 Oric, *supra* note 157.

210 Borenstein, *supra* note 202, at 21.

211 Cathy O'Neil, WEAPONS OF MATH DESTRUCTION: HOW BIG DATA INCREASES INEQUALITY AND THREATENS DEMOCRACY 23-24 (Crown. 2016); Wallach, *supra* note 63; Matthias *supra* note 32, at 178.

212 Matthias *supra* note 32, at 178; Golubski, *supra* note 67, at 168.

213 Michael Fisher et al., *Verifying Autonomous Systems: Exploring Autonomous Systems and the Agents That Control Them*, 56 COMMS. OF THE ACM 84, 89 (2013).

214 *Id.*

215 Marilyn Mantei, *The effect of programming team structures on programming tasks*, 24 COMMUNICATIONS OF THE A.C.M. 106, 109 (1981).

lacking authority that will enable him or her to oversee the work of other programmers and to take steps to ensure that the running of the software produces only intended outcomes.

The question then is whether an individual in the organization who is responsible for overseeing the work of the team of programmers and for approving the code has "effective control" over the LAWS even when the LAWS is operating on the battlefield. This factual determination depends on whether the nature of control the head programmer has over the code can be compared to the nature of control a superior has over the subordinates. There is a degree of analogy between the lines of code and the subordinates. Subordinates in a unit may communicate and decide to perpetrate a crime. In the context of LAWS the interaction of the lines of code and their execution leads to a machine triggering an international crime. The ICTY Trial Chamber in Prosecutor v. Orić explained that what is crucial for attribution of accountability is whether the superior had the means to prevent the commission of the crimes rather than knowledge of the identity of the perpetrators.[216] The head programmer possesses the material ability to prevent the inclusion of unsuitable components of the program into the software. On the application of Prosecutor v. Orić it is immaterial that the head programmer did not know the final architecture the LAWS's software acquired on the battlefield. Moreover, one the application of Prosecutor v. Orić the head programmer does not need to know all components of the software and how they interacted in order to possess "effective control."[217] The head programmer's authority to remove unsuitable software components, to endorse the blueprint of LAWS and to oversee the work of individual programmers is sufficient to establish "effective control."

Nevertheless, such an analysis is incomplete. It is premature to impute "effective control" to the head programmer on the basis of his or her authority to check the code and to order the team to modify the software. The test of "effective control" arguably presupposes that a superior is able to monitor the intentions, conversations or conduct of subordinates.

This fact may be gleaned from the decision of the ICTY Trial Chamber in Prosecutor v. Blaškić. The Judges held that an individual has a material ability to prevent the commission of crimes where he or she has a duty to submit reports to competent authorities in order to enable them to take appropriate measures.[218] To be in a position to prepare and to submit reports, the superior needs to monitor the conduct of the subordinates. Through monitoring conversations and conduct of subordinates, the superior gains awareness of their intentions. Knowledge of the subordinates' intentions enables a superior to detect that a subordinate may commit a crime. Likewise, the head programmer would need to monitor how the architecture of LAWS evolves as the weapon system is operating on the battlefield to be able to acquire notice of the software executing itself in an unforeseen manner.

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[216] Orić, *supra* note 157.

[217] *Id.*

[218] Blaškić, *supra* note 166.

Some researches contend that it may be possible to monitor the machine's learning process. Peter Margulies, a scholar, maintains that it could be possible to monitor the machine's learning process.[219] The programmers could imbed a function for displaying information, such as a decision tree diagram, and ask the machine to show the factors on which it relied to reach its decision.[220] The branches on a tree diagram represent alternative courses of action while the leaves depict causal factors that influenced the decision.[221] The problem is that such mechanisms do not enable the head programmer to know how the architecture of the software evolves once LAWS is operating on the battlefield. The software will modify itself once LAWS encounters each scenario on the battlefield.[222] The head programmer will lack the capacity to monitor all LAWS the corporation manufactures. Due to lacking knowledge about what architecture the software acquired in the process of being used, the head programmer cannot acquire notice that an unexpected code interaction or glitch was about to occur. Because an ability to become cognizant of the risk of improper conduct is integral to the possession of "effective control," the head programmer may not be said to have a material ability to prevent the robot from triggering an international crime.

However, others believe that the complexity of robots with artificial intelligence makes it impossible for one individual, such as a head programmer, to know how all software components interplay.[223] Since no single individual will know with "absolute certainty" how the software components interact, there is arguably no individual who has full knowledge of how the software operates.[224] Because an ability to become cognizant of the risk of improper conduct is integral to the possession of "effective control," the head programmer may not be said to have a material ability to prevent the robot from triggering an international crime.

A counterargument would be that there is no requirement for the head programmer to know how all components of the code operate when a LAWS carries out a mission on the battlefield. Usually superiors high in the chain of command, such as Heads of State and Generals, are held responsible for the conduct of the subordinates at low hierarchical levels even when they were far away from the location where the subordinates committed war crimes and even though they may not have been aware of the exact manner in which the subordinates interacted.[225] The head programmer is in a different position from a General

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219 Margulies, *supra* note 72, at 16-17.

220 *Id.*

221 *Decision Tree*, INVESTOPEDIA, http://www.investopedia.com/terms/d/decision-tree.asp (last visited Dec. 4, 2017); STUART J. RUSSELL & PETER NORVIG, ARTIFICIAL INTELLIGENCE: A MODERN APPROACH, 757 (Prentice Hall Inc. 3rd ed., 2010).

222 Wallach, *supra* note 63.

223 Borenstein, *supra* note 202, at 284.

224 *Id.*

225 Prosecutor v. Mengistu et al., S.P.O Investigation File No. 401/85, Reply Submitted in Response to the Objection Filed by Counsels for Defendants, ¶ 1(6) (Ethiopian Special Prosecutor's Office, May 23, 1995).

however. The doctrine of command responsibility imputes accountability to individuals higher in command on the basis that they exercise "effective control" over their subordinates through a chain of command and are expected to enforce compliance with IHL through measures, such as obtaining regular reports.[226] The military chain of command is designed to minimize disobedience and is buttressed by the imposition of criminal sanctions on superiors who fail to exercise appropriate oversight over their subordinates.[227] In contrast, the nature of the artificial intelligence programming tools is conducive to a robot performing in an unanticipated manner. It has been established that an individual programmer lacks "effective control" over LAWS when it is operating on the battlefield. The LAWS cannot be linked to the head programmer using a chain of command. In order for a superior to be held accountable, the superior should have "effective control" over the subordinate, and the subordinate should in turn possess "effective control" over his or her respective subordinate.[228] When the subordinate tasked with monitoring the conduct of LAWS lacks "effective control" over the robot, the head programmer too lacks "effective control" over the machine. It is concluded that the head programmer does not exercise "effective control" over LAWS when it operates on the battlefield.

There is another hurdle for imputing "effective control" to the head programmer. For there to be "effective control" the superior should have the requisite degree of control over a subordinate at the time of the commission of the crime.[229] Chantal Meloni explains the rationale for this requirement.[230] The person who by failing to control the subordinates creates a risk that crimes will be committed cannot be a different individual from the person who fails to take reasonable and necessary measures to prevent this risk from materializing.[231] The fact that the possibility of inflicting sanctions for disobedience is closely-linked to an individual's ability to control the conduct of subordinates substantiates Meloni's reasoning.

Yet, it is unclear whether the head programmer will have an opportunity to regularly monitor the performance of the software after the government agency transfers the robot to the armed forces. The software architecture of LAWS is fluid, due to the robot modifying some of its elements.[232] Accordingly, it is necessary to monitor the robot's architecture. Even if the head programmer possesses "effective control" over subordinates at the armed forces who regularly

226 Rep. of the Int'l Commission of Inquiry on Darfur to the U.N. Secretary General, ¶ 558 (Jan. 25, 2005) [hereinafter Inquiry on Darfur]; Blaškić, *supra* note 220.

227 National Defense and the Canadian Armed Forces, *Chapter 1: The purpose of Military Justice*, Government of Canada (2017), *available at* www.forces.gc.ca/en/about-reports-pubs-military-law-summary-trial-level/ch-1-purpose-of-mil-justice.page.

228 Inquiry on Darfur, *supra* note 226.

229 Prosecutor v. Čelebići, IT-95-21-A A.Ch., Judgment, ¶ 306 (Feb. 20, 2001); Prosecutor v. Gombo, ICC-01/05-01/08-424 Pre Trial Chamber II, Decision Pursuant to Art 61(7)(a) and (b) of the Rome Statute, ¶ 418 (June 15, 2009).

230 Meloni, *supra* note 151.

231 *Id.*

232 Wallach, *supra* note 63.

check how the robot operates on the battlefield and report back to him or her, the nature of the artificial intelligence software renders it difficult for the subordinates to predict what decision a LAWS will select on any given mission. These subordinates will not always be able to acquire notice of the danger that the robot may perform in an unjustifiable manner. In cases where the recording boxes do not provide a comprehensive snapshot of the neural network and how LAWS reaches each conclusion, the subordinate lacks "effective control" over LAWS. Since the subordinates lack "effective control" over the LAWS so does the head programmer. On the other hand, subordinates who have the tools to monitor operations and to learn how LAWS produces solutions may be held accountable due to possessing "effective control" over LAWS. The head programmer who possesses "effective control" over such subordinates may too be held accountable.

Another question is whether the head programmer has a material ability to prevent LAWS from triggering a war crime on the ground of being able to test its performance in simulated battlefield scenarios. This suggestion is problematic because it assumes that it is possible to test exhaustively how software components interact and how LAWS will perform in each battlefield situation. Robots with artificial intelligence are "complex adaptive systems" which can reorganize themselves in a fundamental way after encountering a "tipping point" event.[233] For this reason, it is very expensive "if not impossible" to fully test them.[234] The assertion that it may be impossible to fully test robots is further supported by the fact that individuals cannot foresee every scenario a soldier or a robot may encounter on the battlefield.[235] Soldiers receive general instructions, such as to open fire if there is an "imminent threat" to their life, rather than detailed guidance on how to act in a prescribed set of situations because the battlefield is unpredictable.[236] Since one cannot foresee every scenario a soldier can encounter neither can LAWS be exposed to all possible battlefield scenarios in a simulated environment. For this reason programmers cannot comprehensively test LAWS.

Although the head programmer will strive to create reliable machines, the nature of the artificial intelligence software is conducive to a LAWS performing in an unforeseen manner. Every time a robot learns a new task its algorithm alters itself in order to ensure that the robot performs differently in the future.[237] The changes to the software accumulate. At some point these alterations could result in a fundamental reorganization of the software's architecture.[238] It is difficult to see how a head programmer who cannot foresee how LAWS will change its algorithm after being exposed to a new scenario on the battlefield retains a material ability to prevent the commission of crimes. Of course, with the development of

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233 *Id.*

234 *Id.*

235 *Id.*; Lin et al., *Autonomous Military Robotics: Risk, Ethics, and Design*, 78 Ethics & Emerging Sciences Group at Cal. Polytechnic St. U. 1.0.9 (2008).

236 COMMANDER ALAN COLE ET. AL., SANREMO HANDBOOK ON RULES OF ENGAGEMENT 31 Annex B (Int'l Inst. of Humanitarian L. 2009); Lin, *supra* note 235, at 32.

237 Wallach, *supra* note 63.

238 Wallach, *supra* note 63.

technology this state of affairs may change. When it becomes possible to track the internal workings of the software, a head programmer will fulfil more criteria for "effective control."

Depending on how technology advances, it may or may not be possible to employ the doctrine of command responsibility to hold government employees who create a robot's architecture accountable when LAWS performs in an unforeseen fashion.

When "effective control" over a machine cannot be imputed to a programmer or a head programmer, those higher in command who tasked the programmers with creating a LAWS lack "effective control" over the machine. The result is that the government officials at the Department of Defense responsible for certifying LAWS may be held accountable under the doctrine of command responsibility only where the individual programmer and the head programmer had "effective control" over the LAWS when it was operating on the battlefield. In practice, the fluid nature of the artificial intelligence software and the nascent nature of tools employed to record the workings of the neural network render it challenging to impute "effective control" to any individual in the government agency.[239]

b. Employees of a corporation

A situation where the government outsources to a corporation the task of designing and manufacturing LAWS will now be considered. There is nothing in the doctrine of command responsibility limiting its application to particular institutions or actors. The doctrine of command responsibility focuses on the degree of control a superior has rather than on his or her identity.[240] For instance, in the Prosecutor v. Musema case the ICTR found a tea factory manager liable for failing to prevent his employees from carrying out acts of genocide against the Tutsis.[241] It can be gleaned from this case that the degree of control the programmer, head programmer or the manager has over a robot is more important than whether that individual works for a corporation, the armed forces or a government agency. Likewise, it is immaterial how many subordinates a superior has or what position in the hierarchy he or she occupies.[242] Consequently, it is neither pertinent that a head programmer may be at the low tier in a corporate hierarchy nor that he or she is a creator of many mass-produced LAWS.

The closest analogy to applying the doctrine of command responsibility to corporate employees is that of Private Military and Security Companies (hereinafter PMSCs). Governments hire PMSCs to perform similar tasks to the armed

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239 Matthias, *supra* note 32.

240 Prosecutor v. Bagilishema, ICTR-95-1-A-A A.Ch., Judgment, ¶ 52 (Int'l Crim. Trib. for Rwanda July 3, 2002).

241 Prosecutor v. Musema, ICTR-96-13-T, Judgment and Sentence, ¶ 894-895 (Int'l Crim. Trib. for Rwanda Jan. 27, 2000).

242 Prosecutor v. Kunarac, IT-98-23/-23/1 T.Ch., Judgment, ¶ 398 (Int'l. Trib. for the Prosecution of Persons Responsible for Serious Violations of Int'l. Humanitarian L. Committed in the Territory of the Former Yugoslavia Feb. 22, 2001).

forces, ranging from analyzing intelligence to conducting military operations.[243] For instance, the U.S. hired the services of Six3 Intelligence Solutions in July 2016 to provide intelligence analysis in Syria as part of its fight against the Islamic State militant group.[244] The main challenge for applying the doctrine of command responsibility to the managers of such companies is that they are not in the chain of command to the armed forces and commanders in the armed forces may lack disciplinary authority over the employees of PMSCs.[245]

The similarity between the PMSC and robotic context is that in both cases the corporation's employees operate in a separate chain of subordination to the armed forces. The difference is that LAWS operates under a dual chain of command. A programmer creates the parameters within which LAWS operates while the operator brings into operation the robot's software by issuing instructions to it. This raises the question whether the solutions scholars have developed for extending the application of the doctrine of command responsibility to the PMSC context can be transplanted to the context of a corporation employee's exercise of control over LAWS.

Chia Lehnardt posits that supervisory personnel of PMSCs are in a functionally equivalent position to military commanders where they are: 1) former military officers, 2) exercise authority in a similar way to military commanders, 3) operate in a hierarchically structured organization, and 4) can report crimes to competent government authorities.[246] Micaela Frulli relies on the Prosecutor v. Musema case to argue that the senior managers in PMSCs have "effective control" over the personnel in the field because they hire employees and can dismiss them as a sanction for failing to properly discharge a task.[247] The ICTR held in Prosecutor v. Musema that Musema was in a position to take reasonable measures to prevent his employees from committing genocide while they were engaged in their professional duties because they retained the power to appoint and remove the employees.[248] The scholarship of Lehnardt and Frulli creates a framework whereby the perpetrator's act is imputed to the immediate superior, and the superior's failure to properly supervise the offender is attributed to his or her manager.

The solutions scholars crafted for the PMSC context do not hold for the robotic context. When a robot performs unlawfully, there are hurdles to employing the doctrine of command responsibility to impute the war crime to an act or

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243 Teresa Welsh, *Who is Fighting America's Battles?* U.S. NEWS & WORLD REPORT (Sept. 11, 2014), http://www.usnews.com/opinion/articles/2014/09/11/private-military-contractors-are-helping-fight-americas-wars.

244 Kate Brannen, *Spies-for-Hire Now at War in Syria,* THE DAILY BEAST (Aug. 18, 2016), http://www.thedailybeast.com/articles/2016/08/09/spies-for-hire-now-at-war-in-syria.html.

245 Chia Lehnardt, *Individual Liability of Private Military Personnel under International Criminal Law*, 19 EUROPEAN JOURNAL OF INT'L LAW, 1016, 1025-26 (2008).

246 *Id.*

247 Micaela Frulli, *Exploring the Applicability of Command Responsibility to Private Military Contractors*, 15 J. OF CONFLICT & SEC. LAW 435, 464 (2010).

248 Prosecutor v. Musema, ICTR-96-13-T, Judgement and Sentence ¶ 880 (Int'l Crim. Trib. For Rwanda Jan. 27, 2000).

omission of a particular individual. As has already been shown, the degree of control programmers have over LAWS when it is operating on the battlefield does not amount to "effective control." It is likely that the corporation's employees, such as the head programmer, will not oversee further operations and software updates upon the sale of LAWS. Even if corporate employees do provide oversight, it is difficult to establish "effective control" between them and LAWS. Although the head programmer endorses instructions on which LAWS performs, the machine modifies its software on the battlefield as it is exposed to new scenarios.[249] It is maintained that a superior who cannot predict how the software will modify itself and monitor the performance of the machine lacks a material ability to prevent LAWS from triggering an international crime.[250] Since the head programmer lacks "effective control" over a LAWS, so do superiors higher in the corporate hierarchy, such as corporate managers. The result is that accountability cannot be imputed to the managers although managers meet certain criteria for possessing "effective control" over their subordinates. Managers have the capacity to influence the corporation's structure and to market LAWS; both aspects are indicia that the individual possesses "effective control."[251]

This outcome, however, is paradoxical because it runs counter to the rationale of the doctrine of command responsibility. It is odd that the doctrine of command responsibility is not applicable to individuals who design and implement software into LAWS. The purpose of the doctrine is to ensure compliance with IHL.[252] Arguably, these individuals are in the best position to prevent it from performing unlawfully. This outcome can be explained on the ground that judges formulated the doctrine of command responsibility with traditional military institutions in mind.[253] Such institutions are characterized by a clear hierarchy and chains of command.[254] The elements of command responsibility are based on the concept of responsible command.[255] The concept of responsible command requires that commanders issue instructions to their subordinates which comply with IHL, maintain an organizational structure that facilitates the maintenance of discipline

249 Wallach, *supra* note 63.

250 *Id.*

251 The International Criminal Court held that the capacity to change the command structure, control over the means of waging war, ability to communicate on behalf of the group and representing the group's ideology are indicia of "effective control." Prosecutor v. Gombo, ICC-01/05-01/08-3343 T.Ch. III, Judgment, ¶ 188 (Mar. 21, 2016). Clearly, there is a parallel between the ability to change the command structure and to alter a corporation's organizational structure. Since weapons are indispensable to waging war and since resources are needed to manufacture a LAWS, control over finances can be analogized to control over weapons. Since representation of the group's ideology and communication on behalf of the group relate to representing the group to the public, this aspect can be equated with informing the public about the products the corporation is producing.

252 Halilović, *supra* note 148.

253 *In re. Yamashita*, 327 U.S. 1, 14-17 (1946) [hereinafter Yamashita].

254 RAY MURPHY, U.N. PEACEKEEPING IN LEBANON, SOMALIA AND KOSOVO: OPERATIONAL AND LEGAL ISSUES IN PRACTICE 134 (Cambridge University Press. 2007) [hereinafter Ray Murphy].

255 Prosecutor v. Hadžihasanović, Case No. IT-01-47-AR72 A. Ch., Appeals Chamber Decision on Interlocutory Appeal Challenging Jurisdiction in Relation to Command Responsibility, ¶ 22 (Jul. 16, 2003).

and ensure that subordinates observe IHL.[256] By focusing on the issuance of orders and enforcement, the principle of responsible command arguably envisions that commanders retain control over communication with their troops.[257]

The central assumption that commanders have a duty to retain control over their subordinates may be further gleaned from the nature of the Prosecutor's charges in United States v. Yamashita. Yamashita faced charges before the United States Military Commission for having "unlawfully disregarded and failed to discharge his duty as commander to control the operations of the members of his command, permitting them to commit brutal atrocities and other high crimes."[258] Although on appeal Justice Frank Murphy of the United States Supreme Court in his dissent argued that Yamashita could not control the troops due to losing communication with them, what is relevant here is the content of the doctrine of command responsibility rather than whether the court correctly applied the law to the facts.[259]

The creators of LAWS do not maintain control over and communication with LAWS. The two elements are implicit in how the doctrine of command responsibility envisages a superior-subordinate relationship. The fact that programmers collaborate on designing LAWS is not captured by the doctrine of command responsibility. The doctrine assumes that there is a particular superior who issues instructions and enforces compliance. Programmers cannot foresee all the solutions that LAWS will generate to particular scenarios on the battlefield. This fact makes it difficult for them to monitor and adjust their performance.

c. *Procurement officials*

Geoffrey Corn believes that a solution lies in modifying the doctrine of command responsibility in order to hold officials who are responsible for weapons procurement liable.[260] The rationale is that procurement officials make the decision that LAWS is an appropriate technology to deploy.[261] These officials are thus in the best position to prevent the commission of crimes.[262] Because the decision whether to employ LAWS that may perform unreliably entails a moral judgment and has grave consequences for individuals enjoying immunity from attack, such officials ought to be held accountable. The doctrine of command responsibility in its present form is unsuitable for this end because it assumes that

256 The Hague Convention No. IV of 18 October 1907, Respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land Art. 1, Oct. 18, 1907, 36 Stat. 2227, Treaty Ser. No. 539; Prosecutor v. Hadžihasanović, Case No. IT-01-47-PT T.Ch., Decision on Joint Challenge to Jurisdiction, ¶ 66 (Nov. 12, 2002).

257 *Id.* This argument is derived from the fact that the principle of command responsibility is concerned with duties associated with commanding the troops and with ensuring that the force is organized. Hadžihasanović, *supra* note 255.

258 United States v. Tomoyuki Yamashita, 4 L.R.T.W.C. 3-4 (United States Military Commission in Manila, 1945).

259 In re. Yamashita, *supra* note 253, at ¶ 34-35.

260 Corn, *supra* note 128, at 23.

261 *Id.*

262 *Id.*

a superior has command over a subordinate; yet, procuring officials will "rarely" be in this position.[263] None of these officials will input an order into LAWS or monitor its performance because this is usually the responsibility of the operator.

To determine what individual or individuals should be held accountable when LAWS performs unlawfully on the basis of possessing authority over it, a looser concept than "effective control" needs to be applied. The concept of power is useful to apply to study this question because 1) LAWS falls into a sui generis category between a weapon system and a subordinate, 2) those who decide on the robot's architecture may exercise power over other individuals involved in designing and manufacturing the robot, 3) multiple stakeholders, such as the corporation and the Department of Defense, may have input in different degrees into the design of LAWS, and 4) the relevant stakeholders may interact with each other in complex ways. The next section will survey through what mechanism the exercise of power occurs so as to create an accountability framework for the robotic context.

IV. Using the Lens of Power to Develop an Accountability Framework

This section will analyze how organizations exercise power to show that accountability should be attributed to numerous individuals on the basis of the fact that they exercise power over LAWS. Different individuals and societies attach varied labels to the term power.[264] Mark Haugaard explains that sociologists and political theorists give different definitions to the term power because the aspects they focus on depend on the nature of the problem they are studying.[265] Specifically, in using the term power, social and political scientists refer to related but different phenomena because each theory captures different dimensions of the notion of power.[266] The work of scholar Boaventura de Sousa Santos intimates that definitions which distort reality are useful as long as one knows the mechanism by which the concept alters reality.[267] Michel Foucault's theory of power will be employed as a starting point for understanding 1) how organizations, such as the armed forces and the corporation, exercise power, and 2) who may be described as the architect of LAWS when the corporation and the Department of Defense contribute to the design in different degrees. Given the fact that Foucault wrote extensively on the subject of power, only the most relevant aspects of his

263 Corn, *supra* note 128, at 21.

264 Robert A. Dahl, *The Concept of Power*, 2 BEHAVIORAL SCIENCE 201 (1957).

265 Mark Haugaard, *Power: A 'family resemblance' concept*, 13 EUR. J. OF CULTURAL STUD. 419, 429 (2010).

266 *Id.* at 420.

267 Boaventura De Sousa Santos, *Law: A Map of Misreading. Toward a Postmodern Conception of Law*, 14 J. L. AND SOC'Y 282-83 (1987). De Sousa Santos obsérves that individuals use maps in order to facilitate their ability to orient themselves in their environment. However, in order to enable individuals to orient themselves in their surroundings, maps necessarily cannot replicate reality. For instance, maps condense or magnify distance; the map contains a scale to convey what distance on the map corresponds to actual distance. De Sousa Santos elaborates that as long as the user knows the mechanism by which the map distorts reality, the map can show the truth to that individual notwithstanding the fact that it distorts reality.

theory to the present discussion will be laid out. After showing why Foucault's theory of power is promising for mapping how power is exercised in corporations and the armed forces, his theory will be applied to trace who exercises power over LAWS.

A. The value of Michel Foucault's theory of power

To analyze why Foucault's theory is valuable, it is first necessary to know the main concepts. Foucault is not concerned with defining what power is.[268] Rather, he focuses on showing through what mechanisms the state and institutions exercise power over individuals.[269] The merit of Foucault's approach is that by examining what the exercise of power entails, he allows us to crystallize what elements this mechanism is comprised of. The disadvantage of defining an abstract concept, such as power, is that it encourages making relative assessments on issues, such as whether an individual who has considerable influence over another individual possesses power.

For Foucault power is neither about coercing another person to act in a particular way nor about consent to be governed.[270] Rather, the exercise of power leads to the array of actions open to an individual to be limited; this is achieved by leading an individual to internalize particular behavior and to voluntarily act it out.[271] In effect, the exercise of power influences the likelihood of an individual engaging in a particular behavior.[272] When individuals do not have an array of possible actions open to them, power may not be said to be exercised.[273] Yet, for Foucault power is not vested in a particular person or group of persons.[274] The exercise of power comes about through particular mechanisms being incorporated into the architecture of an institution or society.[275]

Foucault posits that the way in which individuals exercise power over things differs from the manner in which individuals exert power over others.[276] Power over things is about "capacity."[277] Individuals derive power over objects through using the aptitudes of their body to modify, use, consume and destroy things.[278] On the other hand, power over individuals entails "relations" between individuals

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268 MICHEL FOUCAULT, POWER 326 § III (Paul Rabinow ed., Robert Hurley and Others trans., The New Press. 2000) [hereinafter POWER].

269 *Id.* at 342.

270 *Id.* at 341.

271 *Id.*

272 *Id.*

273 *Id.* at 342.

274 MICHEL FOUCAULT, DISCIPLINE & PUNISH: THE BIRTH OF THE PRISON 202 (Alan Sheridan trans., Vintage Books 2 ed. 1995) [hereinafter DISCIPLINE & PUNISH]; MICHEL FOUCAULT, POWER/KNOWLEDGE: SELECTED INTERVIEWS AND OTHER WRITINGS 1972-1977 98 (Colin Gordon ed., Colin Gordon, et al. trans., Pantheon Books 5 ed. 1980) [hereinafter POWER/KNOWLEDGE].

275 DISCIPLINE & PUNISH, *supra* note 274, at 202.

276 POWER, *supra* note 268, at 337.

277 *Id.*

278 *Id.*

and groups; institutions underpin the exercise of power.[279] Although programmers apply their aptitudes in creating software for LAWS, the manner in which they exercise power over the robot is closer to Foucault's conception of how power is exercised over individuals. To illustrate, imagine that there is a single programmer who designs LAWS. When an individual manipulates an object, he or she knows what end state will be attained. The programmer employs his or her capacity to create the robot's architecture. However, once the LAWS becomes operational, the programmer can no longer use his or her capacities to control how it performs. Neither can the programmer modify the robot's architecture. The way in which the programmer continues to exercise power over LAWS once it is on the battlefield resembles how individuals exercise power over other individuals. Because LAWS will work on probabilistic algorithms, a software creator does not know what assessment the machine will produce in a given situation.[280] The programmer can merely predict the range of actions open to the machine because the software creates parameters for the range of possible conduct. Imposing constraints on the range of solutions a machine can generate matches how Foucault conceptualizes the exercise of power over individuals.

When a programmer tests the LAWS in a simulated battlefield environment and adjusts its software, the programmer is in a similar position to a superior who trains troops. Through providing soldiers with feedback on their performance, the commander modifies their conduct. For instance, soldiers learn what degree of certainty they should have before opening fire on a target by being reprimanded for shooting when they encounter suspicious behavior. Analogizing LAWS to human beings for the purpose of describing how individuals exercise power over the robots is not as far-fetched as it might appear at first sight. Although soldiers possess agency, the armed forces apply institutional mechanisms, such as the doctrine of command responsibility, to limit decision making.

Foucault describes individuals over whose bodies the state exercises power as "small machines," "political puppets" and "small-scale models of power."[281] Lethal autonomous weapons systems may be characterized in these terms too because the software predetermines the array of decisions they can generate. Moreover, operators will choose when to employ LAWS, where and for what tasks. The fact that Foucault's theory of power captures how the software creator exercises power over LAWS and how institutions exercise power in general indicates that his theory is fruitful for identifying who exercises power over LAWS.

Foucault argues that the state, armies, factories, schools and other organizations employ the same methods in order to exert power over the population.[282] The value of Foucault's approach is that he developed a single theory to capture how organizations that are of interest to the present enquiry, such as the armed forces, the corporation and the Department of Defense operate. For instance, the

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279 POWER, *supra* note 268, at 337.

280 Zoubin Ghahramani, *Probabilistic machine learning and artificial intelligence*, 521 NATURE, 452 (2015); Russ Altman, *Distribute A.I. benefits fairly*, 521 NATURE 417, 418 (2015).

281 DISCIPLINE & PUNISH, *supra* note 274, at 136.

282 POWER, *supra* note 268, at 218-19.

factory is a precursor to the corporation because both entities employ individuals for the purpose of producing goods (and in the case of a corporation services too). The fact that Foucault's theory accurately describes institutional mechanisms for exercising power is evidenced by the fact that it captures core features of the doctrine of command responsibility.

According to Foucault metaphorically speaking society and its institutions are a machine which, through distributing individuals in particular spaces in relation to each other and in relation to the source of power, achieve the exercise of power.[283] Power is "capillary" in that it permeates legal regulations, institutions and techniques which are used to shape social practices and the overall social "climate."[284] Power circulates between individuals and through institutions.[285] Multiple forces sculpt individuals and their thoughts.[286] An individual can simultaneously exercise power over others and have power being exercised over him or her.[287] For instance, a director can be positioned to spy on his or her employees; an inspector could arrive unexpectedly and assess the director's performance.[288]

Under the doctrine of command responsibility, power is exercised by positioning individuals in a particular relation to each other, namely through the creation of a superior-subordinate relationship. The power to supervise and discipline is concentrated in the commander but also circulates with commanders being disciplined by those higher in the chain of command. The expectation that the commander remains informed of the conduct of the subordinates, including through creating a system for reporting and through identifying risk factors, such as intoxication or violent character of a subordinate, is arguably reminiscent of Foucault's mechanisms of constant surveillance.[289] Foucault's envisioning of the exercise of power flowing from the centre down through the capillaries is well suited for examining the context where multiple stakeholders may be involved in creating specifications for LAWS and where many individuals are involved in designing LAWS but where there is an individual or individuals in whose hands the power is concentrated.[290]

Foucault employs the term "disciplines" to denote modes of organization that the state and organizations employ in order to exert power over the population.[291] The three elements of "technical capacities," "game of communications" and "the relationships of power" together constitute a means through which individu-

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283 *Id.*

284 POWER/KNOWLEDGE, *supra* note 274, at 96-97.

285 *Id.* at 98.

286 *Id.* at 97.

287 *Id.* at 98.

288 DISCIPLINE & PUNISH, *supra* note 274, at 204.

289 Prosecutor v. Čelebići, Case No. IT-95-21-A A.Ch., Judgment, ¶ 238 (ICTY Feb. 20, 2001); DISCIPLINE & PUNISH, *supra* note 274, at 214.

290 POWER/KNOWLEDGE, *supra* note 274, at 96.

291 POWER, *supra* note 268, at 218-19.

als in an institution exercise power.[292] The institutions deploy these three elements using a particular formula and adjust the weight the formula places on a given element depending on the requirements.[293] The element of "technical capacity" refers to activities or tasks aimed at producing a particular outcome.[294] Examples include training individuals to master a skill or to manufacture a product.[295] To illustrate, universities employ activities, such as classes, as well as question and answer sessions to ensure that students acquire certain aptitudes and types of behavior.[296] The element of communication involves individuals communicating to each other; an example would be workers who collaborate on transforming objects.[297] The third element, namely the relations of power, is needed to enable goal directed activities to operate.[298] For instance, there may be an individual who supervises how the workers carry out their duties and assigns tasks to each worker.[299]

Foucault's description of how power is exercised maps well onto how the doctrine of command responsibility conceptualizes of authority. The doctrine of command responsibility envisages that the commander and the troops are engaged in a goal-directed activity of carrying a military operation. As predicted by Foucault, there is a hierarchical division of labor.[300] The commander learns how to exercise command while soldiers learn how to implement the commander's objectives. The commander uses techniques, such as training troops in IHL and disciplining soldiers for violations, in order to constrain the array of actions open to the troops. Foucault refers to these techniques as a "technical capacity."[301] The doctrine of command responsibility presupposes that commanders use orders to communicate with the soldiers. This is congruent with Foucault's proposition that individuals use means, such as orders, to communicate with individuals over whom they exercise power.[302] The assumption in the doctrine of command responsibility that for there to be a superior-subordinate relationship the subordinate should regard himself or herself as bound to follow orders and that there are hierarchical structures to enforce obedience are consistent with Foucault's claim that the relations of power permeate institutions to make it possible to achieve particular goals.[303]

Additionally, the passing down of orders through the chain of command in the armed forces and the forwarding of reports from low level commanders to high

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292 *Id.* at 339.

293 *Id.* at 218-19.

294 *Id.* at 338.

295 *Id.*

296 *Id.* at 338-39.

297 POWER, *supra* note 268, at 338.

298 *Id.*

299 *Id.*

300 *Id.*

301 *Id.*

302 POWER, *supra* note 268, at 338-39.

303 Ferreira, *supra* note 167; Blaškić, *supra* note 166, at ¶ 333; POWER, *supra* note 268, at 217-18.

level commanders can be likened to power operating through a capillary system. The fact that subordinates may exercise judgment and enjoy discretion in assessing whether the order is lawful is consistent with Foucault's claim that individuals continue to have a range of options open to them notwithstanding the fact that power is exercised over them.[304] Foucault's theory will now be employed to establish whether a programmer, a corporate manager, a Department of Defense official or a combination of these individuals exercise power over LAWS.

B. Applying Michel Foucault's theory to the robotic context

This section will show that under Foucault's theory accountability can be imputed to individuals across the hierarchy employed by the weapon manufacturer and in some cases to the procurement officials. The three components of the mechanism entailed in exercising power to which Foucault refers to as the "disciplines" map onto the interface between the programmer and LAWS. In designing LAWS to accurately identify targets on the battlefield and to engage them, the software creator carries out a task aimed at achieving a particular outcome. This relationship fits into the element of "technical capacities." Foucault defines communication as the use of language, system of signs and other symbolic mediums in order to act upon another person.[305] In creating a neural network or a genetic algorithm as a basis for software, the software creator uses the medium of a software to induce LAWS to exhibit particular responses. Consequently, the software creator fulfils the third element of the "disciplines." It follows that the software creator exercises power over the LAWS by virtue of creating its architecture and determining what tasks it will be able to perform.

Of course, in practice many programmers collaborate on creating the software. Because the software cannot function if one or two program components were to be removed, the programmers collectively act upon a robot. Conversely, no single programmer constrains the range of actions open to LAWS because the software cannot operate if the program is incomplete. Therefore, the programmers collectively exercise power over LAWS. Significantly, the programmers do not exert power over each other. Although programmers can exchange information with each other and debate on the best design for the robot they lack a position in the organizational hierarchy to be able to constrain each other's actions. On the application of Foucault's writings, one must look beyond individuals who exercise power over the LAWS due to creating its architecture. According to Foucault, there can be individuals exercising power over other individuals who hold power.[306] One should trace how power operates at the extremities to the locus where power is concentrated.[307] For this reason, it is necessary to establish who ultimately exercises power over LAWS when it is operating on the battlefield due to exercising power over the programmers.

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[304] POWER, *supra* note 268, at 341.

[305] *Id.* at 337.

[306] DISCIPLINE & PUNISH, *supra* note 274, at 204.

[307] POWER/KNOWLEDGE, *supra* note 274, at 99.

The relationship between the head programmer and individual programmers fulfils Foucault's three elements of a mechanism for the exercise of power. Because the head programmer occupies a higher position in the hierarchy and is able to issue instructions to programmers, the head programmer is in a position of power in relation to them. Through giving instructions and receiving reports on their implementation, the head programmer relies on communication to constrain the array of actions available to the programmers. Furthermore, the creation of LAWS constitutes a "goal-directed activity" because the programmers collaborate on a particular task. It emerges that the head programmer exercises power over the programmers.

Does Foucault's theory solve the puzzle of whether the team of programmers exercises power over LAWS at the time it triggers a war crime on the battlefield? The following examples illustrate the conundrum. On the one hand, the LAWS's architecture predetermines the range of acts it can carry out and the range of possible interactions between software components. On the other hand, unless the software's design is flawed, the robot's unjustifiable performance will be due to the fluid nature of artificial intelligence software and due to programmers necessarily having limited foreseeability regarding how the robot will perform. The LAWS triggers the commission of a crime because the programmers cannot anticipate the entire range of conduct available to the machine. On this reasoning, it is questionable whether the team of programmers and therefore the head programmer exercise power over LAWS if they do not know the exact array of conduct available to the machine.

On the application of Foucault's theory, the programmers exercise power over LAWS at the moment it brings about a war crime while operating on the battlefield. Foucault posits that there can be no exercise of power when the subject lacks freedom.[308] The subject possesses freedom when power is exercised over him or her because the subject can select among an array of possibilities he or she regards as being available.[309] Another dimension of freedom is that the subject can refuse to submit to the exercise of power.[310] There is a similarity between LAWS performing in an unjustifiable manner and a human being acting beyond the range of actions the holder of power wishes to be available to him or her. While an individual exercises agency in reaching decisions, LAWS can perform in an unjustifiable manner due to modifying its software. The fact that LAWS lacks agency is immaterial for the purposes of the present enquiry. What is relevant is through what mechanisms individuals exercise power rather than the process which enables individuals to act contrary to the power holder's wishes. Under Foucault's definition, the programmers exercise power over LAWS even when it does not perform as intended. To argue otherwise would be absurd because LAWS relies on its software even when it performs in an unjustifiable manner. In turn, the head programmer exercises power over the programmers.

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308 POWER, *supra* note 268, at 342.

309 *Id.*

310 *Id.*

A more crucial difference between human subjects and LAWS is that Foucault envisages that the mechanism for exerting power positions individuals so that they feel "permanent, exhaustive, omnipresent surveillance."[311] This aspect neutralizes individuals and groups who resist its power without the need for someone to intervene to prevent them from engaging in a particular behavior.[312] Because LAWS are not self-reflexive and lack agency, they cannot experience themselves as being under constant surveillance. Neither are programmers able to monitor the grounds on which LAWS generates solutions and how it modifies its software. This difference is immaterial for the purpose of the present analysis. The value of Foucault's theory for the purpose of the present enquiry lies in him explaining how power is exercised rather than why individuals obey. LAWS will in many cases perform according to the intentions of the programmers due to the software circumscribing the array of solutions it can generate and the range of acts it can carry out.

In corporations and government agencies there is likely to be a manager who gives the head programmer specifications about what kind of machine to create and what standards the machine should meet. When LAWS performs in an unjustifiable manner, does the exercise of power over the robot extend to individuals higher in the hierarchy? The employment duties of the manager fall within Foucault's element of "technical capacities." Through monitoring the performance of the head programmer and through informing him or her whether the robot's architecture is adequate, the manager constrains the array of possible conduct available to the head programmer. This corresponds to Foucault's element of communication. By virtue of being in a position of authority in relation to the head programmer, the manager fulfils the third element of the mechanism through which power is exercised. This reasoning can be extended to top managers who oversee the work of the managers. On Foucault's approach, as long as the ability of the superiors to act upon their employees relates to the design and testing of the robot's architecture, that superior exercises power over the subordinate. Foucault's conception of the mechanism through which institutions exercise power allows one to trace the chain of accountability for the performance of LAWS to senior members of the corporation or the government agency responsible for designing LAWS.

It will now be scrutinized whether a Department of Defense procurement official or an official of a similar agency exercises power over a robot under Foucault's approach when he or she decides to acquire LAWS from a corporation. Let's initially imagine that the government agency does not communicate the design specifications to the corporation and does not take part in testing the robot. Government documents will state what specifications a product should fulfil in order to be eligible for procurement. Examples of the specifications are the ability of the armed forces to employ the LAWS in compliance with IHL, appropriate safeguards to prevent the machine from performing in an unjustifiable manner and reliability requirements. In practice, the closer the robot's de-

311 DISCIPLINE & PUNISH, *supra* note 274, at 214.

312 *Id.* at 219.

sign to the needs of the armed forces, the more likely the Department of Defense or a similar agency to buy that particular model. Consequently, the corporate managers will be constrained by the criteria which they perceive the government agency officials to be guided by when the agency determines from which company to procure the LAWS. The managers are likely to constantly monitor and adjust the robot's blueprint in light of their understanding regarding what machine the government agency wishes to purchase. A relevant consideration is that many governments, such as the U.S. and India, regard competition as a powerful tool to foster productivity.[313] Because the government agency chooses among numerous companies and because in practice corporations will tailor the product design to the perceived preferences of the government agency, the most senior decision-maker in the government agency responsible for procurement exercises power over individuals in a corporation determining what design LAWS should have.

In some cases the corporation and the government agency work closely together on the design of LAWS. Linda Gooden, the Executive Vice President of Lockheed Martin, explains that the company works with its customers to assess their needs in order to ensure that it is "delivering what they need, when they need it—and at a price they can afford."[314] Foucault's theory does not address a situation where individuals closely collaborate. According to Foucault, the architecture of a mechanism for exercising power positions individuals in a manner so as to prevent them from having contact with their companions.[315] Through minimising opportunity for communication, the operation of the mechanism prevents individuals from mutually influencing each other.[316] Accordingly, alternative theories will be applied in the subsequent section to address this scenario. What can be said at this stage is that the greater the role that the government agency plays in giving specifications for the robot to the corporation or in testing the robot, the greater the possibility of imputing power to the government agency officials over the senior members of the corporation due to narrowing the array of decisions open to the corporate decision-makers.

When LAWS performs in an unjustifiable manner, due to a feature in its design of which the programmers were unaware, the government agency exercises power over the corporation but not over the robot. Let us consider a situation where LAWS inferred that it is permissible to kill civilians based on observing the unlawful conduct of the adversary. Manufacturing LAWS that do not enable the armed forces to fulfil their obligations does not fall within a range of behavior that a government agency would want a corporation to pursue. Accordingly, the war crime LAWS brings about can be attributed to the corporate actors on the basis that they exercise power over it. Additionally, accountability could be at-

313 Memorandum from the U.S. Office of the Under Secretary of Defense to Department of Defense Acquisition Professionals, 9 (Sept. 14, 2010); Competition Commission of India, Public Procurement and Competition Law 3 (2015), http://cci.gov.in/sites/default/files/event%20document/p4.pdf?download=1.

314 Linda Gooden, *Executive Message: Customer Relevancy*, 4 CONNECT: INFO. SYSS. & GLOBAL SOLUTIONS (Lockheed Martin) no. 3, 2010, at 2.

315 DISCIPLINE & PUNISH, *supra* note 274, at 200.

316 *Id.*

tributed to procurement officials in cases where they exercise power over senior leaders in the corporation.

Do members of the armed forces exercise power over the LAWS when they deploy it on the battlefield? By deciding what task to assign to the LAWS, the operator sets the "goal-directed activity." However, the nature of the task the operator can assign to the LAWS is limited by the range of acts that the software architecture enables a robot to undertake. When an operator issues an instruction to the LAWS, it is the execution of the software that enables a robot to implement the order. Consequently, although an operator acts upon LAWS, it is the software creator who constraints the array of possible actions available to the robot. It follows that the power of the operator over the LAWS is embedded in the power the software creator exercises over the robot. On the application of Foucault's theory, the programmer and the operator exercise power jointly over LAWS when an operator orders it to carry out a war crime.

Yet, it is counter to the principle of personal culpability in international criminal law to attribute accountability to both the programmer and the operator in this scenario. The principle of personal culpability is that, "[N]obody may be held criminally responsible for acts or transactions in which he [or she] has not personally engaged or in some other way participated."[317] Activating the LAWS's mechanism by ordering it to shoot a civilian is similar to pressing a trigger of a rifle or driving a bulldozer with the aim of killing a civilian. When a programmer designs a reliable LAWS, he or she does not participate in the act of the operator ordering the robot to bring about a war crime. Neither does international criminal law treat weapon manufacturers who sell lawful products liable on the basis of aiding and abetting when the buyer uses the product to commit a war crime, as long as the manufacturer did not know that the buyer bought the article with the intent to commit an international crime and the nature of the crime being planned.[318] This raises the question whether Foucault's theory needs to be refined in order to make it possible to make more accurate attribution in the robotic context.

The application of Foucault's theory to analyze what actors exercise power over LAWS yielded an interesting insight that the government agency officials responsible for procuring weapons exercise power over corporate decision-makers when the two entities do not collaborate. In contrast to the doctrine of command responsibility, Foucault's theory points to the fact that individuals across the spectrum of the corporate hierarchy exercise power over LAWS even when they operate on the battlefield. The company directors can be the loci of power to the extent they create guidelines for what product should be created and monitor the performance of their employees. On this approach, accountability can be imposed on the procurement officials, company directors and the head programmer on the basis of exercising power over LAWS. Nevertheless, the fact that under Foucault's theory the software creator exercises power over LAWS when an op-

317 Prosecutor v. Tadić, IT-94-1-A, Judgment, ¶ 186 (ICTY Jul. 15, 1999).

318 *United States of America v. Carl Krauch et. al.*, Case No. 10, ¶ 1168 (Trials of War Criminals before the United States Nuremberg Military Tribunal under Control Council Law Jul. 30, 1948).

erator orders it to commit a crime calls for a more refined analysis of how organizations exercise power. The final limitation of Foucault's theory is that it does not tell us how to impute accountability when a terrorist or a rebel group creates LAWS.

C. Developing an accountability framework

An interdisciplinary perspective will be utilized with a view to understanding how corporations, armed forces, armed groups and terrorist cells exercise power. It will be shown that all these types of organizations exercise power through the same mechanism. Subsequently, the analysis will be employed to create a framework for imputing accountability in the robotic context.

1. Corporations

Because Foucault wrote with factories and state institutions in mind, his theory closely reflects how government agencies tasked with developing LAWS operate. However, his theory needs to be refined because how corporations function has changed since Foucault's writings. Specifically, in the past corporations used to have a hierarchical structure for exercising authority and control over the subordinates.[319] Senior office-holders, such as managers, were the ultimate decision-makers.[320] Increasingly, the leaders in different tiers of the hierarchy hold disparate degrees of power and authority in relation to each other and in relation to their subordinates.[321] Organizations have flat structures and managers derive their authority by fostering commitment and a sense of shared purpose among the team members rather than from their position in the organization.[322] Organizations are increasingly organized in this manner."[323] Involving individuals who are responsible for implementing the decisions of management in the discussions contributes to financial success.[324] The best practices indicate that top managers should set out organizational policies and strategies.[325] Meanwhile, the middle and lower management should have the autonomy to decide how the teams should be run from day to day.[326] Nevertheless, there is evidence that managers

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319 Michael Maccoby, *Why People Follow The Leader: The Power Of Transference*, HARV. BUS. REV. (Sept. 2004), https://hbr.org/2004/09/why-people-follow-the-leader-the-power-of-transference.

320 *Id.*

321 Oginni Babalola, et al., *A Study of Superior-Subordinate Relationship and Employees' Commitment to the Core Beliefs of Organisation in Public Universities of Southwest, Nigeria*, 3 AM. J. BUS. & MGMT. 28, 29 (2014).

322 Robert McKinney, et al., *Danger In The Middle: Why Midlevel Managers Aren't Ready To Lead*, HARV. BUS. PUB., 2013, at 1, 4.

323 Massimo Garbuio, et al., *How Companies Make Good Decisions: McKinsey Global Survey Results*, MCKINSEY & COMPANY (January 2009), http://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/how-companies-make-good-decisions-mckinsey-global-survey-results.

324 *Id.*

325 *Decision Making: How Much Does Hierarchy Matter?*, MGMT. STUDY GUIDE (2016), http://www.managementstudyguide.com/decision-making-and-hierarchy.htm.

326 *Id.*

lack substantial authority to bring about particular outcomes.[327] Managers, team leaders and team members influence the range of decisions their superiors consider as viable options through exchanging information, views and experiences. This mutual influence takes place in a context of asymmetrical power relationships. The reciprocal influence aspect and its implication for understanding how power circulates in corporations needs to be examined in greater detail because Foucault's theory excludes this dimension.

Corporate leaders exert power over the employees through configuring the group identity and interactions between members. According to the Management Study Guide, "[C]orporate decision-making is successful as long as there is a 'glue' to bind the organization together in the form of charismatic leaders or an organizational culture that values coherence and imposes stability."[328] Western companies create a corporate culture by communicating the company mission to the employees and by telling them to be guided by this mission.[329]

Raimo Tuomela's philosophical enquiry into how individuals act as members of a group suggests that corporations exercise power through creating a group with a distinct identity and through fostering a perception among the employees of belonging to the group.[330] Tuomela argues that individuals who regard themselves as belonging to a group with a distinct ethos and who are committed to the group ethos use group norms to decide what array of possible actions is open to them.[331] The group ethos, consisting of "constitutive goals, values, standards, beliefs, practices" serves as "the foundation for the unity and identity of the group."[332] The work of anthropologist Mary Douglas supports the assertion that the group channels how individuals perceive events and how they act.[333] She writes that institutions create categories which individuals apply in their thinking and fix their identities.[334] Institutional norms create expectations and individuals act in conformity with them.[335]

Furthermore, Robert Ellickson's work points to the fact that employees exercise power over each other by evaluating whether a group member's conduct conforms to group norms and through communicating to others when an individual's conduct deviates from the norm. According to Ellickson, close-knit groups create social norms that maximize the welfare of their members.[336] Additionally,

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[327] David Burkus, *Why Managers Are More Likely to Be Depressed*, HARV. BUS. REV. (Sept. 23, 2015), https://hbr.org/2015/09/why-managers-are-more-likely-to-be-depressed.

[328] *The Process of Corporate Decision Making*, MANAGEMENT STUDY GUIDE (2016), http://www.managementstudyguide.com/corporate-decision-making.htm.

[329] Eric Markowitz, *How to Create a Unified Culture in a Company With Multiple Offices*, INC. MAG. (Feb. 24, 2011), http://www.inc.com/guides/201102/how-to-create-a-unified-corporate-culture.html.

[330] RAIMO TUOMELA, THE PHILOSOPHY OF SOCIALITY: THE SHARED POINT OF VIEW 13 (2007).

[331] *Id.* at 124-25.

[332] *Id.* at 3, 5.

[333] MARY DOUGLAS, HOW INSTITUTIONS THINK 92 (1986).

[334] *Id.* at 112.

[335] *Id.* at 48.

[336] ROBERT C. ELLICKSON, ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES 184 (1991).

social norms define the identity of the group and membership criteria.[337] To exercise social control over each other, group members identify norms as well as rewards and punishments attached to particular conduct.[338] They rely on established lines of communication with each other so as to spread information about departure from a norm.[339] This informal method for social control may be mixed with enforcement through formal rules.[340] Ellickson defines a close-knit group as a group where the members have equal power.[341] He leaves it open whether the theory is applicable to groups where individuals hold disparate degrees of power.[342]

Although superiors and subordinates hold disparate degrees of power, Ellickson's theory arguably equally applies to corporations. Because corporations have a particular identity, culture, norms of conduct and relatively stable membership, they are a close-knit organization. The nature of human interaction is such that employees pass information to each other and to their superiors about the conduct of their peers. The superior relies on this information to punish deviation from the norms and thereby enforces the corporation's norms. Ellickson's work indicates that each employee exercises social control over other employees, that power circulates in the organization and that organizations rely on a mixture of formal and informal rules in order to enforce power. The role of the group and social norms in regulating employee behavior in corporations echoes Foucault's proposition that the conduct of individuals is constrained through being distributed in relation to other individuals in a particular way and that power circulates between individuals.[343] In sum, senior leaders exercise power over subordinates by establishing an asymmetric relationship between group members, by having employees enforce obedience through interacting with each other and by employees reporting conduct deviating from the norm. The group identity and norms define the array of possible exchanges that can take place between group members.[344]

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337 *Id.* at 233.

338 *Id.* at 184.

339 *Id.* at 214-15.

340 *Id.* at 254.

341 ELLICKSON, *supra* note 336, at 177.

342 *Id.*

343 DISCIPLINE & PUNISH, *supra* note 274, at 198; POWER/KNOWLEDGE, *supra* note 274, at 98.

344 Further support for this understanding of how corporations exercise power may be found in the scholarship of the sociologist Stewart Clegg. Clegg studied how organizations lead individuals to obey. Clegg hypothesizes that organizations create three circuits through which power flows in order control the conduct of individuals. He calls these circuits episodic, dispositional and facilitative power. Power may remain in the episodic circuit or flow between the three circuits. Episodic power involves configuring social relations in such a way that A can lead B to act in a way B would not have otherwise acted through communication. The dispositional circuit pertains to 1) rules of meaning, namely the organizational rules and norms shaping how the employees give meaning to concepts through interpretation, and 2) rules of membership prescribing how the group expects its members to act. This circuit of power produces the company's culture, goals to be pursued and organizational structure. The facilitative circuit refers to techniques of production and discipline. These include management practices, organizational structures, machinery to be used and business processes. Power is exercised by fixing relations and identifying "nodal points" through which discourse and exchange must pass. Rules of membership and

Given that non-Western countries will also manufacture LAWS, it is necessary to establish whether companies in other countries rely on group membership as a tool for exercising power. Japan was chosen as a case study because Western managers regard the Japanese business culture as "unique."[345] If similar patterns of exercising power are present in organizations that are perceived as being vastly different, then it can be argued that the identified mechanism for exerting power is not confined to a particular organization or culture. In Japan the relationship between the employer and the employee cannot be explained in contractual terms.[346] Rather, the employer-employee relationship is characterized as a mutual obligation and the employees are loyal to the company.[347] The company members view the corporation as a social group and receive each new member as a "newly born family member."[348] Ruth Wolf comments that the central principle of Japanese culture of integration with the group and of maintaining harmony in group relations results in individuals relinquishing their personal desires in order to uphold the interests of the group.[349] Wolf's observation points to the fact that Japanese corporations constrain the range of courses of actions the subordinates perceive as being available to them through creating a group with a distinct identity, fostering a sense of allegiance to the group and having an expectation that employees will adhere to group norms.

An important characteristic of the Japanese management style that is less present in Western companies is decision-making through consensus-building.[350] Although the Japanese managers employ an egalitarian method for decision-making, the Japanese workers are much less willing to question the assessment of their superiors than Western employees.[351] Accordingly, although the Japanese companies have a different structure and management philosophy in comparison to Western companies, they exercise power over employees in a similar manner. The case study of Japan illustrates that even when an organization has a horizon-

interpretation as well as the institutional structures create rules which a practice or a decision must satisfy in order to pass these "nodal points." As a result, individuals may exercise discretion but only within the parameters the rules of meaning, membership and practice prescribe. STEWART R. CLEGG, FRAMEWORKS OF POWER (SAGE Publications Ltd. 1997); STEWART R CLEGG, et al., POWER AND ORGANIZATIONS (SAGE Publications Ltd. 2006); JOÃO OLIVEIRA & STEWART CLEGG, ORGANIZATIONAL CONTROL AND CIRCUITS OF POWER (2014).

345 Andrew Miller, *Differences in Business Culture Between Japan and West*, JAPAN TODAY (Apr. 2, 2013), http://www.japantoday.com/category/lifestyle/view/differences-in-business-culture-between-japan-and-west.

346 NAKANE CHIE, JAPANESE SOCIETY 15 (Weidenfeld and Nicolson 1970) (quoted in John van Willigen & Richard Stoffle, *The Americanization of Shoyu: American Workers and a Japanese Employment System*, 28 ANTHROPOLOGY AND INT'L BUSINESS. STUDIES IN THIRD WORLD SOCIETIES 131 (Serrie Hendrick ed. 1984).

347 *Id.* at 129; Ruth Wolf, *Management Relations in the Work Culture in Japan as Compared to That of the West*, 2 INNOVATIVE J. OF BUS. AND MGMT. 116, 117 (2013).

348 CHIE, *supra* note 346, at 14.

349 Wolf, *supra* note 347, at 117.

350 Peter F. Drucker, *What We Can Learn from Japanese Management*, HARV. BUS. REV., (March 1971), https://hbr.org/1971/03/what-we-can-learn-from-japanese-management; Reina Hashimoto, *10 Cultural Contrasts between U.S. & Japanese Companies*, BTRAX (2016), http://blog.btrax.com/en/2010/12/15/10-cultural-contrasts-between-us-and-japanese-companies-a-personal-view.

351 Willigen & Stoffle, *supra* note 346, at 149.

tal structure and involves employees in decision-making, the managers continue to exercise power over their subordinates. This has significance for determining what individuals should be treated as having power over the decision how to design a robot.

To cross-check the broad applicability of the findings of how organizations exercise power, Nigeria will be used as a case study. Nigeria has over 250 ethnic groups and superiors manage teams consisting of individuals belonging to multiple tribes.[352] If a similar mechanism for exercising power exists in Nigeria, Japan and Western countries, then it is likely to manifest itself in other regions too. This is because Nigeria, Japan and Western countries are located in different parts of the globe and have divergent cultures. Moreover, it is significant if the same principle is equally applicable to managing a particular ethnic group and a group with mixed membership. According to Olu Ojo, a Nigerian scholar who studied the link between organizational culture and employee performance in Nigerian insurance companies, organizations have a shared system of meaning which creates a basis for communication and mutual understanding.[353] Culture acts as a bond which generates a sense of belonging to the organization.[354] The culture of the organization leads employees to forgo their personal interests and to act for the benefit of the whole; as a result, employees perform better.[355]

Ojo's study suggests that a feeling among the employees of belonging to a group with a particular identity and culture, namely the company, leads to them being more productive. This outcome is consistent with the finding made above that the elements of creating a group with a distinct identity, fostering a sense of belonging to the group, and associating particular conduct with promoting the interests of the group form part of a mechanism for exercising power over the employees. Significantly, many other studies confirm Ojo's observation. According to Ranya Nehmeh, a Western scholar, many studies demonstrate that employees who are committed to their organization exert greater effort, deliver better service quality and exercise control over their own conduct; this removes the need for supervision.[356] Nehmeh uses the following definition for commitment: 1) a wish to belong to an organization, 2) personal identification with the values and goals of the organization and 3) willingness to exert effort to benefit the organization.[357]

The combination of Foucault's theory and the present analysis of the role of group membership dynamics in the management of companies enables the fol-

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352 Peter Kuroshi, et al., *Cultural Diversity Management of Construction Firms in Abuja-Nigeria*, 6 ORG., TECHNOLOGY AND MGMT. IN CONSTRUCTION 1047, 1048-1049 (2014).

353 Olu Ojo, *Organisational Culture and Performance: Empirical Investigation of Nigerian Insurance Companies*, 8 MANAGER 118, 118-119 (2008).

354 *Id.*

355 *Id.* at 123, 127.

356 Ranya Nehmeh, *What is Organizational Commitment, Why Should Managers Want it in Their Workforce and is There Any Cost Effective Way to Secure it?*, SWISS MGMT. CENTER, May, 2009, at 2, 6.

357 The author draws on the definition of commitment Mowday coined. RICHARD M. STEERS, et al., EMPLOYEE—ORGANIZATION LINKAGES: THE PSYCHOLOGY OF COMMITMENT, ABSENTEEISM, AND TURNOVER (Academic Press. 1982); Nehmeh, *supra* note 466, at 3 (full quote found in text).

lowing conclusion to be drawn about how corporations exercise power. Under Foucault's theory, an individual who determines how to distribute other individuals in time and space in relation to one another in an organization so as to limit the array of courses of action available to them has power concentrated in his or her hands. What is more, in determining whether an individual exercised power over others, regard must be had to whether that person defined the task the employees had to perform, used communication to direct the individuals who carried out the task and created an oversight mechanism. On the application of Foucault's theory, accountability for the war crime brought about by LAWS should be attributed to an individual or group of individuals at the highest tier of the hierarchy who determine how to structure the corporation, what decision-making procedures the employees should follow, how superiors should supervise their subordinates and how to organize the production process. The reason is that these individuals exercise power over the programmers, who in turn exercise power over LAWS.

The fact that power is concentrated in a particular group of persons and that these individuals use group membership as one of the basis for controlling the employees further supports attribution to individuals high in the company hierarchy who define the corporation's norms of conduct, organizational culture, the nature of relationships between employees and criteria for being retained as an employee. Therefore, individuals occupying senior leadership roles who make decisions relating to such aspects as the goals and strategy of the corporation should be held accountable for developing and manufacturing LAWS that brings about an international crime. Where multiple individuals vote for a decision, such as members of the board of directors, the decision should be attributed to each individual who voted in favour of the decision on the ground that the individual enabled the group to adopt a joint position. It is immaterial that superiors involve subordinates in decision-making because subordinates rely on the organization's norms to put forward ideas.

Turning to the head programmer, Foucault's theory indicates that he or she should bear accountability on the basis of exercising power over LAWS. The head programmer should be held accountable due to electing to be part of an organization or group which operates on the basis of particular norms. However, the criterion for attribution should reflect the fact that the head programmer's role in the decision-making may vary depending on the domain to which a company decision pertains. For instance, the head programmer may be more knowledgeable than the manager about how neural networks operate and may influence as a result the manager's decision-making when it comes to technical aspects of how to design LAWS. However, the manager has greater power in the domain of deciding what resources to allocate to designing and testing LAWS. A failure to allocate adequate time and resources to the task of designing a robot could result in an unreliable product. In such cases, the design of the robot cannot be attributed to the head programmer because he or she did not play a dominant role in reaching a decision which resulted in LAWS performing in suboptimal manner. Similarly, if the head programmer conveyed to the corporate director that there was a small likelihood that LAWS could learn that it is permissible to target

civilians on the basis of observing enemy behavior and the director proceeded nevertheless to market the robot, then the director should be held accountable.

Cassandra Steer's test should be adopted to determine when the head programmer can be held accountable. Steer argues that when ascribing responsibility, attention should be paid to whether the individual had input into the deliberation and decision-making that produced the collective will.[358] The focus should be on the individual who had "control over the deliberative process of the collective."[359] This would mean that the head programmer should be held responsible if by virtue of his or her technical expertise that individual played a dominant role in the decision regarding what software design should be selected.

The application of Foucault's theory indicates that individual programmers who prepared a portion of the software but who did not necessarily know the architecture of the entire product should not be held accountable. This is because LAWS cannot function when the software is incomplete and because all software components work together to determine how it performs. Holding every programmer accountable is undesirable because most corporations will set out to create lawful products and because artificial intelligence algorithms are not transparent. More broadly, as Frédéric Mégret explains, blame is a finite resource because when everyone is to blame, no one can be blamed.[360] Holding all individuals involved in creating LAWS deflects attention from the fact that particular individuals made decisions relating to the system's design.

2. *Rebel groups, terrorist cells and other non-state actors*

The present section will demonstrate that the armed forces and rebel groups rely on a similar mechanism to exercise power over their members as the corporation. The findings will then be employed to extend the application of the test for allocating accountability from the corporate context to the rebel groups, terrorist cells and similar actors. The rhetoric the Israel Defense Forces employ illustrates that they perceive the military organizational structure as being similar to a corporation. Soldiers use terms, such as "large firm" and "business," to talk of the armed forces.[361] They speak of a battalion in terms of a machine where the function of each person and how individuals relate to one another are clearly defined.[362] Just like corporations, the armed forces exercise power over soldiers both through the chain of command and through group membership. The armed forces construct the identity of their personnel around organizational values and require them to be guided by these values in their decision-making. Lieutenant Colonel Michael R. Contratto writes that throughout history, the armed forces

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358 Nehmeh, *supra* note 356 at 12.

359 *Id.* at 34.

360 Frédéric Mégret, *What Sort of Global Justice is 'International Criminal Justice'?* 13 J. OF INT'L CRIM. JUST. 77, 84 (2015).

361 Ben-Ari, *supra* note 106, at 36.

362 *Id.* at 34-35.

expected soldiers to exhibit the virtues of patriotism, valor, honor and courage.[363] Robert Mandel elaborates that military ethos underpins the "warrior code" of conduct.[364] The code of conduct stipulates "why soldiers fight, how they fight, what brings them honor and what brings them shame."[365] The references in the code of conduct to values, such as honour, to how the soldiers should fight and to shaming conduct that deviates from the norm point to the fact that there is an interconnectedness between values, the identity of what it means to be a soldier and how soldiers ought to conduct themselves.[366]

It can be discerned from the doctrinal publication Leadership in the Canadian Forces that creating a group with a distinct identity and values as well as instilling a feeling of belonging to the group is critical for exercising control over the armed forces. According to the document, the pre-conditions for exercising leadership and achieving mission goals are fostering a feeling among service members that they are a part of a distinct community, that they possess a particular shared professional identity and that they have a feeling of loyalty towards one another.[367] Common values are used to expand the freedom of action available to individuals and teams while constraining their conduct.[368]

Other sources corroborate that the armed forces utilize the group membership to control soldiers. Mégret, who served as a Sergeant at Eurocorps, explains that the armed forces discourage individualism; they instill a sense among the soldiers that their military unit is their family.[369] This leads to soldiers making sacrifices for the benefit of the group.[370] Other sources echo Mégret's experience in Eurocorps. The U.S. Department of Army Doctrine Publication 6-0 Mission Command states that a sense of mutual trust, shared understanding and common purpose among unit members facilitate effective command over the unit.[371] Corn elaborates that the American armed forces inculcate a sense of loyalty to the commander among the soldiers as a way for enhancing discipline.[372] This information points to the fact that the connection and loyalty soldiers feel to each other and to the unit strengthen the commander's exercise of power over them.

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363 Lieutenant Colonel Michael R. Contratto, *The Decline of Military Ethos and Profession of Arms: An Argument Against Autonomous Lethal Engagements* 17 (2011 Air University).

364 ROBERT MANDEL, SECURITY, STRATEGY AND THE QUEST FOR BLOODLESS WAR 164 (Lynne Rienner Publishers Inc. 2004); Contratto, *supra* note 406, at 19.

365 *Id.*

366 ROBERT MANDEL, SECURITY, STRATEGY AND THE QUEST FOR BLOODLESS WAR 164 (Lynne Rienner Publishers Inc. 2004); Contratto, *supra* note 406, at 19.

367 CHIEF OF THE DEFENSE STAFF, LEADERSHIP IN THE CANADIAN FORCES 10, 13, 30 (Canadian Defense Academy 2005) [hereinafter CHIEF OF THE DEFENSE STAFF].

368 *Id.* at 13-14.

369 Interview with Frédéric Mégret, Professor, McGill University (2016) [hereinafter Interview with Mégret].

370 *Id.*

371 DEPARTMENT OF THE ARMY, U.S. ARMY DEPARTMENT OF ARMY DOCTRINE PUBLICATION 6-0 MISSION COMMAND I-12 (Department of the Army 2012).

372 Corn, *supra* note 128, at 26.

Additionally, the Israel Defense Forces fosters strong ties between soldiers and solidarity; there is strong cohesion in the unit.[373] Because every member is an equal and because of "small group dynamics," the governing modes of thinking are reinforced.[374] The soldiers have a homogenous outlook and ethos.[375] It can be gleaned from this description that soldiers constrain their own and each other's actions as a result of viewing themselves as belonging to a particular group. Furthermore, Ellickson's research intimates that soldiers constrain each other's actions through passing on information to each other and the superior about the fact that their peer deviated from the norm.[376]

In some countries, the armed forces exercise power over the subordinates through creating a group with a distinct identity and formulating norms governing the conduct of members but use violence instead of a sense of allegiance to enforce compliance. For instance, prior to the introduction of contract-based military service in Russia, the superiors employed informal rules to instill obedience into the new conscripts.[377] The social norms of the armed forces specified to which sub-group the conscripts belonged based on the length of time they had spent in the army.[378] Those who had served one year or longer, known as "dedy" (grandfathers), had the power to assign tasks to new recruits and to administer violence for failure to comply with the order or for displeasing the senior members.[379] The case study of Russia corroborates that those who exercise power rely on informal rules to establish groups, to define group membership, to produce rules of conduct and to enforce obedience. These unofficial mechanisms are embedded in the hierarchical structures.

The rigidity of the hierarchical structures and the degree of input the subordinates are allowed to make into the decision-making varies across the armed forces of different countries. According to Mégret, the armed forces communicate to the soldiers that they should unquestionably obey their commanders and the soldiers are never involved in the decision-making process related to the planning of the military operation.[380] On the other hand, the Canadian armed forces specify that leadership "is a dynamic interactive process, involving both hierarchical and mutual influence."[381] All service members are part of a "system of interlocking relationships" and should contribute their ideas where this enables the unit to gain a tactical or strategic advantage.[382] Although the Canadian armed

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373 Ben-Ari, *supra* note 106, at 25, 98-99; ANTHONY KELLET, COMBAT MOTIVATION: THE BEHAVIOUR OF SOLDIERS IN BATTLE 46-47 (Kluwer. 1982); *Id.* at 103 (full quote found in text).

374 Ben-Ari, *supra* note 106, at 63.

375 *Id.* at 67.

376 ELLICKSON, *supra* note 336, at 180-81.

377 Viktor Sokirko, *The reform of the armed forces: 'grandfathers' left but dedovshyna remains*, KOMSOMOLSKAYA PRAVDA (July 14, 2010), http://www.kp.ru/daily/24522/669971.

378 *Id.*

379 *Id.*

380 Interview with Mégret, *supra* note 369.

381 CHIEF OF THE DEFENSE STAFF, *supra* note 367, at 18.

382 *Id.* at 11-13.

forces encourage the exchange of ideas and mutual influence, the authority to commence a military operation is vested in the commander.[383] The fact that the Israel Defense Forces emphasize egalitarianism and are open to "smart comments" from soldiers about how the unit should operate points to the fact that they allow greater consultation. Nevertheless, Israeli commanders only accept ideas which fit the "logic-of-action."[384] Consequently, even egalitarian armed forces have an asymmetrical relationship between superiors and subordinates.

There is a parallel between the extent to which subordinates can have an input into the decision-making in corporations and the armed forces. Even when superiors encourage subordinates to share their views, there is an implicit understanding that the superior retains the ultimate power to make a decision and is a better judge of the suitability of a proposal. Crucially, because a subordinate relies on group norms to formulate ideas and proposals, his or her ideas are an organizational product. Each organization may rely on the mechanisms of a hierarchical relationship and group membership as a way to exercise power to a different degree.

The armed groups employ similar mechanisms for exercising power over their members as the armed forces and corporations. William Murphy is an anthropologist who has studied the relationship between rebel armed groups and child soldiers in Liberia and Sierra Leone.[385] He describes commanders of rebel groups as offering physical protection and economic assistance to child soldiers in exchange for child soldiers risking their lives to provide military services.[386] Child soldiers are frequently very loyal to their commanders due to being provided for.[387] Accordingly, there is a structure of domination that co-exists with a relationship of reciprocity.[388] The rebel groups carry out "signifying rituals" in order to create ties between children and the armed group.[389] Arguably, rebel commanders create a group with a distinct identity in order to facilitate exercising power over the children. Murphy's observation that the rebel forces tattoo children to symbolize their separation from the traditional authority supports this argument.[390] Moreover, the tattoos represent allegiance to comrades and the commander as well as solidarity with the rebel group.[391] Commanders in Sierra Leone told child soldiers that they were their new fathers.[392] The use of the word "father" expresses that children should be loyal to commanders and attributes a

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383 *Id.* at 7, 13.

384 Ben-Ari, *supra* note 106 at 29, 40-42.

385 William P. Murphy, *Military Patrimonialism and Child Soldier Clientalism in the Liberian and Sierra Leonean Civil Wars*, 46 AFR. STUD. REV. 61, 61-62 (2003) [hereinafter William P. Murphy].

386 *Id.* at 65.

387 *Id.* at 70.

388 *Id.* at 62, 70.

389 *Id.* at 75.

390 William P. Murphy, *supra* note 385, at 76.

391 *Id.*

392 *Id.* at 70.

moral bond to the relationship.[393] Scholar Austin Sarat envisions the parent-child relationship as having another dimension. He maintains that fathers are a source of law for their children because fathers define the rules of conduct for their children.[394] By judging the actions of their children and imposing punishment, fathers enforce their law.[395] Sarat's scholarship denotes that through using terms such as "father," commanders combine the exercise of power through a hierarchical relationship with creating a bond to the group's leader in order to reinforce their relationship of power.

Armed groups comprised of adult men too rely on group membership and internal cohesion to exercise power over their members. Brian McQuinn, an anthropologist, describes the revolutionary brigades who fought the Qaddafi regime in 2011 in Libya as cohesive and as owing strong allegiance to their military leaders.[396] The fighters voted to elect their commander.[397] Once elected, the commanders relied on consensus decision-making.[398] For this reason, the structure of the rebel groups resembled a decision-making committee rather than the traditional hierarchical command structure of the armed forces.[399] Because unit commanders employed consensus decision-making, the fighters had close ties with the commander.[400] On the application of Ben-Ari's analysis of the Israel Defense Forces[401] it would appear that the emotive experience of having allegiance to the commander and the group played a role in the commander reinforcing his or her authority over the unit.

The Libyan commanders used group norms and criteria associated with being a member of the group for exerting control over the fighters. The code of conduct the Libyan Ministry of Interior and the Misratan Military Council issued on 20 February 2012 when assigning the task of securing polling stations illustrates this point.[402] This document stated, "Respect the military uniform and raise public awareness through good manners and conduct."[403] The code of conduct draws a link between the military uniform, good manners and acceptable modes of conduct. The document's authors invoke military uniform as a symbol for describing norms and values that should guide a fighter's behavior. The references to God and to "acceptable" conduct in the two documents imply that the superiors relied on community values in order to provide an additional constraint on the behavior

393 *Id.*

394 Austin Sarat, *Imagining the Law of the Father: Loss, Dread and Mourning in the Sweet Hereafter*, 34 LAW & SOC'Y REV. 3, 11, 13 (2000).

395 *Id.* at 14.

396 Brian McQuinn, *After the Fall: Libya's Evolving Armed Groups* 18 (Small Arms Surv., Working Paper No. 12, 2012).

397 *Id.*

398 *Id.*

399 *Id.* at 19.

400 *Id.* at 20.

401 Ben-Ari, *supra* note 106, at 63.

402 McQuinn, *supra* note 396.

403 *Id.*

of the fighters.[404] This discussion demonstrates that one of the ways in which rebel commanders exercised power over the fighters was through creating a group with a distinct identity. They used symbols and values to give content to that identity.

Because corporations, the armed forces and rebel groups rely on similar mechanisms for exercising power over subordinates, the same test for attribution can be applied to actors such as rebel groups which develop and manufacture LAWS. The same reasoning can be applied to terrorist groups because they exercise power through group membership and have a leader who formulates the group's ideology. Specifically, individuals join terrorist groups because they want to belong to a group which gives them a social identity and to connect with peers sharing the same values.[405] What is more, the members of terrorist cells use the group ideology as a narrative for interpreting events.[406] Even terrorist groups that are organized as networks and act on generalized guidance have leaders who set the goals of the organization and give guidance on how such aims may be attained.[407] Consequently, accountability should be imputed to an individual or individuals who determine how the terrorist or armed group is structured, its identity, norms, membership criteria and how members interact with one another. Additionally, the programmer who is part of the group is responsible when he or she controlled or dominated the deliberative process in the group related to the LAWS's design.[408] A more refined test will be developed in the conclusion.

3. *Procurement officials*

The principle that two individuals can have a reciprocal relationship in circumstances where one of the actors occupies a dominant position can be employed to understand the interaction between the procurement officials and the weapons manufacturer. The best practice guidelines on procurement state that the government agency should inform the companies what criteria the officials will apply when reaching decisions.[409] For instance, the United States Office of the Under Secretary of Defense issued a Memorandum for Acquisition Professionals stipulating that the government procures the least expensive products featuring the desired capabilities.[410] As was already discussed, the procurement agent exercises power over the corporation leaders when the corporation designs a product with the features the government agency perceives as desirable in mind. Of

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[404] *Id.* at 23-24.

[405] Emile Bruneau, *Understanding the Terrorist Mind*, The D.A.N.A. Foundation (2016), http://www.dana.org/Cerebrum/2016/Understanding_the_Terrorist_Mind.

[406] Bruneau, *supra* note 405.

[407] U.S. Army Training and Doctrine Command, U.S. Army T.R.A.D.O.C. G2 Handbook No. 1: A Military Guide to Terrorism in the Twenty-First Century 3-2 and 3-3 (United States Army, 2007).

[408] Steer, *supra* note 42, at 34 (this proposal is based on Steer's test).

[409] New Zealand Ministry of Business Innovation and Employment, Government Rules of Sourcing (2015); O.E.C.D. Recommendation of the Council on Public Procurement 7 (2015).

[410] Memorandum from the Office of the Under Sec'y of Def. to the Dep't of Def. 2 (September 14, 2010) (on file with the author).

course, there are instances when a single company manufactures a product.[411] In such cases the government agency will be unable to select among different offers. When there are no or few other companies that have an equally technologically advanced product, the corporation will enjoy greater bargaining power.[412] In such instances the official is nevertheless in an asymmetrical (dominant) relationship in relation to the corporation's leaders because he or she decides whether to acquire the product or to buy the next best option at a cheaper price. Whilst Western countries have strict anti-bribery laws, the giving of a financial reward to a public official for granting a contract or a permit is a widespread practice in countries, such as Mexico, Egypt and Burkina Faso.[413] In cases where the government official accepts a financial reward from the corporation for concluding a contract, it is suggested that the relationship is closer to an exchange. However, this reciprocal relationship is embedded in an asymmetrical relationship due to the official deciding from which company to take the bribe.

At the time the corporation and the government agency negotiate a contract, they exchange views, convey expectations and mutually influence the terms of the contract through dialogue.[414] The concluded contract represents a reciprocal exchange of obligations.[415] Because the corporation and the government agency interact through dialogue and exchange, they mutually influence one another. This does not mean that the corporation will be in the same bargaining position as the government agency.[416] Because the clients of the corporation mainly consist of states, and because not all states can afford to commission or to buy cutting edge technology, the number of customers a corporation has is limited. Therefore, the corporation is likely to be prepared to make concessions in order to meet the customer's demands. For instance, Turkey requires the winning bidder to invest in local technologies or infrastructure as a condition for the contract while the United States expects foreign arms manufacturers to source labor in the United States.[417] This analysis supports the assertion that even when the corporation and the government agency reciprocally exercise power over one another, the government agency is nevertheless in an asymmetric (dominant) relationship of power in relation to the corporation.

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411 *Id.* at 9.

412 Michael Sanibel, *The Art of Negotiating,* ENTERPRENEUR (Aug. 24, 2009), https://www.entrepreneur.com/article/203168.

413 *Guns and Sugar,* THE ECONOMIST (May 25, 2013), http://www.economist.com/news/business/21578400-more-governments-are-insisting-weapons-sellers-invest-side-deals-help-them-develop [hereinafter The Economist]; Eric Markowitz, *The Truth About Bribery and Doing Foreign Business,* INC. MAGAZINE (Apr. 27, 2012), http://www.inc.com/eric-markowitz/mexico-walmart-truth-about-bribery-and-business.html (usually, such practices are not officially sanctioned by the government).

414 P. D. V. MARSH, CONTRACT NEGOTIATION HANDBOOK 106 (3rd ed. 2001); Sanibel, *supra* note 412.

415 Mariusz Jerzy Golecki, *Synallagma as a Paradigm of Exchange: Reciprocity of Contract in Aristotle and Game Theory, in* ARISTOTLE AND THE PHILOSOPHY OF LAW: THEORY, PRACTICE AND JUSTICE 259, (Liesbeth Huppes-Cluysenaer & Nuno M.M.S. Coelho eds., 2013).

416 MARSH, *supra* note 414 at 106; Sanibel, *supra* note 413.

417 The Economist, *supra* note 413.

Let us now consider a scenario where the weapons manufacturer works side by side with its customer.[418] In these cases the government officials will have an ongoing dialogue with the weapons manufacturer. The interaction between the U.S. government and the scientist Ronald Arkin to whom it commissioned to design LAWS illustrates that the two parties reciprocally influence one another.[419] In particular, it appears that the U.S. specified the core requirements for LAWS. Arkin informed the government about technological possibilities and the likelihood of particular avenues of research being successful. The U.S. then reconsidered what type of product it wished to procure and how it used the technology. This is evidenced by the fact that the U.S. official government position is that human operators will retain control over LAWS at present, but that it does not exclude the possibility that one day these machines will operate fully autonomously.[420] Arkin speaks out in favor of robots operating autonomously.[421] He said in an interview in 2011, "I am convinced that we can indeed create these systems that can perform and outperform human beings from an ethical perspective."[422] He additionally expressed his disagreement with the computer scientist Noel Sharkey, who maintains that this state of technology is unachievable.[423] The divergent statements of Sharkey and Arkin illustrate how the government position on the use of LAWS is conditioned by its dialogue with scientists and programmers about what is technologically possible. When this occurs, the government agency and the corporation mutually influence each other. Although there is reciprocal influence, the government is in a dominant position to the weapons manufacturer and the programmer. This is because the government official chooses with which corporation or scientist to enter in a relationship and on what terms. Therefore, procurement officials should be held accountable in addition to corporate leaders and the head programmer on the basis of exercising power over the corporate leaders.

It is immaterial that the procurement officials do not exercise power over LAWS at the time it performs in an unjustifiable manner. By acquiring LAWS, the officials create a situation where the weapons manufacturer can exercise power over the robot when it is being deployed on the battlefield and take a risk that the machine may bring about a war crime. Because the officials know that programmers have limited foreseeability regarding how LAWS will perform in a particular situation, the officials create a situation where the nature of the software does not allow any individual to have adequate oversight over the workings of the software.

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418 Lockheed Martin, CONNECT: INFORMATION SYSTEMS & GLOBAL SOLUTIONS 2 (2010).

419 Arkin & Ulam, *supra* note 193, at 1.

420 Enclosure, *supra* note 178, at ¶ 4(a), ¶ 4(d); Meier, *supra* note 8, at 1.

421 Sofia Karlsson, *Ethical Machines in War: An Interview With Ronald Arkin*, OWNI.eu, http://owni.eu.6x9.fr/2011/04/25/ethical-machines-in-war-an-interview-with-ronald-arkin/index.html.

422 *Id.*

423 *Id.*

V. A Legal Framework for Attribution

The present analysis demonstrates that the doctrine of command responsibility does not accommodate modern organizational structures, such as corporations. It focuses on the presence of a hierarchical relationship. Yet, organizations, such as corporations and terrorist cells, may have horizontal management structures and rely on consensual decision-making. Moreover, numerous organizations may co-operate with each other on a common goal, such as on creating LAWS, through dividing up the task of designing or manufacturing components. Another flaw of the doctrine of command responsibility is that its vision of how individuals exercise authority is incomplete. The doctrine of command responsibility associates authority with the possession of a particular position in an organization in relation to others. It regards a superior as an individual with the material ability to oversee the subordinates' conduct and to discipline them. Consequently, the doctrine of command responsibility fails to capture the fact that state and non-state organizations exercise authority both through creating an asymmetrical relationship of power between individuals, through formulating group norms to guide the conduct of the subordinates and through having subordinates enforce group norms.

The present discussion provides a blueprint for rethinking the doctrine of command responsibility to enable it to fit the realities posed by organizations which have flat structures, informal networks or the workings of which are not transparent. One step towards enabling the doctrine of command responsibility to capture within its net the conduct of members of terrorist cells and corporate actors could be the inclusion of the material ability to choose how the organization should be structured, to formulate the goals or strategy of the organization, to determine formal and informal norms which guide the conduct of group members and to decide on how the relationships between group members are structured as indicia for possessing "effective control."

When it comes to regulating LAWS, it is better to develop a novel test for imputing accountability.[424] This need stems from the fact that the process of designing and manufacturing a complex artificial intelligence system differs from the process of supervising subordinates. Many individuals, teams and even organizations may be involved in the process. The relationship between them is closer to collaboration than to the traditional military hierarchy. Crucially, the test needs to reflect that artificial intelligence systems are opaque and that it impossible to trace how an act of a particular individual resulted in a particular software error. The analysis shows that primary responsibility for the design of LAWS lies with senior corporate officials, leaders of the armed groups and leaders of terrorist cells who decide to create LAWS and who organize the development process. This proposition reflects the fact that how programmers act is shaped by their interactions with other individuals in the organization or group and with the organizational framework. This suggestion addresses Madeleine Elish's observation that even when the errors of particular individuals contribute to accidents, the

[424] Crootof, *supra* note 79, at 25.

underlying cause of such events is often the management's failure to create a responsible culture and to allocate adequate resources to safety.[425]

The knowledge of the mechanisms through which power is exercised can be employed to trace accountability in cases where multiple corporations or terrorist cells collaborate on creating LAWS. By analogy, accountability should focus on individuals in the partner corporations or terrorist cells who decide to cooperate on creating LAWS. These individuals will create structures to enable the development and manufacture of LAWS. Where two or more organizations cooperate, individuals who play a significant role in designing a component of LAWS are accountable on the same basis as a head programmer in a corporation or a terrorist cell. Additionally, the procurement officials should be held accountable even when multiple corporations cooperate on designing LAWS due to being in a dominant position in relation to the developers and due to creating a situation where the developer or developers jointly exercise power over LAWS on the battlefield.

Imposing accountability on multiple stakeholders promotes the goal of international criminal law of deterrence. Programmers, leaders of organizations developing LAWS and procurement officials are in a position to prevent LAWS from bringing about war crimes by virtue of having input into how LAWS is designed or produced. Yet, the proposed approach to attribution does not lapse into holding individuals responsible based on guilt by association. For instance, the procurement officials are held liable on the basis of exercising power over the corporate leaders rather than because they have a business relationship with the corporation. The proposed approach to imputing accountability echoes the doctrine of command responsibility which imposes obligations and sanctions on individuals throughout the chain of command or supervision on the basis that an individual located at a particular point in the chain exercises authority over other individuals. Here is an example of an attribution test derived from the findings made in this paper:

In cases where LAWS brings about an international crime as a result of operating in an unreliable fashion or in a manner its developers did not intend, the relevant crime shall be attributed to individuals who:

1) Played a "substantial" role in the decision-making relating to 1) the determination to develop and manufacture LAWS either in their own organization or in partnership with other organizations and 2) the design of the governance and operational structures of the organization. The development of governance and operational structures includes: the articulation of the organization's strategy, the decision what resources to allocate to enable the organization to achieve its strategic goals, the setting up of infrastructure, the delineation of the roles of employees, the prescription of the nature of the relationships between employees and what channels of communication they should use, the formulation of decision-making criteria the employees should apply, the setting out of formal or

[425] Madeleine Elish, *Moral Crumple Zones: Cautionary Tales in Human-Robot Interaction* 8-9 (We Robot, Working Paper, 2016).

informal norms guiding the conduct of the employees, and the creation of mechanisms to discipline employees for failing to adhere to the organization's norms.

OR

2) Had "substantial" input, either through direct or indirect communication, into the decision of what architecture or design LAWS should have, or who had "control over the deliberative process of the collective" relating to the said decision.

OR

3) Had a "material" ability to 1) acquire notice that LAWS was about to bring about an international crime as a result of supervising the system's performance and 2) to terminate the mission. Such ability could stem from the design of the user interface, from the possession of technical training or from other factors.

Naturally, it will be necessary to formulate an appropriate test for the mental element to ensure that only sufficiently blameworthy conduct attracts criminal accountability. The mental element test would need to reflect existing standards for locating blameworthiness. It is uncontroversial that individuals who satisfy the proposed attribution test and who act with intent or recklessness should be criminally prosecuted. Given that senior leaders in a corporation or a terrorist cell create structures to enable the development process to take place one could apply an identical or similar mental element test to these individuals as that applied under the doctrine of command responsibility. This is due to the fact that these individuals, just like commanders, embed disciplinary mechanisms to ensure that the organization's members act in conformity with the organization's agenda. Equally, because head programmers have oversight over the work of other workers, one could apply an identical or similar mental element test to them as that applied under the doctrine of command responsibility. For instance, a head programmer who had substantial input into the architecture of LAWS could be held accountable if he or she either knew or had reason to know that there was a real risk that LAWS with that design may trigger a war crime. Given that procurement officials have a supervisory function to ensure that the LAWS they acquire can be used in compliance with IHL, the same mental element test is suitable for this group.

VI. Conclusion

LAWS is a new technology with some experts believing that it will revolutionize warfare.[426] LAWS require that lawyers and states rethink existing legal doctrines and approaches to attribution. It is questionable whether the current position of states of viewing LAWS as weapon systems captures their nature. The better approach is to view LAWS as having a unique nature and status. Countries are moving in the direction of recognizing artificial intelligence systems as hav-

[426] Samuel Gibbs, *Elon Musk leads 166 experts calling for outright ban of killer robots*, THE GUARDIAN, 20 August. 2017.

ing a legal personality. Saudi Arabia granted Sophia, an artificial intelligence system, citizenship in 2017.[427] The Rapporteurs made a recommendation to the European Parliament that it should vote to recognize autonomous robots as having a legal status of "electronic persons."[428] However, individuals should be accountable for the conduct of LAWS because they determine the parameters within which these systems perform. Because numerous individuals and groups of organizations may collaborate on developing LAWS, it is difficult if not impossible to hold a particular individual liable using existing legal categories.[429] Through changing the way in which we think about the exercise of control in organizations it becomes possible to develop suitable accountability frameworks. The operator, commander, programmer, corporate leaders and senior Department of Defense officials should be held accountable when LAWS trigger war crimes on the ground of exercising power over LAWS or over individuals who wield power over LAWS.

427 Zara Stone, *Everything you need to know about Sophia, the world's first robot citizen*, FORBES (Nov. 7, 2017).

428 Report with recommendations to the Commission on Civil Law Rules on Robotics A8-0005/2017. 18 (2017).

429 McFarland, *supra* note 31.