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DIRECTED ENERGY WEAPONS
ETHICAL IMPLEMENTATION OBSTACLES

by

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This thesis illustrates the historical vectors of missile superiorities improvements, a corresponding decrease in discrimination of intent, and weapon adoption struggles that seek to balance the necessity for victory over humane weapons and moral intents. Narrowly focused on lethality, these evolutionary conventional weapons improvements predictably resulted in an increased escalation into wars of attrition. Departing from the historical vector, directed-energy weapons (DEWs) are the next evolutionary step in improved missile superiority to offer non-lethal effects. DEWs still face the same adoption obstacles and tug of war between necessity and morality while facing additional criticisms from human and civil rights institutions with claims of unethical effects and intent. This research determines that DEWs are more humane when compared to conventional kinetic weapons due to non-lasting and reversible effects. DEWs adhere to the spirit of the Laws of War. The allegations that DEWs violate the laws are based on old ambiguous text and their illegitimate correlation to rightfully banned historical weapons of war. DOD DEW policy aligns with the various laws and codes. It is also postured to implement DEWs. This thesis recommends that a new strategic narrative is required to overcome anchored claims and violations and to familiarize political decision-makers and military leaders to better understand the technology and accept the shifting risks associated with DEWs.

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DIRECTED ENERGY WEAPONS ETHICAL IMPLEMENTATION OBSTACLES

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ABSTRACT

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LIST OF ACRONYMS AND ABBREVIATIONS

5-Ds	deny, degrade, disrupt, deceive, or destroy
A2AD	anti-access area denial
ABL	airborne laser
ADS	area denial system
AFG	Afghanistan
AFSOC	Air Force Special Operations Command
AGM	air to guided munitions
AHEL	airborne high energy laser
AOR	area of responsibility
BPUFF	Basic Principles on the Use of Force and Firearms by Law Enforcement Officials
CAT	Conventions against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment
CCDR	Combatant Commanders
CCW	Conventions on Conventional Weapons
CD	collateral damage
CIVCAS	civilian casualties
CJCS	Chairman of the Joint Chiefs of Staff
CoG	center of gravity
COI	community of interest
CT	counterterrorism
CUI	controlled unclassified information
CWC	Chemical Weapons Convention
DDE	doctrine of double effect
DE	directed energy
DEW	directed-energy weapon
DEW RAP	Directed Energy Weapon Initial Operational Employment Review and Approval Process
DOD	Department of Defense
DODD	Department of Defense Directive

DODI	Department of Defense Instruction
DOTMLPF-P	Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, and Policy
DTA	defense technological assessment
EDTAS	Emerging Disruptive Technology Assessment Symposium
EIT	enhanced interrogation techniques
EM	electromagnetic energy
F3ED	find, fix, finish, exploit, analyze, and disseminate
FHA	foreign humanitarian assistance
FLOT	forward line of troops
FVEY	Five Eyes (Australia, Canada, New Zealand, the United Kingdom, and the United States)
GBU	guided bomb unit
GPC	great power competition
HASC	House Armed Service Committee
HEL	high-energy laser
HRW	Human Rights Watch
ICRC	International Committee of the Red Cross
IED	improvised explosive device
IFC	intermediate force capabilities
IHL	international humanitarian laws
INCLO	International Network for Civil Liberties Organization
IO	information operations
ISIS-K	Islamic State Khorasan
JADO	joint all domain operations
JIFCO	Joint Intermediate Force Capabilities Office
JNLWD	Joint Non-Lethal Weapons Directorate
LTD	laser targeting designators
MOAB	massive ordinance air blast
MOOTW	military operations other than war
NDS	National Defense Strategy
NLW	non-lethal weapons

OT&E	organizing, training, and equipping
PBLW	Protocol of Blinding Lasers Weapons
PGM	precision-guided munition
PHR	Physicians for Human Rights
PTSD	post-traumatic stress disorder
R&D	research and development
RCA	riot control agents
ROE	rules of engagement
ROMO	range of military operations
RPA	remotely piloted aircraft
S&T	science and technology
SROE	standing rules of engagement
SWaP-C	size, weight, power, and cooling
TNT	transnational threat
TTP	tactic, technique, and procedure
TU	Technical University
UN	United Nations
USAF	United States Air Force
USMC	United States Marine Corps
VEO	violent extremist organization

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I. DIRECTED-ENERGY WEAPONS BACKGROUND

A. INTRODUCTION

The *Air & Space Power Journal* previously published this introduction in Fall 2021.[1]

> A strategist should think in terms of paralyzing, not killing...and on a still higher plane, psychological pressure on the government of a country may suffice to cancel all the resources at its command—so that the sword drops from a paralyzed hand.
>
> — B. H. Liddell Hart, *Strategy: The Indirect Approach*[2]

1. A Case for Directed-Energy Weapons

As the United States transitions from a well-developed understanding of terrorism and violent extremism to focus on strategic competition, U.S. military and coalition forces will encounter similar adversary tactics, techniques, and procedures (TTPs). In both operational environments, proxy belligerents pursue their objectives in irregular warfare battlespaces.[3] Terrorists and violent extremists conduct embedded operations in populated areas to conceal intent. They often seek opportunities to create collateral damage (CD) and civilian casualties (CIVCAS).[4]

As seen in recent operations, U.S. forces have limited conventional weapons' options against hostile actors comingling with noncombatants as these adversaries seek to capitalize on U.S. kinetic operations and CIVCAS reporting.[5] Violent extremist

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[1] Alfred Cannin, "Directed-Energy Weapons: An Option for Strategic De-Escalation," ed. Laura Thurston Goodroe, *Air & Space Power Journal* 35, no. 3 (September 17, 2021): 57–65.

[2] Liddell Hart, *Strategy: The Indirect Approach*, 1st ed. (New Delhi: Pentagon Press, 2012), 228.

[3] Department of Defense, *Summary of the Irregular Warfare Annex to the National Defense Strategy* (Washington, DC: Department of Defense, 2020), 2, https://media.defense.gov/2020/Oct/02/2002510472/-1/-1/0/Irregular-Warfare-Annex-to-the-National-Defense-Strategy-Summary.PDF.

[4] Stephen D. Davis, "Controlled Warfare: How Directed-Energy Weapons Will Enable the U.S. Military to Fight Effectively in an Urban Environment while Minimizing Collateral Damage," *Small Wars & Insurgencies* 26, no. 1 (January 2, 2015): 49–71, https://doi.org/10.1080/09592318.2014.959764.

[5] Davis, 51–52.

organizations, with the presence of the world's media, take advantage of mistakes and CD by promulgating narratives critical of U.S. kinetic CD and CIVCAS reporting, which then shapes an "us-or-them" local propaganda message and shifts international opinion.[6]

By portraying the United States as callous and indifferent to the suffering of local populations, this effective guerrilla tactic creates vulnerabilities for U.S. and coalition forces. These vulnerabilities are especially problematic when the U.S. military tries to balance offensive operations and self-defense with strategy in conventional operations and across the continuum of strategic competition. Uncertainty about the true nature of civilian casualties in the battlespace means a delay in identifying hostile acts or intent. Under the current rules of engagement (ROE) in Phase III military operations and exacerbated by the inherent compression of time and space, the rapid escalation of force necessitates a preference for lethal conventional kinetic weapons.[7] Often as a result, the comprehensive analysis required to identify and prosecute a threat is limited.

Traditional conventional weapon escalation-of-force scenarios also limit system 1 (fast thinking) and system 2 (slow thinking) cognitive problem analyses used to determine hostile intent.[8] This analytic model is vital in determining hostile intent and calculating associated responses across the full spectrum of military options, from Phase 0 to Phase V and along gray-zone continuums. Moreover, this calculus is made even more complex by the limitations on range capabilities, complex targeting solutions, fog (actual and metaphorical), and the inescapable friction of war.[9]

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[6] Sjef Orbons, "Are Non-Lethal Weapons a Viable Military Option to Strengthen the Hearts and Minds Approach in Afghanistan?" *Defense & Security Analysis* 28, no. 2 (June 1, 2012): 127, https://doi.org/10.1080/14751798.2012.678163.

[7] Orbons, 122.

[8] Paul Van Riper, "The Identification and Education of U.S. Army Strategic Thinkers," ed. Heather M. K. Wolters, Anna P. Grome, and Ryan M. Hinds, *Exploring Strategic Thinking: Insights to Assess, Develop, and Retain Army Strategic Thinkers* (Fort Belvoir, VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 2013), 16–18, https://doi.org/10.1037/e639722013-001; Daniel Kahneman, *Thinking, Fast and Slow* (New York: Farrar, Straus and Giroux, 2013), 19–107.

[9] Chairman of the Joint Chiefs of Staff, *Joint Planning*, Joint Publication (JP) 5–0 (Washington, DC: Chairman of the Joint Chiefs of Staff, 2020), IV–28, https://www.jcs.mil/Doctrine/Joint-Doctrine-Pubs/5-0-Planning-Series; Sun Tzu and Carl von Clausewitz, *The Book of War*, ed. Caleb Carr (New York: Modern Library, 2000), 322.

Emerging technological advances have provided multiple nonlethal options to deter, deny, and incapacitate threats posed by new adversaries and changing strategic implications. Directed-energy weapon (DEW) options demonstrate, via an escalation of force from nonlethal to lethal, a direct targeting capability with a high likelihood of low CD and reduced risk of civilian casualties.

DEWs should be used in conjunction with conventional weaponry to provide friendly forces with various escalations-of-force capabilities to enable the military to apply the minimum force required for a specific threat versus a one-size-fits-all kinetic solution.[10] Such an operational concept provides the nonlethal and lethal DEW effects that Joint Force commanders require while safeguarding U.S. policy and strategy, limiting adversary retaliation or escalation, and controlling battlespace information and perceptions.

The simplified targeting and speed-of-light characteristics of DEWs provide an increased standoff range for forces, which allows opportunities to prosecute hostile threats early. With a new employment operational concept, DEW capabilities expand the current kinetic escalation-of-force timeline, foster minimum-force weapon applications, and increase safety for friendly forces.

2. Nonlethal Directed-Energy Weapons

The Joint Intermediate Force Capabilities Office, formerly the Joint Nonlethal Weapons Directorate, is exploring the function and application of nonlethal DEW defense technologies across the spectrum of conventional warfare and the competition continuum. These technologies will allow the U.S. military to accomplish the mission while protecting friendly forces "without unnecessary destruction that initiates or prolongs expensive

[10] Chairman of the Joint Chiefs of Staff, *Peace Operations*, Joint Publication (JP) 3–07.3, Incorporating Change 1 (Washington, DC: Chairman of the Joint Chiefs of Staff, 2018), I–7, III–3, IV–2, https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_0ch1.pdf?ver=2018-11-27-160457-910.

hostilities."[11] Current binary decision-making solutions limit early nonlethal weapon-escalation possibilities across the entire range of military options.[12]

Bridging the gap between military presence and lethal intent, the Joint Intermediate Force Capabilities Office shapes the use of emerging nonlethal microwave, millimeter, and laser-energy technologies in gray-zone operations, urban areas, and irregular and unconventional warfare battlefields.[13] Nonlethal DEWs are "developed and used with the intent to minimize the probability of producing fatalities, significant or permanent injuries, or undesired damage to material or infrastructure."[14] Nonlethal DEW technologies safeguard U.S. forces against nefarious activities with capabilities including long-range, laser-induced plasma audio devices that communicate the U.S. military presence, and nonlethal dispersal and denial devices, which are silent and invisible to the human eye.[15]

Additionally, silent, often nonattributable, nonlethal millimeter and microwave devices exist to disorient personnel and to disable, neutralize, and incapacitate enemy electronic targets, such as threat vehicles, vessels, and aircraft, with mitigation benefits similar to those noted previously for the escalation-of-force concept.[16] Nonlethal DEW options could better address a potential hostile act in uncertain battlespaces—urban—to preclude an automatic, and possibly unnecessary, acceleration to lethal-targeting options.

3. Lethal Directed-Energy Weapons

Lethal DEWs, including high-energy lasers (HELs), complement nonlethal DEW diffuse capabilities in the escalation-of-force methodology. These weapons progress from nonlethal intermediate-force capabilities to material-kill targeting. These DEWs are

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[11] Wendell Leimbach, personal communication, September 16, 2020.

[12] Orbons, "Are Non-Lethal Weapons a Viable Military Option," 114–30.

[13] Orbons, 114, 117–120, 126–127.

[14] Ashton B. Carter, *DOD Executive Agent for Non-Lethal Weapons (NLW), and NLW Policy*, DOD Directive 3000.03E, Incorporating Change 1 (Washington, DC: Department of Defense, 2018), 3, https://fas.org/.

[15] Davis, "Controlled Warfare," 54; Wendell Leimbach, personal communication, September 16, 2020.

[16] Davis, 54, 58; Wendell Leimbach, personal communication, September 16, 2020.

"technologies that relate to the production of a beam of concentrated electromagnetic energy or atomic or subatomic particles."[17] These technologies are developed into weapons or systems "that use directed energy to incapacitate, damage, or destroy enemy equipment, facilities, and/or personnel."[18]

Silent and invisible, HEL systems used on counter material targets can disable and destroy the mobility of positively identified personnel. These systems minimize conventional weapon escalation and the secondary threat of CD and civilian casualties.[19] HELs are in the nascent stage of development and not currently authorized. However, as their power levels evolve, weapon-quality lethal targeting options will emerge.[20]

4. Advantages

DEW technologies offer a simplified aiming solution and instantaneous targeting escalation from nonlethal intent to lethal force that result in an elongated nonlethal weapons escalation-of-force window. If applied early, nonlethal and lethal DEWs "in certain cases prevent the use of excessive force, escalation in hostilities, and CD."[21] Lethal DEW effects, which are highly discriminant and antisuffering, offer a solution to minimize critical infrastructure or private property CD while still accomplishing military and political objectives. These weapons also remove the violent sensation and perception associated with conventional kinetic weapons to avoid third-order effects of adversary information-operations propaganda and messaging that facilitates support and recruiting.[22]

Over time, as the size, weight, power, and cooling levels of DEWs advance, flexible nonlethal and lethal DEWs are anticipated to proliferate across a diverse range of security

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17 Department of Defense, *DOD Dictionary of Military and Associated Terms*, *Directed Energy* (Washington, DC: Department of Defense, 2020), 64, https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/dictionary.pdf.

18 Department of Defense, 64.

19 Davis, "Controlled Warfare," 49–54.

20 "Solid-State High-Energy Laser Systems," *Northrop Grumman* (blog), accessed November 9, 2020, https://www.northropgrumman.com/space/solid-state-high-energy-laser-systems.

21 Davis, "Controlled Warfare," 63.

22 Davis, 49.

environments. These capabilities could be employed more routinely than any other conventional weapon or emerging-weapons technologies.[23]

5. The Right Tool

With various overlapping 5-Ds (deny, degrade, disrupt, deceive, or destroy) properties, the preemptive escalation-of-force application of DEWs could resolve malicious activities before conventional lethal force was required. The early application of nonlethal weapons de-escalates ambiguous situations with minimum use of force and safeguards friendly forces while avoiding CD and CIVCAS. These weapons can be applied sequentially and concurrently during the escalation of force to demonstrate resolve while avoiding damage caused by conventional kinetic (blast, fragmentation, cratering, incendiary, and penetration) weapons.

During confrontations where the ROE authorize lethal force, violence is not always immediately suitable across the range of military options, particularly in gray-zone operations where U.S. policy and strategy limit military operations below the threshold of armed conflict. The civilian population-centered approach facilitated by nonlethal DEWs retains the hearts and minds of those the United States defends and helps gain the long-term trust and confidence of future populations facing irregular and unconventional warfare in these unstable gray-zone battlespaces of great power competition (GPC).[24]

The scalability, silent, and often nonattributable nature, damage-level selections, and immediate responsiveness (speed of light) of DEW capabilities provide friendly forces the means to target nuisance cominglers and direct threats with a variety of tailored, minimum-force weapons.[25] Nonlethal and lethal DEW capabilities also allow for engineered warfare scenarios. The combination of effects could greatly influence multiple

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[23] James N. Mattis, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Washington, DC: Office of the Secretary of Defense, 2018), 3, https://dod.defense.gov/; "Laser Systems," Northrop Grumman, accessed October 7, 2021, https://www.northropgrumman.com/chemical-high-energy-laser-systems.

[24] Orbons, "Are Non-Lethal Weapons a Viable Military Option."

[25] Joint Targeting School, *Joint Targeting School Student Guide* (Dan Neck, VA: Joint Targeting School, 2017), 54, https://www.jcs.mil/; Orbons, 114–116, 126–127; Davis, "Controlled Warfare," 49–53, 63; Wendell Leimbach, personal communication, September 16, 2020.

wartime missions and result in less cause for the enemy to retaliate or escalate force. With no clear evidence of U.S. force and attribution or signature-less employment by friendly forces, the United States can engineer the de-escalation of a potential enemy threat.

GPC proxies deliberately operate below the threshold of armed conflict, which renders conventional kinetic weapons incompatible since they can "adversely affect efforts to gain or maintain legitimacy and impede the attainment of both short-term and long-term goals."[26] The use of intermediate-force capabilities, nonlethal DEWs, and the nonlethal application of HELs are particularly advantageous in gray-zone scenarios "when restraints on friendly weaponry, tactics, and levels of violence characterize the operational environment" across the competition continuum.[27]

Although the *2017 National Security Strategy*, *2018 National Defense Strategy* (NDS), and *2021 Interim National Security Strategy* have refocused the Department of Defense (DOD) toward strategic competition, the nature of warfare and our adversaries' TTPs (to operate as a wolf in sheep's clothing and maneuver to induce CD and CIVCAS events that can then be exploited to the disadvantage of the United States) remain unchanged.[28]

Military forces operate across the spectrum of conflict zones, including military operations other than war. During such noncombat operations, the authorized use of nonlethal DEWs early in an escalation-of-force methodology increases the envelope of time available to identify and mitigate a threat. This capability provides Joint Force commanders the technological advantage to ensure friendly-force safety with mission success across multiple spectrums.

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[26] Rudolph C. Barnes, "Military Legitimacy in OOTW: Civilians as Mission Priorities," *Special Warfare* 12, no. 4 (Fall 1999): 38–39.

[27] Chairman of the Joint Chiefs of Staff, *Joint Targeting*, Joint Publication (JP) 3–60 (Washington, DC: Chairman of the Joint Chiefs of Staff, 2013), II–16.

[28] Donald J. Trump, *National Security Strategy of the United States of America* (Washington, DC: Executive Office of the President, 2017), 25–27, https://trumpwhitehouse.archives.gov/; Mattis, *Summary of the 2018 National Defense Strategy of the United States of America*, 1–4.

6. Alternative Consideration

Implementing DEWs, individually, and as a whole, will involve the expected hurdle of doctrine, organization, training, materiel, leadership, personnel, facilities, and policy, and necessary bureaucracy. However, DEWs will also face external scrutiny. Some argue the premature, ultimately disappointing DEW technologies in the DOD are based not on results but instead on overestimated technological capabilities and unrealistic timelines.[29] Others amplify this warning, noting future budgetary constraints, challenges in adopting innovation, and disconnects in implementation as the United States fails to capitalize on ally and partner relationships, particularly in DEW technologies.[30]

The effects of public opinion on U.S. decision-makers are an unanticipated obstacle to the implementation of existing DEWs. Highlighted by the U.S. and international media, multiple human-rights activists and critics have raised two fundamental issues regarding DEW effects, safety concerns and ethics violations.[31]

Culminating in 2010, controversy obscured the capabilities of the active denial system in Afghanistan.[32] Major media headlines hyper-sensationalized the effects of active denial system weapons—in this case, a microwave heat ray gun dubbed *Silent Guardian*—as crippling and brutally painful, like "being exposed to a blast furnace," or "making people feel like they are on fire."[33] These only partially substantiated media spins resulted in the immediate removal of the Army active denial system weeks after its arrival but before its

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[29] Ash Rossiter, "High-Energy Laser Weapons: Overpromising Readiness," *Parameters* 48, no. 4 (Winter 2018): 33–44; John Gourville, *Eager Sellers and Stony Buyers Understanding the Psychology of New-Product Adoption*, R0606F (Cambridge, MA: Harvard Business Review, 2006), 7, https://hbr.org.

[30] Rossiter, "High-Energy Laser Weapons," 39, 44; Hugh Beard, "View from the UK: Directed Energy as a Next Generation Capability," Booze Allen Hamilton, 2019, https://www.boozallen.com/.

[31] Sharon Weinberger, "U.S. Military Heat-Ray: Set Phasers to… None," *BBC News*, accessed February 9, 2021, https://www.bbc.com.

[32] Weinberger.

[33] Tim Elfrink, "Safety and Ethics Worries Sidelined a 'Heat Ray' for Ears. The Feds Asked about Using It on Protesters," *Washington Post*, September 17, 2020, https://www.washingtonpost.com/; John Hudson, "Raytheon Microwave Gun Recalled Amidst Controversy," *Atlantic*, July 19, 2010, https://www.theatlantic.com.

operational use, which drastically stunted the progress and momentum of DEW implementation.[34]

The effectiveness of the media campaign directly conflicts with the hypothesis that nonlethal DEWs promote strategic benefits and tactical prudence.[35] The effects of public opinion also highlight future requirements to incorporate supportive narratives purposely that encourage the adoption and implementation of DEWs, which include re-educating decision-makers on past misunderstandings and current capabilities.

7. Conclusion

New and old adversaries alike seek to exploit political perceptions regarding the use of force. Changing U.S. priorities have led to new challenges that modern technologies and innovative tactics could address to provide Joint Force commanders effects. DEWs, including intermediate-force, nonlethal, and lethal capabilities, present a complementary set of useful minimum-force options as the U.S. military continues to operate across multiple spectrums of conflict, especially in urban environments.

Updated escalation-of-force guidance in the form of ROEs that leverage DEW capabilities early could enable Joint Force commanders to shape battlefield conditions proactively and avoid unnecessarily raising the level of conflict. These weapons could mitigate second- and third-order effects of irreversible U.S. kinetic weapon miscalculations, which thus safeguard U.S. strategy and political objectives, limit adversary retaliation, and shape battlespace information, influence, and perceptions in conventional operations and across the continuum of strategic competition.[36]

B. THESIS RESEARCH QUESTIONS

DEWs and the concept of using non-lethal force are relatively new. The available literature on DEWs is minimal, which has resulted in significant gaps in knowledge. With

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[34] Elfrink, "Safety and Ethics Worries"; Noah Shachtman, "Pain Ray Recalled," *Wired*, July 20, 2018, https://www.wired.com/.

[35] Shachtman, "Pain Ray Recalled"; Orbons, "Are Non-Lethal Weapons a Viable Military Option," 114–116.

[36] Joint Targeting School, *Joint Targeting School Student Guide*, 16–17.

the many supposed benefits of DEWs going unused, this research aims to identify the innovation implementation obstacles surrounding ethical considerations for DEWs. This thesis seeks to legitimize and substantiate allegations that non-lethal DEW effects are unethical and claims that DEWs violate multiple Laws of War. Finally, it assesses if current U.S. policy and DOD directives facilitate future DEW implementation and operational considerations to maximize their unique attributes.

1. What are the historical parallels of military technologies that generated unethical claims, were some technologies rejected over the status quo capabilities, and were some military technologies adopted regardless of inhumane effects?

2. How do the attributes of non-lethal DEWs integrate into the ethical considerations of morality and Just War Theory principles?

3. Are U.S. strategy and policy and DOD directives for non-lethal weapons (NLWs) and DEWs compatible with the international Laws of War norms: Geneva Convention, Conventions on Conventional Weapons, Chemical Weapons Conventions, and the Protocol on Blinding Laser Weapons?

4. Do U.S. and DOD policies foster DEW adoption and implementation?

C. RESEARCH METHODOLOGY

This thesis aims to validate and then close the ethical implementation obstacles that adversely limit the fielding of DEWs by legitimizing the rationality of unethical claims poised against the use of DEW capabilities using Just War Theory principles and by assessing how the current U.S. policy and DOD directives facilitate DEW operational consideration, adoption, and implementation.

From ancient times through modern-day, comparative historical missile superiority examples are assessed to identify ethical and necessity adoption patterns regarding military technological weapons. This foundation will help frame post-world war international norms, which later becomes the spirit of treaties, conventions, and Laws of War. Additionally, the missed opportunity of the Army's area denial system (ADS) (a

microwave heat ray *Silent Guardian*) in Afghanistan is assessed to identify the root cause and second-order fallout (unethical and inhumane claims against non-lethal DEWs).

Following the analysis of the historical trends, unethical claims against DEWs are assessed and validated using Just War Theory principles to confirm or discredit specific allegations. This assessment identifies if weaknesses exist in ethical arguments against DEWs using *jus ad Bellum* and *jus in Bello* criteria. This research attempts to reestablish grounded ethical responsibilities for combatants and DEW risks. Finally, the Just War Theory ethical analysis identifies and links the relationship between the limitations of binary conventional weapons solutions with moral injury.

Following the Just War Theory ethical assessment, this research validates and discredits the same unethical and inhumane allegation claiming DEW effects violate international norms established throughout the Laws of War. Specifically, it assesses DEWs' compatibility with the Geneva Conventions, the Convention on Conventional Weapons, the Chemical Weapons Convention, and the Protocol of Blinding Lasers. This legal assessment also seeks to understand the most current interpretation of international humanitarian laws (IHL) by the International Committee of the Red Cross (ICRC) to determine the compatibility of DEWs with individual convention's existing text and the spirit of intent.

Finally, this thesis includes a U.S. DOD DEW policy review to identify if current directives adhere to or conflict with the Laws of War, conventions, and the spirit of IHLs regarding adoption, fielding, and implementation for emerging DEW systems.

D. LITERATURE REVIEW

The trigger for this discussion begins with the 2018 NDS, which directs the requirement to leverage new technologies including "advanced computing, big data analytics, artificial intelligence, autonomy, robotics, directed energy, hypersonics, and biotechnologies."[37] This research focuses on directed energy (DE) because these technologies coalesce to provide tactical Fires solutions that quintessentially align with

[37] Mattis, *Summary of the 2018 National Defense Strategy of the United States of America*, 3.

U.S. strategic requirements that can positively change the characteristics of war.[38] Additionally, as DE advances coalesce into DEW systems, which are expected to proliferate over time across the range of military operations (ROMO), these capabilities can possibly be employed more routinely than any other conventional intent weapon or emerging technologies.[39] Moreover, the remaining emerging technologies identified in the NDS are strategic level capabilities or supportive in nature, which leave DEWs as the most impactful tool of missile superiority for combat personnel in the immediate future.

1. Department of Defense

Subject matter experts internal to the DOD have a unified front to increase research and development (R&D) by focusing on adopting and implementing DEWs across the military over the next decade.[40] Together during the 2020 Directed Energy Summit, the chief scientists from each military service component articulated the continued and long-term strategic need to develop DEW capabilities across the DOD. They also called for increased integration on the battlefield and warfighter confidence in DEW capabilities.[41] The Undersecretary of Defense for Research and Engineering and Chairman of the Defense Innovation Board testimony to the House Armed Service Committee (HASC) echoes a similar sentiment.. He adds that the DEW ecosystem has significant gaps and that the DOD has both an adoption and implementation problem to field DEWs.[42] Additionally, a critical HASC question remains unanswered of whether the DOD should continue to invest in a diverse DEW portfolio or divest some technologies to allow for an increased focus on

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[38] Chairman of the Joint Chiefs of Staff, *Joint Operations*, Joint Publication (JP) 3-0 (Washington, DC: Chairman of the Joint Chiefs of Staff, 2018), III 30–37, https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_0ch1.pdf?ver=2018-11-27-160457-910; Mattis, *Summary of the 2018 National Defense Strategy of the United States of America*, 1–3.

[39] Cannin, "Directed-Energy Weapons," 60.

[40] David Stoudt, "The Lessons of Directed Energy Deployment," Booze Allen Hamilton, accessed July 7, 2020, https://www.boozallen.com/.

[41] Stoudt.

[42] Eric Schmidt and Michael Griffin, *Promoting DOD's Culture of Innovation* (Washington, DC: House Arms Service Committee, 2018), https://armedservices.house.gov/; Nathan Bennett and Jacob M. Parks, "Struggling to Innovate? Examine Your Structure, Systems, and Culture," *Business Horizons* 58, no. 5 (September 1, 2015): 563–69.

fewer technologies in the future.[43] Once answered, additional questions are raised. Which specific DEW investments should take the lead (and why) and what technologies should be divested? Only after those two answers are determined can redefined, articulated requirement strategies begin.[44]

2. Allies and Partners

Expanding the focus to capitalize on U.S. allies and partners, Royal Navy ADM Beard, Assistant Chief of Naval Staff Capabilities, United Kingdom (UK), draws attention to similar national strategies and hurdles faced in the United Kingdom. Specifically, these strategies and hurdles are the erosion of its technological edge, the evolution of near-peers, and the claim that "DEW across the electromagnetic spectrum (EM) will play a key role in future wars."[45] As part of his recommendation to the community of interest (COI), ADM Beard highlights the United Kingdom's three key components to advance its DE programs: wargaming operational analysis, acquisition and procurement of DEWs as core programs, and the need to formalize the existing relationship with the United States in shared DEW best practices.[46] Concurrently during the 2019 Emerging Disruptive Technology Assessment Symposium (EDTAS), the Australian DOD science and technology (S&T) branch framed equal DEW barriers and implementation obstacles identified by the United States and the United Kingdom.[47] "Ideas without evidence will absolutely fail."[48] In 2019, U.S. allies highlighted two key arguments that should be expounded upon in the future. The first is an operational effectiveness analysis to identify and fill gaps between the current U.S. DEW strategy and challenging tactical scenarios that emerging DEW effects

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[43] Stoudt, "The Lessons of Directed Energy Deployment."

[44] Bennett and Parks, "Struggling to Innovate?"; Charles O'Reilly and Andrew J. M. Binns, "The Three Stages of Disruptive Innovation: Idea Generation, Incubation, and Scaling," *California Management Review* 61, no. 3 (May 1, 2019): 49–71, https://doi.org/10.1177/0008125619841878; Paul A. Geroski, *The Evolution of New Markets* (Oxford: Oxford University Press, 2017), 21–57.

[45] Beard, "View from the UK."

[46] Beard.

[47] "Emerging Disruptive Technology Assessment Symposium: Directed Energy Technologies," Australian Government, Department of Defense, November 1, 2019, https://www.dst.defence.gov.au/event/emerging-disruptive-technology-assessment-symposium-directed-energy-technologies.

[48] Beard, "View from the UK."

can satisfy. Second, unlike the exotic and highly classified nature of strategic technology like hypersonics, DEWs are tactical level tools with potentially lower classifications that can possibly be appropriately shared with specific partners like the Five Eyes (FVEY) alliance to cultivate international relationships, as well as shape DEW norms and future interoperability of combined operations. The FVEY alliance includes Australia, Canada, New Zealand, the United Kingdom, and the United States.

3. U.S. and International Academics

A valuable consensus on the benefits of DEWs pervades the academic community. Stephen Davis of Texas Tech University presents a perspective focused on using existing non-lethal DEW technologies exclusively within urban environments as a suitable alternative to reduce CD and CIVCAS.[49] Davis presents his perspective in two unique approaches via a tactical capability point system and case studies to develop the readers' mental understanding of invisible and silent weapon systems.[50] Complementing Davis's work, the international academic community has attempted to capture similar non-lethal DEW benefits across the war in Afghanistan by coalition forces under General Petraeus's Hearts and Minds strategy.[51] Sjef Orban, from the Netherlands Defense Academy, attempted to represent non-lethal DEW systems visually using a theoretical defense technological assessment (DTA) criterion. The DTA model is specifically "designed for a systematic approach to new military concepts, with a focus on the tactical context including human and procedural factors, in which each system is to be applied."[52] Although Davis's and Orbon's research does not consider emerging HEL technologies, they did capture non-lethal DEW capabilities across various warfare continuum case studies. Future vignette and case study analysis should be replicated by incorporating emerging technologies that are adapted to a new operational concept across various ROMO to assess DEW benefits and limitations. Furthermore, Davis's tactical capability point system and Orban's DTA models

[49] Davis, "Controlled Warfare."

[50] Davis, 55–62.

[51] Orbons, "Are Non-Lethal Weapons a Viable Military Option," 114–115.

[52] Orbons, 116.

should be expounded upon to incorporate intent guidance within each measurement of effectiveness matrix.

4. Counter Argument and Media

Dr. Ash Rossiter, from Khalifa University Abu Dhabi, presents a valid counter-argument in the DEW discussion with claims that the premature, ultimately disappointing DEW technologies within "America's national security establishment," is based not on outcomes but instead on overestimated capabilities and unrealistic timelines by defense sector executives and DOD leadership.[53] Rossiter outlines the need for less exquisite and expensive weapons systems and that DEWs have a history of hyped-up performance that fail to produce advertised results repeatedly after 50 years of R&D.[54] It is essential to note that this discussion is circulating internally to the DOD, specifically highlighted during the 2020 Directed Energy Summit.[55] Nevertheless, this international counter-argument credence is further verified by Rossiter's supporting justification that highlights future U.S. challenges in budgetary constraints and innovation adoption, as well as implementation disconnects in preparation for strategic competitors and the U.S. failure to capitalize on allied DEW technologies.[56]

Rossitter attributes three arguments to the failure of DEWs during his analysis. First, the individual advancements of interdependent DEW components make up the DE ecosystem (e.g., laser, batteries, cooling, beam control). Rossiter unscientifically targets a single subsystem, i.e., beam director, as an overall failure versus recognizing a 75% success on the remaining three subcomponents and extensive lessons learned. Second, Rossiter targeted a unique low-density prototype, the YAL-1A chemical airborne laser (ABL) project, discontinued in 2012, as the predominant loss of both U.S. time and money in the

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53 Rossiter, "High-Energy Laser Weapons," 33; Gourville, *Eager Sellers and Stony Buyers*, 1, 9 Cannin, "Directed-Energy Weapons," 62.

54 Rossiter, 43–44.

55 Stoudt, "The Lessons of Directed Energy Deployment."

56 Rossiter, "High-Energy Laser Weapons," 39, 44; Beard, "View from the UK"; Australian Government, Department of Defense, "Emerging Disruptive Technology Assessment Symposium."

DEW sector.[57] The author correctly presents the argument for realistic timelines, lower cost, and timelier fielding for HELs. However, Rossiter may have overlooked that the 20-year, $5 billion ABL project did not result in "the U.S. losing significant sums of money" but instead was an incremental step for a long-haul technological innovation that ultimately matured the early DEW ecosystem.[58] These disconnects, subsystem interdependence, ecosystem maturity, and psychological innovation obstacles should be further examined to develop a framework that fosters Rossiter's observations to improve the DEW COI efforts to move forward more harmoniously.

An additional unanticipated obstacle to DEW implementation is the public opinion's influence on U.S. decision-makers and military leaders. Captured by domestic and international media, influential human and civil-rights activists have encapsulated two fundamental issues against DEWs, more specifically, safety concerns and ethical violations.[59] Peaked in 2010, this controversy outshadowed the new DEW capabilities of the ADS, a microwave heat ray gun in Afghanistan dubbed *Silent Guardian*.[60] ADS weapon effects were hyper-sensationalized "as 'crippling' and 'brutally painful,' like 'being exposed to a blast furnace,' or 'makes people feel like they are on fire' across major media headlines titled: *"Invisible Pain Gun."*[61] Additional DEW findings surfaced from the United States Air Force (USAF) in 2008. It cited that a non-lethal DEW system caused second-degree burns to a volunteer during testing in 2008.[62] These media campaign claims contributed to General McCrystal's immediate removal of the Army's new ADS from Afghanistan in 2010, "weeks after its arrival but prior to its operational use—impeding the momentum of DEWs implementation."[63] The effectiveness of the media campaign directly conflicts with Orban's study that hinges on non-lethal DEWs fostering long-term strategic

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57 Rossiter, 38.

58 Geroski, *The Evolution of New Markets*, 9.

59 Weinberger, "U.S. Military Heat-Ray"; Cannin, "Directed-Energy Weapons," 62.

60 Weinberger; Cannin, 62.

61 Elfrink, "Safety and Ethics Worries"; Hudson, "Raytheon Microwave Gun Recalled Amidst Controversy"; Shachtman, "Pain Ray Recalled"; Cannin, 62.

62 Elfrink.

63 Elfrink; Shachtman, "Pain Ray Recalled"; Cannin, "Directed-Energy Weapons," 62.

benefits and tactical prudence.[64] The effects of public opinion on political decision-makers also highlight two future requirements to assess. The first is how to overcome the current misunderstandings of DEWs that date as far back as the 1990s. The second is how to incorporate future narratives productively as the driver of public opinion, as well as encourage decision-makers to be early adopters of DEWs.

5. Overwhelming Agreement

One fundamental concept remains undisputed by DOD leaders, industry executives, academics, and international professionals. Conventional weapons via traditional means do more harm than good across Iraq, Syria, and Afghanistan with the adverse effects seen as CD and CIVCAS and the propensity to be used against the United States in adversary IO campaigns.[65] Moreover, as the United States shifts to face the rising threat of GPC and strategic competition, conventional weapons usage could unintentionally escalate gray-zone continuum conflicts into an unintended all-out war.[66] These agreed-upon arguments have value but neglect to provide a flexible de-escalation and deterrent solution suitable for broad economic adoption, applicable across the ROMO, of which DEWs present a potential suitable solution.

E. ORGANIZATION OF THE THESIS AND CHAPTER OUTLINE

1. Introduction: Outlines the topic and problem, provides a brief review of DEWs and conventional weapons incompatibilities, research questions, literature review, research methods, definitions, findings, and overview of chapters.

2. History: Draws parallels from historical missile superiority, necessity, discrimination and links ethical implications for adoption using medieval

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[64] Shachtman; Orbons, "Are Non-Lethal Weapons a Viable Military Option," Cannin, 62.

[65] Davis, "Controlled Warfare," 115–116; Orbons, 50; Stoudt, "The Lessons of Directed Energy Deployment."

[66] Beard, "View from the UK"; Rossiter, "High-Energy Laser Weapons"; Wendell Leimbach, personal communication, September 16, 2020; "Promoting DOD's Culture of Innovation," House Armed Services Committee—Democrats, April 17, 2018, https://armedservices.house.gov/2018/4/promoting-dod-s-culture-of-innovation.

knights and their fall from the longbow, the adoption of early torpedo improvised explosive devices (IED)s, the evolution in discrimination of air-to-ground bombing, incremental ethical improvements to make modern-day kinetics, and finally, the fall out of the Army's ADS *Silent Guardian* in 2010.

3. Ethics: A Just War Theory assessment assimilating the properties of DEWs in the foundational *jus ad Bellum* and *jus in Bello* principles, the doctrine of double effect (DDE) calculations, responsibilities, and linking moral injuries and post-traumatic stress disorder (PTSD) with ex gratia CIVCAS payments.

4. DEW Laws of War: Review of Geneva Convention Article 27 and IHL 87/89, Article 32, with an enhanced interrogation techniques (EIT) vignette, Protocol of Blinding Lasers Weapons, (PBLW) Conventions on Conventional Weapons (CCW), and Chemical Weapons Convention (CWC) to assess the legal compatibility of DEWs. This legal review then assesses DOD DEW policy, CJCSM 3230.01A Directed Energy Weapon Initial Operational Employment Review and Approval Process (DEW RAP), DODI 5000.69 DOD Joint Service Weapons and Laser Safety Review Process, and Department of Defense Directive (DODD) 3000.03E DOD Executive Agent for NLW and NLW Policy to assess the legal compatibility of DEWs and U.S. posture to adopt and implement future capabilities.

5. Conclusion: A summary of nine principal findings and three recommendations are focused on grounded claims and reframing the U.S. DEW narrative and messaging strategy to foster future implementation.

II. HISTORY

Ranged weapons of war have incrementally improved from rocks to rockets as evolutionary steps to gain missile superiority over someone's adversaries. From the beginning of time, this hard-wired behavior has motivated societies to use instruments of violence, including ranged weapons, both moral and amoral.[67] The drive for missile superiority has remained constant with increasing precision and accuracy, greater standoff range, lethality (incapacitation), and weapon systems discrimination. All these warfighting elements are found in the longbow through modern-day Hellfire missiles. The sequential technological improvement of lethal capabilities depicts a desire for military means that offer use-of-force improvements but are overshadowed by a decision-making tug-of-war between necessity and morality.

A commonality throughout the evolution of missile superiority can be seen as a steady increase of lethality use indiscriminately with reciprocal escalation. Clausewitz stressed in the 19th century that opposing sides "will force the other to follow suit; each will drive its opponent to extremes, and his only limiting actors are the counterpoints inherent in war."[68] This natural survival tendency drives a perpetual arms race for instruments of violence, being limited only by considerations of necessity and normative behaviors, which predictably fosters uncontrolled escalation.[69] According to the historian P. E. Cleator, this cyclical weapon development and response cycle "introduced new and more powerful missile weapons" within each revolutionary step of available technologies, all of which have lacked consideration for de-escalation capabilities and minimum use of force.[70]

Today, aggregated technological innovations exist in the form of DEWs that demonstrate missile superiority of a new character. The DOD recognizes these attributes

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[67] Carl von Clausewitz, Michael Eliot Howard, and Peter Paret, *On War* (Princeton, NJ: Princeton University Press, 1989), 69, 605.

[68] Clausewitz, Howard, and Paret, 76.

[69] Lawrence Freedman, *Strategy: A History* (Oxford; New York: Oxford University Press, 2013), 1.

[70] P. E. Cleator, *Weapons of War* (New York: Thomas Y. Crowell Company, 1967), 96.

and it is shaping non-lethal force intent under the Non-lethal Weapons Policy DOD Directive 3000.03E that states DEW capabilities are "used with the intent to minimize the probability of producing fatalities, significant or permanent injuries, or undesired damage to material or infrastructure."[71] Through electromagnetic means, emerging non-lethal microwave, millimeter, and laser-energy technologies could benefit gray-zone operations, urban areas, irregular and unconventional warfare battlefields with missile superiority attributes, used with non-lethal de-escalation intents.[72]

This chapter explores the historical counterpoints in weapons technologies and modes of warfare of medieval knights and the longbow, and then early torpedoes through World War II (WWII) bombings. The first section begins with chivalry to illustrate the honorable conduct of knights who desired non-lethal fighting and ultimate discrimination. Next, this chapter describes the rise of the longbow during the infantry revolution and the manner in which its missile superiority resulted in the decline of medieval knights, and with it, the altruism of discrimination that triggered attrition warfare. This theme continues with assessing early torpedoes and aerial bomb superiority and employment to depict the steady increase of helpless lethality that triggered Clausewitzian "unwanted explosive escalation," which resulted in unrestricted submarine warfare and the indiscriminate area bombings of WWII.[73]

Next, this chapter assesses modern-day technologies and its menu of lethal force options, all of which face the same historical decision-making challenges of adoption and employment. Each example depicts increased missile superiority characteristics, including increased range, accuracy, lethality, and adversary helplessness from effects. However, each also sequentially demonstrates the steady rise in lethality and escalation, with a corresponding decline of discrimination. These historically consistent challenges offer many parallels to DEWs.

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[71] Undersecretary of Defense for Acquisition, Technology and Logistics (AT&L), *DOD Executive Agency for Non-Lethal Weapons, and NLW Policy*, DOD Directive 3000.03E (Washington, DC: Department of Defense, 2017), 3, https://fas.org/irp/doddir/dod/d3000_03.pdf.

[72] Undersecretary of Defense for Acquisition, Technology and Logistics (AT&L), 2–3.

[73] Henk W. Houweling and Jan G. Siccama, "The Risk of Compulsory Escalation," *Journal of Peace Research* 25, no. 1 (1988): 44.

Finally, this chapter ends with various arguments against the ADS called *Silent Guardian*, a nascent microwave DEW adopted but quickly recalled from the battlefield in Afghanistan. Similar to how knights failed to adopt the longbow due to social incompatibilities despite its many advantages, DEWs face the same challenges and have been socially deemed unethical, and unimplemented. The United States and its allies, now limited to modern-day conventional kinetic weapons, miss out on humane DEW options of non-lethal force that provide de-escalation and replace them instead with status-quo weapons that are less discriminant, more lethal, and ultimately, trigger retaliatory escalation.

A. MEDIEVAL KNIGHTS NOBLE INTENT

The principles of discrimination, proportionality, and humane intents can be seen in the normative behaviors of knightly combat during the middle ages. The notion of knights and knighthood chivalry has been romanticized for hundreds of years with stories and poems of moral virtue within a fraternity of arms.[74] Noted by historians O'Connell and Batchelor, the "fighting became a matter of class. The aristocracy monopolized the right to bear arms, and henceforth elite soldiers were knights."[75] As an armed hand of the state, these select few of well-disciplined, high-ranking officers operated under an oath of service to each other, under their King.[76] Vincent of Beauvais, a French Dominican friar, best articulates this loyal service and gallantry by arguing, "The use of an organized knighthood lies in protecting the Church, attacking disloyalty, reverencing the priesthood, avenging the wrongs of the poor and keeping the country in a state of quiet."[77] In today's vernacular, knightly decrees were leveraged to limit the violence of combat and its associated suffering.

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[74] Robert L. O'Connell and John Batchelor, *Soul of the Sword: An Illustrated History of Weaponry and Warfare from Prehistory to the Present* (New York: Free Press, 2002), 61.

[75] O'Connell and Batchelor, 61.

[76] "Vincent of Beauvais Homepage," Vincent of Beauvais, accessed August 9, 2021, http://www.vincentiusbelvacensis.eu/.

[77] R. Ewart Oakeshott, *The Archaeology of Weapons: Arms and Armour from Prehistory to the Age of Chivalry* (Mineola, NY: Dover Publications, 1996), 185.

A small select group of well-trained military professionals who held discrimination in combat to the highest standard symbolized the character of knightly chivalry at the height of the 12th century. One such principle is the act of saluting. Although the true origins of a military salute are unknown, the stories trace back to French knights in armor. They would hold their horses with their left hand, and would then salute with the right by "raising the visor with the right to identify each other."[78] It is reasonable to argue that the act of saluting was an early attempt to confirm an individual's opponent prior to engaging in mortal combat, what might be called discrimination, and the confirmation of what later would be coined the moral equality of combatants.[79]

This period of romantic chivalry also presents a principle that knights would fight not to the death but a yield or honorable surrender when used as a champion in the place of a massive battle of attrition.[80] This humane strategy that uses non-lethal ends to limit violence and suffering fosters more agreeable conflict outcomes and prolonged peace; similar to the second- and third-order effects produced by DEWs today. This form of battle character shows modern-day tenants of the minimum force principle and ethically fighting well.

The fall of the knights in shining armor was due to their noble intent and the resistance to obtain emerging missile superiority. As the bow made evolutionary steps to become more accurate with greater standoff precision, horse warrior combat effectiveness proportionally declined, and knights became obsolete.[81] A feature of this missile superiority adoption resistance was the anchored principle of discrimination and a hubris desire for the noble status of knightly confrontations. This status quo effect offered a counterpoint mismatch between the necessity of the emerging longbow and notions of fighting well, while maintaining honor amongst military professionals.

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78 "The Salute," Army, accessed August 10, 2021, https://www.army.gov.au/our-heritage/traditions/salute.

79 Michael Walzer, *Just and Unjust Wars: A Moral Argument with Historical Illustrations*, 5th ed. (New York: Basic Books, 2015), 34–48.

80 Clifford J. Rogers, "The Military Revolutions of the Hundred Years' War," *The Journal of Military History* 57, no. 2 (1993): 255, https://doi.org/10.2307/2944058.

81 Cleator, *Weapons of War*, 99.

Furthermore, the social behaviors of this period determined that the use of emerging weapons like the longbow was indiscriminate due to the greater standoff range that prevented adversary eye contact, and therefore, was considered unethical.[82] The premature longbow moral determination parallels DEW concerns that unseen effects are also unethical. At this point of the 15th century, the fellowship in arms and the bond of chivalry transitioned from the noble altruism of knights to peasant infantries, often displaying extreme bloodthirstiness.[83] The increased adoption of the longbow signaled the end of non-lethal attempts to spare life and the absence of surrender. This revolutionary transition away from fighting hand-to-hand combat into mass employment of standoff weapons with lowered discrimination triggered escalation and increased body counts in wars of attrition.

B. THE FEATHERED ARROW AND LONGBOW

The evolutionary culmination of the feathered arrow and longbow is an example of missile superiority and a turning point in military force innovation adoption on technological, organizational, and social levels; three components of what Clifford Rogers, a professor of history at the United States Military Academy at West Point, called the "infantry revolution."[84] Some societies resisted the adoption of this capability, deeming it an unethical means of fighting well, striving for discrimination, and clinging to chivalry; others did not. Philippe de Commynes, a 14th century French diplomat, embraced the longbow as "the flower and hope of their army."[85] Advancing societies held the principle of necessity above discrimination, which outweighed the requirement of victory above the status quo, and established humane norms.

The combination of tail feathers to stabilize the flight path, resulting in the larger bow's increased standoff, allowed archers to remain safely outside the weapon engagement zone of incoming fire while maintaining their own lethal combat effectiveness. The

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[82] Walzer, *Just and Unjust Wars*, 42.

[83] Rogers, "The Military Revolutions of the Hundred Years' War," 256.

[84] Rogers, 247.

[85] Philippe de Commynes, *Mémoires de Philippe de Commynes* [*Memoirs of Philippe de Commynes*] (Paris: Librairie de Firmin-Didot et cie, 1881), 23, https://hdl.handle.net/2027/mdp.39015012315910.

longbow, mirroring many attributes of modern DEWs, offered superior tactical capabilities like reach (range) and more predictable precision and accuracy to defeat adversaries. Its adoption also ended the cavalry and knightly superiority reign in what Rogers called "a punctuated equilibrium point."[86]

The technical missile superiority of the bow and arrow reached its height in England in the 14th century with the development of the six-foot ye longbow.[87] This new design allowed for more archer draw that resulted in a formidable missile with a greater distance and lethal force.[88] Arrows were comparatively inexpensive which allowed for a deeper magazine of ammunition. O'Connell estimated this "composite weapon" could be fired at a rate of six arrows per minute up to 300 yards, with "capabilities to penetrate armor at 100 yards."[89] This capability is significant and acted as a force multiplier, which allowed volley after volley of accurate arrows at a range that inflicted both physical harm and psychological effects, similar to DEWs. According to Rogers, "it seems reasonable to hypothesize that this increase could make the difference between ineffectiveness and lethality when attempting to penetrate an enemy's armor."[90] David Weber, a science fiction author, captures the emotion of such an attack in his book, *The War God's Own*:

> As a storm of arrows soared upward. They rose from the boulder field, now all but invisible in the shadows, but their lethal tip flashed golden as they arched into the sunlight and came diving down upon the fort like black death fletched in crimson and green. The sound of their flight was like nothing else on earth—rustling, whistling hiss of a sound, like a million enraged serpents—and they struck. Steel arrowheads rattled like driven sleet as they thudded home, burying themselves in the shields…in showers of sparks. Here and there, one of them licked past a shield and drove through chain or scale mail, and men cursed or shouted in pain.[91]

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86 Rogers, "The Military Revolutions of the Hundred Years' War," 244.

87 Rogers, 249.

88 Oakeshott, *The Archaeology of Weapons*, 293.

89 O'Connell and Batchelor, *Soul of the Sword*, 8, 47.

90 Rogers, "The Military Revolutions of the Hundred Years' War," 249.

91 David Weber, *The War God's Own* (Riverdale, NY, New York: Baen; Distributed by Simon & Schuster, 1998), 286.

Organizationally, the longbow dramatically shifted the time, space, and force equation for political leaders and military decision-makers on early battlefields. This superior capability was less expensive than other weapons during the period, as it was simple for yeoman archers to master.[92] The simplified targeting skillset was easily achievable by a greater percentage of the average population, and it was faster to train to proficiency than other weapon systems.[93] Budgetary constraints and limited resources have been fundamental factors for every nation when allocating defense research and development funding, or organizing, training, and equipping (OT&E) troops, and committing to expeditionary military objectives.[94] The longbow's missile superiority was economically beneficial for combat effectiveness to inflict casualties with reduced manning while offsetting other less capable weapons.[95] These same attributes are found in DEWs with simplified long-range targeting and a virtually limitless magazine but add the knightly humane intent of non-lethal incapacitation and psychological effects.

Socially, the resistance to adopting the missile superiority of the longbow had noble origins; however, a nation must approach the necessity of winning unavoidable wars amorally.[96] Rogers concludes, "longbows, by their very nature, are intended to kill an opponent before he can come in striking distance of the wielder, and it is difficult to offer or accept a personal surrender at a distance."[97] The feathered arrow and longbow shifted the utilitarian calculus for what should be considered just and generated the question: just because they can, does it mean they should? Anthropologists Gardner and Heider noted a possible explanation for the reluctance to adopt the longbow using the Dani, a tribal people in New Guinea, citing it "may be the realization that if their arrows were feathered, many more warriors would be hit. Perhaps they know that even so small a change in the rules of

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92 Rogers, "The Military Revolutions of the Hundred Years' War," 250.

93 Oakeshott, *The Archaeology of Weapons*, 296.

94 Rossiter, "High-Energy Laser Weapons," 35, 39; Beard, "View from the UK"; Australian Government, Department of Defense, "Emerging Disruptive Technology Assessment Symposium."

95 Rogers, "The Military Revolutions of the Hundred Years' War," 251–52; Oakeshott, *The Archaeology of Weapons*, 296–97.

96 Niccolò Machiavelli, *The Prince*, 2nd ed. (Chicago, IL: University of Chicago Press, 1998), 26.

97 Rogers, "The Military Revolutions of the Hundred Years' War," 257.

war could disturb the delicate balance they have achieved between chance and competence, between the competing needs of life and death."[98]

Paralleling DEW adoption limitations and ethical opposition, the longbow missile superiority in the 14th–15th century was more discriminant to a specific individual at a distance but implemented indiscriminately. Like DEWs, where one population deems the longbow incompatible and unethical, others determine it was the most ethical means and proved once again that necessity would often outweigh relative morality to maintain missile superiority. Rogers's research found accounts from medieval authors who believed the longbow's adoption was so pivotal, claiming, "The most important thing in the world, for battles, is the archers."[99] Contrasted by those who failed to adopt—and ultimately were defeated—or as Charles Q. Brown, Air Force Chief of Staff put it, "accelerate change or lose."[100]

C. EARLY TORPEDOES

Historical accounts of torpedoes' development and implementation share similarities with modern-day IEDs, most notably helpless lethality that triggered heinous escalation. This missile superiority was particularly challenging to defend against and was used indiscriminately, but yet still extensively included in standard combat loadouts in maritime operations. There was little honor in using early torpedoes (commonly referred to and appearing more like "floating bombs") and were quickly deemed an unethical weapon due to the brutal suffering of helpless victims.[101] Moral blindness created a clash

98 Robert Gardner and Karl Heider, *Gardens of War. Life and Death in the New Guinea Stone Age* (New York: Random House, 1968), 139, https://www.papuaerfgoed.org/en/BK/40/55.

99 Rogers, "The Military Revolutions of the Hundred Years' War," 249.

100 Charles Q. Brown, *CSAF Releases Action Orders to Accelerate Change across Air Force* (Washington, DC: Chief of Staff United States Air Force, 2020), 2–4, https://www.af.mil/Portals/1/documents/csaf/CSAF_Action_Orders_Letter_to_the_Force.pdf.

101 Katherine C. Epstein, *Torpedo: Inventing the Military-Industrial Complex in the United States and Great Britain* (Cambridge, MA: Harvard University Press, 2014), 3.

between warfighter's technology and a society's attempt to balance necessity and the utility for tactical advantages of willfully dehumanizing weapons.[102]

Dubbed by O'Connell as a "kamikaze fish," the rise and success of torpedo operations were due to parallel technological innovations that included steam engine propulsion, gyroscopic steering, and horizontal plane accuracy.[103] This clustering of subsystems that culminated into torpedoes parallels the incremental SWaP-C (size, weight, power, and cooling) improvements in DEWs. This culmination is significant because in less than 30 years, nascent torpedo systems quickly "transformed into accurate, high-speed, long-range weapons."[104] A once considered unethical IED, incrementally matured, is widely proliferated today.

Torpedo ships maneuvered silently, using the invisibility of night to escape observation, which effectively masked their hostile intent to prosecute defenseless targets with floating bombs.[105] An early American torpedo inventor, Robert Fulton, described the disproportionate effects noting that capital ships "did not appear to make more resistance than a bag of feathers, and went to pieces like a shattered eggshell."[106] This missile superiority delivered tactical successes and created psychological havoc on adversaries rendered defenseless against what military historian John Barns describes as a "diabolical ingenuity of man, to implement sudden and wholesale murder."[107]

During the American Civil War, the Confederates created "aggressive torpedo boats which, make no noise nor smoke, lying deep in the water, could at night, approach

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[102] David A. Mindell, "'The Clangor of That Blacksmith's Fray': Technology, War, and Experience aboard the USS Monitor," *Technology and Culture* 36, no. 2 (1995): 243–44, https://doi.org/10.2307/3106372.

[103] O'Connell and Batchelor, *Soul of the Sword*, 217.

[104] Epstein, *Torpedo*, 5.

[105] John Barnes, *Submarine Warfare, Offensive and Defensive: Including a Discussion of the Offensive Torpedo System, Its Effects upon Iron-Clad Ship Systems, and Influence upon Future Naval Wars*, vol. 146, The Edinburgh Review (Edinburgh, Scotland: A. Constable, 1877), 311; Cleator, *Weapons of War*, 148.

[106] Barnes, *Submarine Warfare, Offensive and Defensive*, 288.

[107] Barnes, 292.

and sink a ship at anchor."[108] Unanticipated by adversaries, torpedo IEDs delivered an asymmetric anti-ship capability with effects against which it was particularly difficult to defend.[109] One Confederate sailor's account, as annotated in the Southern Historical Society papers, noted this superior advantage's lack of danger and removed any hope of "glory…pomp, and splendor of naval warfare."[110] Emphasized by Confederate Col von Scheliha and echoed by the historian Paul Kennedy, torpedoes occupied the same unthinkable place in naval warfare as landmines, "regarded by many nowadays as one of the most evil weapons of war."[111] Despite the recognizable immorality of these new technologies, the violence steadily escalated, which indicated necessity won the adoption struggle, at the cost of reducing humanity in war.[112] Lord C. Beresford, in the House of Commons, considered early torpedoes an "awful weapon of maritime war that threatened to change the character of naval warfare."[113]

With this character shift and killing class of torpedoes, naval combat steadily escalated into the height of unrestricted submarine warfare in WWII.[114] During that war, the British suffered the most significant losses from torpedoes, with over 6,100 sailors killed at the hands of Germans and with that losing sea superiority.[115] Moreover, supply and transport ships were indiscriminately targeted, and the surviving non-combatants were

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108 O'Connell and Batchelor, *Soul of the Sword*, 218; Robert Alonzo Brock and Southern Historical Society, *Southern Historical Society Papers* (Richmond, VA: Virginia Historical Society [etc.], 1876–1959), 76.

109 Epstein, *Torpedo*, 3.

110 Mindell, "The Clangor of That Blacksmith's Fray," 250–51; Brock and Southern Historical Society, *Southern Historical Society Papers*, 78.

111 Barnes, *Submarine Warfare, Offensive and Defensive*, 292–93; Paul M. Kennedy, *Engineers of Victory: The Problem Solvers Who Turned the Tide in the Second World War* (New York: Random House, 2013), 164.

112 William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military* (New York: G. P. Putnam's Sons, 1925), 269–70; Barnes, *Submarine Warfare, Offensive and Defensive*, 307.

113 Archibald Constable, *The Edinburgh Review*, vol. 146 (Edinburgh, Scotland: Archibald Constable, 1877), 307.

114 William Hardy McNeill, *The Pursuit of Power: Technology, Armed Force, and Society since A.D. 1000* (Chicago: University of Chicago Press, 1982), 284–85.

115 O'Connell and Batchelor, *Soul of the Sword*, 296–97.

left for dead. This atrocity signaled the need for a unilateral policy from continued attack upon sinking ships once catastrophic kills were achieved at sea. An inhumane temper first recognized by Dick Page, a Confederate Commander, in the act of chivalry to "make war glorious," ordered to "fire no shot at those boats saving drowning men."[116] This humane norm was similar to the limitations on firing at Airmen under canopy who had bailed out; both of which were later codified in the Geneva Conventions.

With origins that mimic modern IEDs, early torpedoes offered silent and invisible targeting, indiscriminate lethality, and left surviving victims helpless and unable to surrender. Regardless, torpedoes were widely adopted, but these gallantless nuisance weapons were implemented out of necessity for victory. Torpedo attributes parallel DEWs in both character and perception. Both display highly effective physical and psychological effects. However, the inappropriate WWII maritime application was indiscriminate, which caused inhumane second-order effects deemed unacceptable to modern normative standards.[117] This application indicated it was not the weapon system that was immoral but the intent and offensive targeting atrocities. With similar arguments against DEWs, lessons can be drawn on implementation limitations toward defense and minimum use of force applications. With defenseless targeting and extra lethal effects, torpedoes offered missile superiority as a technology, but the liberal application triggered global escalation that transcended domains from unrestricted subsurface attacks to aerial bombing campaigns.

D. AIR TO GROUND BOMBING

From that faithful moment, man "slipped the surly bonds of earth," so too has its attempt to achieve air dominance and missile superiority from the heavens.[118] Tammy Biddle, Professor at the U.S. Army War College, explains this human-focused origin to

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116 Southern Historical Society, *How The Confederacy Changed Naval Warfare: Ironclads and Torpedoes*, Southern Historical Society Papers (Richmond, VA: Virginia Historical Society, 1894), 78.

117 William M. McBride, *Technological Change and the United States Navy, 1865–1945*, Johns Hopkins Studies in the History of Technology (Baltimore: Johns Hopkins University Press, 2000), 55, 134.

118 John Gillespie Magee, "High Flight," National Museum of the United States Air Force, accessed August 29, 2021, http://www.nationalmuseum.af.mil/Visit/Museum-Exhibits/Fact-Sheets/Display/Article/196844/pilot-officer-john-gillespie-magee-high-flight/.

limit the atrocities of World War I (WWI) trench warfare, "bombers could rely on speed, high-altitude, massed formations, and defensive firepower to penetrate to their targets."[119] Air to ground bombing quickly became airborne armadas of precision destruction, beginning from inaccurate early air to surface bombing morphing into area and strategic bombing. Seen across battlefields as early as 1915, airpower, like so many new technologies before it proliferated in Mahanian fashion (size, power, and concentration) with the same vigor, but had little to no historical lessons upon which to draw.[120]

In only a short period of 10 years, early bomber advancements saw the incremental improvements from the B-9, 10, 12, 17, and 29 weapon systems, with ever-increasing speeds, altitudes, and payload capacities.[121] The once protected remote nations and "interiors were now subject to attack" by airpower from above using high explosives, as well as incendiary, nuclear, or chemical weapons.[122] Targeting became less discriminant to meet necessity; this extra lethal mode quickly escalated with unanticipated unethical hardships for aircrews and planners to justify area and urban targets in an attempt to win the war.[123]

The unlimited objectives of WWII offer a glimpse into how political decision-makers and military leaders leverage missile superiority to balance a decisive victory strategically with the moral conduct found both on and off the battlefield. Biddle elaborated this point noting the "strong moral component to all this, a desire to find a way to fight a war that is clean and that is not going to tarnish the American reputation as a moral nation, a nation of ideas and ideology and commitment to individual rights and respect for human

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119 Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914–1945* (Princeton, NJ: Princeton University Press, 2002), 94, http://www.jstor.org/stable/j.ctt7rq5m.

120 Alfred Thayer Mahan, *The Influence of Sea Power upon History, 1660–1783* (New York: Dover Publications, 1987), 7–9; O'Connell and Batchelor, *Soul of the Sword*, 275.

121 Malcolm Gladwell, *The Bomber Mafia: A Dream, a Temptation, and the Longest Night of the Second World War* (New York: Little, Brown and Company, 2021), 39–40; O'Connell and Batchelor, 288–89.

122 Mitchell, *Winged Defense*, xiv.

123 O'Connell and Batchelor, *Soul of the Sword*, 275.

beings."[124] This parabolic balance can best be framed through the de-evolution of targeting decisions of WWII and the reciprocal improvements afterwards. Furthermore, it illustrates the moral imperative to respect human life, a trait that DEWs can contribute toward with non-lethal and non-lasting effects.

Aerial bombing effects were focused on strategic targets versus land and sea air-to-ground bombing support against conventional forces with bombing campaigns and coordinated attacks to slow the wartime supply chain. Allied Air Forces first began by striking key nodes like manufacturing facilities and major lines of communication.[125] Biddle explains that the bombing quickly escalated into Blitzkrieg, initiated by the Luftwaffe, which was quickly adopted by Allied Air Forces in a "gloves off all-out aerial assault against cities" and populations of innocent civilians and non-combatants, attacking homes indiscriminately in an attempt to stifle productivity and reduce morale.[126] This combined bombing offensive, as Biddle puts it, "shaped the nature of the wartime interaction between national air forces."[127] A retaliatory escalation bombing offensive that was nothing short of terrorism.[128]

Hart describes his theory of this indirect approach, as "the predominance of the psychological over the physical," which was the intent of unrestricted bombing efforts on both sides of the globe.[129] These unrestricted bombing operations violated the early Hague Convention's intent, which limited such acts only to legitimate military targets. Hart notes, Air Forces on all sides continued attempts to "break the spirit of the people."[130] Akin to mass murder, leaders, planners, and bomber crews all desired to mitigate civilian losses

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[124] Gladwell, *The Bomber Mafia*, 50.

[125] Mitchell, *Winged Defense*, xvi.

[126] Biddle, *Rhetoric and Reality in Air Warfare*, 69–70.

[127] Biddle, 70.

[128] Kennedy, *Engineers of Victory*, 109.

[129] Basil Henry Liddell Hart, *Strategy*, 2nd rev. ed. (New York: Meridian, 1991), 5.

[130] Liddell Hart, 5, 136.

and all felt the burden of those harassment missions.[131] Nevertheless, when balancing necessity for a quick, decisive victory against the moral conduct of war, necessity took precedence in WWII to defeat Nazi Germany.[132]

Biddle explains "selective blind spots" and "misplaced optimism" coined the Allied Air Forces target selection with the hope to "facilitate panic" within the Axis' interior, a campaign that sustained some of the greatest losses to the Allied Air Forces in both hemispheres.[133] Ultimately, an air battle of will would escalate into incendiary firebombing by the mid-1940s, a terrorizing outcome that paralleled the holocaust.[134] According to Neer, "General George McClellan found incendiary weapons barbaric—Such means of destruction are hardly within the category of those recognized in civilized warfare."[135] The WWII British Berlin area bombing offensive produced 275,000 casualties alone.[136] In a letter from Brigadier General Charles Cabell (top advisor to General Arnold, Commander of the Army Air Forces), he wrote, such "baby-killing schemes would be a blot on the history of the Air Force and of the U.S. We should strongly resist being sucked into any such venture. It gives full rein to the baser elements of our people...No man alive...can calculate or recognize a crumbling morale."[137] Carl Spaatz, commander of U.S. Air Forces in Europe, agreed and stated, "There is no doubt in my mind that the RAF want very much to have the U.S. Air Forces tarred with the morale bombing aftermath which we feel will be terrific."[138]

Under LeMay's drive to limit the duration of the Pacific, he ordered the incendiary bombing of Japanese cities in a similar fashion. Incendiaries propagate, making fire far

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131 Robert M. Neer, *Napalm: An American Biography* (Cambridge, MA: Harvard University Press, 2015), 46.

132 Biddle, *Rhetoric and Reality in Air Warfare*, 77.

133 Biddle, 80.

134 Neer, *Napalm*, 20; Kennedy, *Engineers of Victory*, 109.

135 Neer, 22; Kennedy, 109.

136 Neer, 64.

137 Neer, 64–65.

138 Neer, 64–65.

more dangerous (physically and psychologically) to a large city, especially those found throughout Japan in the 1940s made of wood, pulp, and paper. According to American estimates from the post-war strategic bombing survey, Gladwell reported that in Tokyo alone, more Japanese civilians "lost their lives by fire in six hours than at any other time in the history of humanity."[139] With over 2,000 tons of napalm bombs dropped within 16 square miles, as many as 130,000 civilians perished in one period as the bloodiest event recorded.[140]

This mode came at a significant cost to those who flew the bombers and their fighter escorts. Biddle notes, "No other Western Allied combatants, except for their American daylight bombing counterparts, suffered the same huge casualties, nor faced the mathematical certainty of their deaths so routinely and so unflinchingly."[141] Some missions would result in losses upwards of 40%. The Berlin offensive cost the Allied almost 500 bomber aircraft alone, a statistic not including fighter escort losses.[142]

Whether it lacked technological solutions or operational creativity, the decision-making calculus once again tilted to necessity of victory over all else. It is also significant that the bomb improvements focused primarily on increased lethality versus precision guidance to limit the widespread killing. Using utilitarian justification for the predicted loss of friendly and enemy forces with civilian non-combatants alike, it rationalized the August 1945 demonstration of missile superiority events at Hiroshima and Nagasaki, Japan. Kennedy argues that "the indiscriminate bombing of a city for the sole purpose of terrorizing the civilian population," which would be "contrary to the dictates of humanity," was executed in an out-of-control escalation with no way to stop it.[143] Later, the Geneva

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[139] Gladwell, *The Bomber Mafia*, 186.

[140] History.com Editors, "Firebombing of Tokyo," History, November 16, 2009, https://www.history.com/this-day-in-history/firebombing-of-tokyo.

[141] Biddle, *Rhetoric and Reality in Air Warfare*, 86.

[142] O'Connell and Batchelor, *Soul of the Sword*, 312.

[143] Kennedy, *Engineers of Victory*, 63.

Conventions deemed such indiscriminate acts as inhumane and banned their future use; just like mines.[144]

E. MODERN DAY KINETICS

Since WWII, the United States, with its allies and their adversaries and competitors, have continued to seek missile superiority via many different threads, all of which have one thing in common, the destruction of objects and the efficient killing of humans. With a menu of damage options offered by conventional kinetic (blast, fragmentation, cratering, incendiary, and penetration) weapons, delivered with laser and global positioning systems precision guidance, the United States is a top competitor in the market of lethality. Using modern intelligence, surveillance, and reconnaissance, the United States unilaterally leverages enduring coverage globally to F3ED (find, fix, finish, exploit, analyze, and disseminate) targets at its discretion, occasionally graying the lines of necessity and sovereignty.[145] According to Faint and Harris, two Army Special Forces officers, the "true symbiotic relationship between the operations and intelligence warfighting functions" currently peaks with 5th Generation aircraft like the F-22 Raptor and B-21 Raider, to the latest remotely piloted aircraft (RPA) development like the RQ-180.[146] The United States employs exotic munition spanning from the guided bomb unit (GBU) 34/B with 11 tons of explosives (MOAB—massive ordinance air blast, colloquially known as the mother of all bombs) to the AGM-114 R9X.

According to the international media, the R9X missile "carries no explosives, instead destroys its target using its kinetic energy and six blades that are deployed from the missile before impact."[147] The R9X (coined by the media as *the flying Ginsu* or *ninja bomb*) was used as recently as August 2021 against Islamic State Khorasan (ISIS-K) in

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144 Neer, *Napalm*, 27.

145 Charles Faint and Michael Harris, "F3EAD: OPS/Intel Fusion 'Feeds' the SOF Targeting Process," *Small Wars Journal*, January 31, 2012, https://smallwarsjournal.com/jrnl/art/f3ead-opsintel-fusion-%E2%80%9Cfeeds%E2%80%9D-the-sof-targeting-process.

146 John Arquilla, personal communication, September 1, 2021; Faint and Harris.

147 Nick Waters, "The Telltale Traces of the U.S. Military's New 'Bladed' Missile," Bellingcat, August 26, 2021, https://www.bellingcat.com/resources/how-tos/2021/08/26/the-telltale-traces-of-the-us-militarys-new-bladed-missile-r9x/.

response to the IED attack outside of the Hamid Karzai International Airport non-combatant evacuation Operation ALLIES REFUGE.[148] This lethal strike and the means to complete a minimum use of force show revolutionary improvements, caught in decision-making that remains consistent with all previous wars, the utilitarian tug-of-war between necessity and morality. Thanks to modern missile superiority, weapon systems like the R9X assist U.S. forces in minimizing CD and reducing the chances of CIVCAS, both intended and unintended.[149]

Even with the precision, accuracy, and minimum use of lethal force offered today, doubts remain to its ethical targeting; a practice scrutinized to this day. According to Letta Tatler, Associate Director of the Crisis and Conflict Division of Human Rights Watch (HRW), "part of the danger here is that these weapons seem so failsafe, but the R9X is only going to be as good as the intelligence used to guide it."[150] Gladwell agrees, noting, precision strike bombing "never solved war, and still has drawbacks. The cleaner and more precise a bomb gets, the more tempting it is to use that bomb, even when you should not."[151] According to reporter Nick Waters and often cited by the media, "even if the U.S. determines it wants to kill a particular person, that does not mean that it can legally do so."[152] Leaving the question, just because you can, does it mean you should?

F. SILENT GUARDIAN

The effects of public opinion toward early DEWs on U.S. political decision-makers and military leaders have negatively created anchored obstacles toward the fielding and implementation of emerging DEWs.[153] Highlighted by domestic and international media, several human and civil rights activists and influential critics have encapsulated numerous

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[148] Tyler Rogoway, "U.S. Executes Revenge Drone Strike on ISIS-K 'Planner' in Afghanistan," The Drive, accessed August 29, 2021, https://www.thedrive.com/the-war-zone/42173/america-strikes-backs-at-isis-k-in-afghanistan.

[149] Waters, "The Telltale Traces."

[150] Waters.

[151] Gladwell, *The Bomber Mafia*, Epilogue 05:00.

[152] Waters, "The Telltale Traces."

[153] Cannin, "Directed-Energy Weapons," 62.

fundamental arguments against fielding DEWs including safety concerns, ethics violations, and the slippery slope effect.[154] Triggered in 2010, this controversy outshadowed the capabilities of the U.S.'s Army's newest ADS, a microwave heat ray gun dubbed *Silent Guardian* deployed to Afghanistan.[155] As seen in Appendix A, across major media headlines, the first of its kind ADS weapons effects were hyper-sensationalized as crippling and brutally painful.[156] Unsubstantiated by research and field tests, these media narratives resulted in the immediate removal of the directed energy ADS within "weeks after its arrival but prior to its operational use—drastically halting the progress and momentum of DEW implementation to this day."[157]

The anchoring effect, also called a psychological, cognitive bias, of these numerous claims, influenced political decision-makers and military leaders with only unsubstantiated negative assessments. Daniel Kahneman, a cognitive and behavioral psychologist, proves the ease and strength of anchoring in his book, *Thinking, Fast and Slow*, by explaining that like the law of primacy, people tend to believe the first piece of information heard and often overestimate its authenticity.[158] Over time, repeated narratives and messaging that saturate the headlines shift ungrounded claims into facts.[159] The media uses this combination of repetition and saturation of eye-catching headlines as a mechanism to sell a product, but with that also manufactures truths, which, when false, disproportionately add risk for decision-makers.[160]

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154 Weinberger, "U.S. Military Heat-Ray."

155 Weinberger.

156 Elfrink, "Safety and Ethics Worries"; Hudson, "Raytheon Microwave Gun Recalled amidst Controversy"; Cannin, "Directed-Energy Weapons," 62.

157 Elfrink; Hudson; Cannin, 62.

158 Kahneman, *Thinking, Fast and Slow*, 120–26.

159 Thomas H. Johnson, Matthew DuPee, and Wali Shaaker, *Taliban Narratives: The Use and Power of Stories in the Afghanistan Conflict* (New York: Oxford University Press, 2017), 9–10; Andrea J. Dew, Marc A. Genest, and S. C. M. Paine, eds., *From Quills to Tweets: How America Communicates about War and Revolution* (Washington, DC: Georgetown University Press, 2019), 15.

160 Ajit K. Maan, *Narrative Warfare* (Scotts Valley, CA: CreateSpace Independent Publishing Platform, 2018), 14; Dew, Genest, and Paine, 14, 43–44.

As a class of systems, DEWs also find themselves in the center of genuine ethical concerns and claims that DEWs incite human and civil rights violations, including torture from legitimate organizations and international institutions. The root of these arguments rests with the morality of these capabilities against established laws, treaties, and social norms (Appendix A lists some of these alleged violations). Each determination further anchors DEW capabilities negatively that result in a narrative that pushes DEWs away from non-lethal and non-lasting effects into permanent inhumane effects; ultimately concluding that DEWs will be misused by military members.

In a short article published by Physicians for Human Rights (PHR) and the International Network for Civil Liberties Organization (INCLO), they present a cautionary argument against DEWs by arguing they have "not yet been transparently and appropriately tested, and PHR has serious concerns about their short-and long-term medical impacts."[161] The PHR article also found "it hard to conceptualize a test that would fulfill federal ethics guidelines for research on human subjects."[162] Additionally, they assess the potential exists for inappropriate or disproportionate use by the military in citing that the long-range capabilities limit opportunities for the user to assess-on-the ground conditions, a logical fallout that rests in the slippery slope argument. The *Silent Guardian* system was designed, built, and advertised as a non-lethal means with technical specifications that limit human skin penetration of the electromagnetic microwaves to no greater than 1/64 inches or .397 millimeters. The PHR raises red flags to this statement by explaining, "The skin on eyelids, for instance, is 0.2 millimeters deep. Increased exposure times can produce skin burns and dermal damage."[163]

Together, these claims against DEWs have resulted in removing the non-lethal DEW *Silent Guardian* from the battlefield, which leaves only conventional lethal munitions. Now rooted negatively, DEWs possess an unethical connotation that artificially

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[161] "Health Impacts of Crowd-Control Weapons: Directed Energy Devices," Crowd-Control Weapons Series, Physicians for Human Rights, October 28, 2020, https://phr.org/our-work/resources/health-impacts-of-crowd-control-weapons-directed-energy-devices/.

[162] Physicians for Human Rights.

[163] Physicians for Human Rights.

increases the risk of implementation for political decision-makers and military leaders. Lacking these nascent DEW effects, military forces are currently limited to binary forces options with their inherent adverse second- and third-order effects.

G. CONCLUSION

This chapter assessed parallels in historical military technological revolutions to DEWs and linked the adoption and implementation challenges between morality and necessity. Unlike the vector in historical weapons evolution that depicted increased lethality and decreasing discrimination that trigger escalation, DEWs now offer the positive attributes of missile superiority with the added benefits of de-escalation via non-lethal intent.

Knightly combat discriminately fought for a non-lethal yield, a humane intent of the profession of arms, and the moral equality of fellow combatants. The emerging longbow was deemed unethical, regardless of its missile superiorities, out of hubris chivalry, and was not adopted. This status-quo resistance triggered the punctuated equilibrium counterpoint that ended close-quarters combat of noble champions for less discriminate lethality at range in wars of attrition. The parallel to DEWs in this section were identified with the knights' desire for non-lethal ends, the longbows' benefits of increased range and accuracy, unlimited magazine, and the psychological effects of the longbow that contributed to military victories. Lessons that apply to DEWs were seen in the fall of the knights during the infantry revolution with the ethical misclassification of the longbow that drove adoption resistance, which led to the knights' ultimate decline, or as Charles Q. Brown, Air Force Chief of Staff put it, "accelerate change or lose."[164]

Next, this chapter assessed the steady increase of helpless lethality that perpetually triggered increased escalation with the implementation and execution of early silent and undefendable torpedoes during the American Civil War through WWII. In WWII, increased indiscriminate warfare character triggered catastrophic escalation into unrestricted submarine warfare and aerial bombing, killing equally applied to the holocaust

[164] Brown, *CSAF Releases Action Orders to Accelerate Change across Air Force*, 2–4.

and acts of terrorism. Despite weapon systems improvements, the liberal offensive use in widespread targeting of civilians concluded that intent was as significant a factor to missile superiority morality as the lethality and discrimination of a new weapon.

This section also described the rise of clustering technological advances and the rapid rate of improvement that matured torpedoes in 30 years and bombers in less than 10 years; a function assessed to improve the SWaP-C in DEWs at the same rate. Additional DEW parallels drawn with torpedoes and WWII area bombing were the effectiveness of a silent and invisible force and the resulting psychological effects that reduce an adversary's will to fight. Finally, this section presented the lesson on how weapon improvements that narrowly focus on increased lethality perpetuated the uncontrolled escalation seen in WWII unrestricted warfare. This lesson illustrates the need to seek a minimum use of force options in the future that can resist escalation, which is a moral imperative to respect human life (both the target and the troops required to employ munitions), a character trait that non-lethal DEWs effects personify.

The final section assessed more recent events that used modern capabilities to link the ever-present tug-of-war decision-making struggle of necessity versus morality in combat. Today, with a plethora of conventional weapons options, U.S. military aircraft can engage targets with as much or as little boom as political decision-makers and military leaders see fit. A common thread in the development of weapons has been the drive for precision and accuracy, speed, simplified targeting, a large (if not unlimited) magazine, with silent and invisible execution; all of which are attributes found in emerging DEW technologies. However, departing from the century-long escalation of lethality, DEWs, for the first time, can now offer a non-lethal element into the utilitarian decision-making calculus that fosters de-escalation and long-term strategic intent.

DEW technologies can help realize results seen in historical missile superiorities. It can only happen, however, if the United States can better understand the moral and ethical claims opposing emerging capabilities. Like so many military technologies before it, leaders and decision-makers should also expect the newness to be scrutinized (even rejected by some) as some believe DEW effects do not align with norms and armed conflict status quos. *Silent Guardian*, a microwave DEW, was fielded and immediately removed

due to allegations it was an inhumane weapon used to indiscriminately torture, a belief now anchored across all DEWs. Furthermore, the anchoring has increased the political risk that limits other DEW fielding, which leaves only conventional lethal munitions. Like the noble knights of the 15th century who failed to adopt the longbow, the United States lacks the missile superiority advantages of DEWs, which results in only binary force options with their inherent adverse second- and third-order effects.

The next chapter explores and expounds upon ethical principles, prioritizes moral justification by applying grounded arguments to nascent DEW technologies, and addresses ungrounded but anchored allegations against them. Singer argues, as this new technology is boasted with claims for "less bloodshed or greater compliance, and established moral principles," the next chapter seeks to ground those sentiments with a look through a critical but dirtier lens.[165] Stressed by Michael Walzer, a traditional Just War theorist, these claims "are true or false, and though it is not easy to judge them (nor is the war plan really so simple), it is important to make the effort…if we call ourselves moral men and women, we must make the effort, and the evidence is that we regularly do so."[166] Hence, this domestic and international discussion must rightly occur prior to fielding DEWs. Finally, the next chapter assesses and attempts to answer the next logical question for DEW employment. Just because we can, does it mean we should?

[165] P. W. Singer, "The Ethics of Killer Applications: Why is it So Hard to Talk about Morality when it Comes to New Military Technology," *Journal of Military Ethics* 9, no. 4 (2010): 303.

[166] Walzer, *Just and Unjust Wars*, 20.

III. A DIRECTED-ENERGY WEAPON ETHICAL ARGUMENT

> The lesson is that the military must fight the war in such a way that it maintains the confidence of the people. That means it must be correct ethically, and morally and, of course, professionally. It's not good enough just to be the good guys. You have to know how to fight too. There needs to be a balance of their elements. You have to be good, solid fighters, and you have to be able to gain the confidence of the people.
>
> — Gen John R. Galvin, U.S. Army[167]

Each revolutionary technological advancement of military weaponry has planted the seeds for new war conventions and professional codes for armed combat shaped by norms that parallel the growing values and philosophical principles to fight well in just causes.[168] Captured into the Laws of War, institutional practices have matured over time and incorporated socially refined norms and judgments codified into codes of combat principles and behaviors that all find their foundations grounded by ethics.[169] With roots that span centuries, the early institutions that created and adopted these moral frameworks could never have fathomed directed energy as a means of force, let alone non-lethal DEWs. These institutional guidelines of fighting well in wartime were narrowly focused on limiting losses of human life from lethal capabilities. In this same manner, historically, moral philosophers have narrowly justified only the rightness of killing without considering non-lethal forms of force in warfare, a technology only recently offered by DEWs.

As the DOD ROMO transcends lines from law enforcement through Phase III warfighting campaigns, any use of DEWs will be subject to normative legal and ethical regimes.[170] DEW definitions, both legally and morally, remain unarticulated in academia, law, military strategy, and ethics. A novice moral strategist and former U.S. Army officer,

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[167] J. D. Waghelstein, "Military-to-Military Contacts: Personal Observations–The El Salvador Case," *Low Intensity Conflict & Law Enforcement* 10 (June 1, 2001): 10.

[168] Walzer, *Just and Unjust Wars*, 3, 44.

[169] Walzer, 24.

[170] Mathew Brooks, "The Ethics of Directed Energy Weapons," *Chesterfield Strategy* (blog), November 22, 2018, https://chesterfieldstrategy.com/2018/11/22/the-ethics-of-directed-energy-weapons/.

Mathew Brooks, identified how this void opens the door to a unique set of ethical risks and legal considerations.[171] International laws and treaties rightfully prohibit the deployment of weapons specifically designed to cause superfluous injury, unnecessary suffering (like blindness), or long-term psychological harm while requiring distinction, proportionality, and discrimination.[172] However, few policies, treaties, or laws prohibit the deployment of non-lethal DEWs. According to the Center for Technology and National Security Policy, "others argued that DEWs devices might be designed to accommodate legal considerations."[173] Brooks theorizes that these new non-lethal DEW capabilities can possibly circumvent existing legal restrictions of prohibited weapons intended to maintain moral justice in wartime distinctions and proportionality.[174]

DEW capabilities are largely undefined and exponentially evolving yet are being judged legally before any moral and ethical assimilation of their unique non-lethal effects are established. This void creates a vacuum vulnerable to classic negative anchoring influence for the nascent classes of superior and formidable DE capabilities that are anti-suffering, discriminant, with non-lethal and non-lasting effects.[175] Moreover, DEWs are not on any future agendas for discussion within the United States or multilateral institutions.[176] With status quo inertia now resisting DEWs, these capabilities must be thoroughly assessed with utilitarian foundations that focus on the rightness or wrongness of effects and outcome, as well as philosophical criticisms for the newly established anchored unethical claims.[177]

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171 Brooks.

172 Siegfried Ullrich, *Directed-Energy Warfare, a Revolution in Military Affairs* (Carlisle, PA: United States Army War College, 2018), 16–17.

173 Elihu Zimet and Christopher Mann, *Directed Energy Weapons—Are We There Yet?* (Washington, DC: National Defense University, 2009), 15, https://ndupress.ndu.edu/Media/News/News-Article-View/Article/1228846/dtp-062-directed-energy-weapons-are-we-there-yet/.

174 Brooks, "The Ethics of Directed Energy Weapons."

175 Ullrich, *Directed-Energy Warfare*, 16–17.

176 Anna Wheeler, "Directed Energy Weapons: Discussion Paper for the Convention on Certain Conventional Weapons (CCW)," *Article 36*, 2, November 2017, https://article36.org/wp-content/uploads/2019/06/directed-energy-weapons.pdf.

177 Walzer, *Just and Unjust Wars*, xxvii.

As seen in recent history and discussed in Chapter II, DEWs designed specifically for non-lethal force have remained at the center of ethical controversy and prevented nascent DE technologies from being implemented by the DOD for over a decade. This roadblock manifests unsubstantiated unethical and inhumane claims, sensationalized by the media against all variations of DEWs, which has resulted in superficially elevated risks to political decision-makers and military leaders. The ungrounded claims against DEWs have greatly limited necessary capabilities during military operations—a means to achieve ends—leaving only binary lethal conventional weapons. Although lethal munitions have resulted in tactical successes, they often have protracted strategic losses for many recent campaigns.

With a shared common morality, the United States must lead global efforts to reestablish DEW defense technologies as an ethically acceptable and morally necessary means with its allies and partners. A multilateral effort is critical to shaping future normative behaviors in DEW conduct and boundaries for acceptable and unacceptable application for DE capabilities throughout the spectrum of conflict.[178] With the changing character of warfare and the rising penalties for failure in conflicts, shifting established domestic and international misunderstandings toward DEWs is necessary to foster future implementation, but that will not happen until specific claims are addressed.[179] All to answer the question orbiting DEWs, just because we can, does it mean we should?

This chapter assesses the DEW ethical and moral vacuum, applies multiple interpretations of their ethical use in war, and applies practical and moral points of view toward non-lethal DEW capabilities in the commonly accepted language and vocabulary (descriptions and interpretations) established by Michael Walzer's Just War Theory doctrine of human rights.[180] This chapter begins by assessing individual tenets of *jus ad Bellum* (right in going to war) and *jus in Bello* (right conduct of war), DDE, and combat responsibilities.

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[178] Walzer, xxvi.

[179] Walzer, 20.

[180] Walzer.

Morality and legality are often misrepresented; therefore, this assessment focuses on DEW moral rightness (or wrongness) in military force.[181] However, Jeff McMahan, a Just War Theory revisionist, further delineates that moral rightness does not equate to lawful or unlawfulness, which "has no bearing on the proper conduct of war."[182] The necessary legal lens is expounded upon in the next chapter. However, the intent of this chapter is to assist political decision-makers and military leaders in fully understanding the ethical issues surrounding DEW technologies and to close the gap between the growing unethical violation claims against moral and ethical reasoning.[183]

A. JUS AD BELLUM

A sovereign state's consideration and political decision-making process to assess entry into a conflict has fundamentally remained constant for many decades regardless of technological advancements. Similar resistance to change exists for the laws of war. Walzer explains, "The rules of engagement have not been replaced but expanded and elaborated, so now we have both a ban on war and a code of military conduct, a dualism of our moral perception is established in the law."[184] James March, an American political scientist, sociologist, and economist, categorized this well-established norm to resist change as behavior within the decision-making model that fosters decision heuristics, outcome predictability, and ultimately, inflexibility to new adoption.[185] DEW capabilities indirectly disrupt the institutional decision-making calculus both positively and negatively. DEWs experience the same dualism between the resistance to adoption, of seemingly humane effects, due to unsubstantiated unethical claims.

Capabilities as a means (within the ends, ways, and means model) offered by DEWs have positive effects on many *jus ad Bellum* tenets; conversely, DEWs could negatively

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181 Stephen Coleman, "Possible Ethical Problems with Military Use of Non-Lethal Weapons," *Case Western Reserve University School of Law Scholarly Commons* 47, no. 1 (2015): 187.

182 Jeff McMahan, *Killing in War* (Oxford: Oxford University Press, 2009), 4.

183 Singer, "The Ethics of Killer Applications," 311.

184 Walzer, *Just and Unjust Wars*, 41.

185 James G. March, *A Primer on Decision Making: How Decisions Happen* (New York: Free Press, 2010), 76–81.

influence the political framing toward an intervention or noncommitment. These specific considerations are the ethical equations of global proportionality, reasonable hope of success, and the end purposes of a better peace.[186] *Jus ad Bellum* methodology helps limit states' commitments against combating aggression, philanthropic intervention, international law enforcement, or self-defense to only those who are just, or as McMahan puts it, to avoid "utterly pointless wars."[187]

These ethical considerations (judgments) shift when incorporating the highly effective minimum use of the non-lethal force of DEWs with non-lasting anti-suffering effects onto new battlefields. This use must be highlighted to avoid potential misalignment of ends, ways, and means of political strategy and military objectives when calculating the morality of a nation and its just right in going to war; a result that even imperfect democracies, including the United States, can get wrong.[188] *Jus ad Bellum* considerations and a nation's decision to enter a conflict are complex, and DEWs can offer both solutions to threshold criteria of proportionality, hope for success, and better peace, as well as tempting pitfalls that must be considered.

1. Global Proportionality

At first glance, a purely utilitarian argument could dominate this conversation for its simplicity of calculating the advertised benefits of using non-lethal force, but such a view of preserving life would overlook the nuances of a purely consequentialist approach to global proportionality.[189] A monochromatic reaction offered by Walzer is that "all aggressive acts have one thing in common: they justify forceful resistance, and force cannot be used between nations, as it often can between persons, without putting life itself at

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[186] Walzer, *Just and Unjust Wars*, 21–23.

[187] McMahan, *Killing in War*, 2.

[188] Walzer, *Just and Unjust Wars*, 35, 41.

[189] Seth Lazar, "Proportionality," in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta, (Stanford, CA: Metaphysics Research Lab, Stanford University, 2020), sec. 3.4, https://plato.stanford.edu/archives/spr2020/entries/war/. Jus ad Bellum proportionality accounts for the aggregated energy of time, resources, treasure, and blood, as well as domestic and international perceptions.

risk."[190] Adversarial aggression against states' sovereignty and individual rights violations varies indefinitely. Such a single-scope combat view, only focused on Phase III combat operations, overlooks the ROMO complexities. As a dominant global power, the United States often supports humanitarian missions, and that decision to support deserves scrutiny prior to military intervention. The DEW attributes modestly lower the violence during conflict but can considerably lower the death toll across the ROMO. For global proportionality across all spectrums of conflict, any reduction in the total loss of life that encourages local, domestic, and international opinions and increases the potential for long-term peace is morally good.

Pessimistically, reducing the burden established within the *jus ad Bellum* proportionality model focused solely on traditional death tolls alone (casualty estimates on all sides) may lower the threshold for entering a commitment. However, overreliance on non-lethal DEW capabilities could reasonably lower casualty estimates and encourage democracies to enter a conflict unjustly using the justification of non-lethal ways. Davis Whetham, a UK Defence studies professor at King's College London, states, "This principle requires that the damage, losses, or injury resulting from any military action, not just to one's own side but considered overall, should not be excessive in relation to the expected military advantage."[191] This change in utilitarian calculations does not fully assess the financial costs, mental tolls, or public opinion on both sides of the battlefront.

The estimates of bystanders killed or injured may be proportional, and fielding non-lethal DEWs would further offset current estimates, but that prewar estimate fails to recognize the global perceptions on second-order effects of DEWs. Walzer's later works recognize that "the number of civilian deaths (possibly a very high number) is not disproportionate to the value of military victory. However, more recent uses of this doctrine have exactly the opposite purpose—to insist that even a small number of civilian deaths

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[190] Walzer, *Just and Unjust Wars*, 52.

[191] David Whetham, "The Just War Tradition: A Pragmatic Compromise," Macmillan Higher Education, 22, 2011, https://www.macmillanexplorers.com/the-just-war-tradition-a-pragmatic-compromise/14243986.

(possibly a very low number) is disproportionate to any possible military achievement."[192] Due to the additional proportionality considerations, Walzer warns decision-makers to recognize the new risks DEWs inject (physical and perceived), including the temporary loss of liberties, especially to non-combatants, and the temporary incapacitation and a sense of pain (in regards to microwave DEWs). Similarly, in the case of millimeter-wave and HELs, DEWs will induce the new risk as a byproduct of mechanical failures in the form of a loss to freedom of movement (physical and perceived) that must also be aggregated in the global proportionality calculus.

Just as strategists calculate potential death toll effects, it is prudent not to underestimate the new risks for DEWs and global interpretation of second- and third-order DEW effects. These effects include public interpretation of classifying undesired DEW effects on innocent civilians as violations and labeling events as CD. Loss of liberties and CD may be unintentionally excluded in early utilitarian calculations attempting to incorporate DEWs due to their temporary nature and non-lethal non-lasting effects, which further shifts the balance toward commitment that may otherwise be unjust. This approach to global proportionality is designed to ensure non-lethal DEW variables do not circumnavigate the traditional utilitarian calculations to maintain the highest *jus ad Bellum* threshold with mutually recognized unintended second- and third-order DEW effects and impressions.

2. Reasonable Hope of Success

Success in battle is a multidimensional concept shaped by political ends, executed in part by military means, with a strategy that balances the necessity of a swift victory and the virtue of fighting well. Reverently stated by the military strategist Karl von Clausewitz, "War is a mere continuation of policy by other means."[193] The political decision-making landscape in foreign policy is by nature a wicked problem requiring influence from all instruments of national power (diplomatic, information, military, and economic), which

[192] Michael Walzer, "Responsibility and Proportionality in State and Nonstate Wars," *Parameters* 39, no. 1 (March 22, 2009): 42–43.

[193] Tzu and Clausewitz, *The Book of War*, xxi, 984.

are synergistically leveraged to achieve political ends.[194] In recent history, the use of (and overuse of) military force options has increased commitments to armed conflict; once committed, these conflicts have been increasingly protracted. The increased duration is that war strategies have lost their focus on the center of gravity (CoG), or people and populations.[195] When assessing the *jus ad Bellum* thresholds criteria for a reasonable hope of success, DEWs introduce available means that are humanely centered on people, property, and perceptions in a manner that can engineer confrontations, and then shorten the duration of conflicts while preserving respect for human life.[196]

As previously discussed in Chapter II, the U.S. military, with its allies, has always strived to increase net reasonable hope for success by innovating and adopting missile superiorities that increase discrimination, accuracy, and lethality.[197] Today, revolutionary missile superiority like DEWs maintain discrimination and accuracy and now adds non-lethal force options. Approaching a conflict with a population-centric strategy presents opportunities beyond simply adversaries and belligerent considerations.[198] Incorporating non-lethal DEWs offers solutions if leveraged appropriately (both technology and doctrine), with cascading effects that can defeat threats, and increase coalitions' safety. Limiting conventional weapons will also offset second- and third-order effects that can manifest new opportunities and regional and international support while enabling the United States to manage public perceptions. All of these can decrease retaliatory escalation, and foster swifter operational victories and long-term strategic success.

CoGs are unique for each adversary but often maintain common threads. In the case of violent extremist organizations (VEOs), terrorist organizations, and transnational threats (TNTs), any friendly conventional kinetic force resulting in (actual or alleged) CD and

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194 William J. Hartig, *Problem Solving and the Military Professional*, rev. June 2012 (Newport: The United States Naval War College, 2005), 7–9.

195 Chairman of the Joint Chiefs of Staff, *Joint Planning*, IV 40–43.

196 "Article 27," International Committee of the Red Cross, August 12, 1949, https://ihl-databases.icrc.org/ihl/b0d5f4c1f4b8102041256739003e6366/ffcb180d4e99cb26c12563cd0051bbd9.

197 The drive for missile superiority has remained constant with increasing precision and accuracy, greater standoff range, lethality (incapacitation), and weapon systems discrimination.

198 Chairman of the Joint Chiefs of Staff, *Joint Planning*, IV 29, 43.

CIVCAS offers adversary propaganda imagery for information operations (IO) narratives that increases adversary recruiting efforts and overall adversary resolve.[199] Over time, friendly nations will inherently lose domestic and international support with each allegation, which then strengthens hostile actor networks and lessens reasonable hope for success. Both have been seen across the Middle East, South and Central America, and Africa.

Conventional weapons with binary solutions often result in short-term tactical victories but reciprocate operational escalation that leads to a strategic stalemate, especially against VEOs, terrorist organizations, and TNTs.[200] As more adversaries live and operate in urban areas, so does their dependence on support from local relationships; this co-mingling characteristic inevitably increases CIVCAS potential. Walzer offers a horrifying Vietnam War anecdote that characterizes hope, stating, "It became necessary to destroy the town [village] to save it."[201] By implementing DEWs smartly into irregular battlefields, friendly forces can apply tactical efforts that achieve strategic ends by disrupting guerrilla TTPs. Moreover, non-lethal DEWs can lessen CIVCAS and CD, and thereby retain the beating hearts and minds of the local populations while fostering the trust and influence required to neutralize an adversary's infrastructure.

When considering how the United States, together with its allies and partners, can posture against strategic competition aggression from peer and near-peer adversaries, the most significant concern is ensuring military operations do not unintentionally escalate activities into an all-out war and thus run counter to any reasonable hope for success. China's long-term aggression-based strategy, predatorial economics, and disguised dual-use programs nefariously breach the sovereignty of weak and poor states.[202] Militarily, China is accomplishing this strategy with state-sponsored proxies and paramilitary forces

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199 Davis, "Controlled Warfare," 51.

200 Michael Walzer, "Destroying to Save," *Dissent Magazine* (blog), January 15, 2018, https://www.dissentmagazine.org/blog/destroying-to-save-mosul-raqqa-civilian-casualties.

201 Walzer.

202 Secretary of State, *The Elements of the China Challenge* (Washington, DC: Office of the Secretary of State, 2020), 7, 12, 19, 24, 40, 45–46, https://www.state.gov/wp-content/uploads/2020/11/20-02832-Elements-of-China-Challenge-508.pdf.

to enforce the Chinese Communist Party's national strategy. Similarly, Russia uses masked troops and cyber-attacks with other national instruments of power to expand Russian territory under Putin's semi-successful and ongoing annexation of Crimea, Ukraine. Walzer notes the predictability of intervention considerations against great powers by stating, "Resistance seems imprudent, even hopeless. Many lives will be lost, and to what end? However, our moral preference holds, not only to justify resistance but call it heroic."[203] Recognizing as early as his first edition of *Just and Unjust Wars* in 1991, Walzer adds:

> Imagine a state whose government tries to press its boundaries or its sphere of influence outward, a little bit here, a little bit there, continually over a period of time—not quite Edmund Wilson's (1962) sea slug state, something nearer to a conventional great power. Certainly, people against whom the pressure is being brought have a right to resist; Allied states and possibly other states as well ought to support their resistance.[204]

China and Russia have displayed their willingness to flex military force for regional expansion and global escalation in a parallel slug fashion. Highly deliberate acts of aggression that tiptoes just below the threshold of armed conflict, if left unchallenged, will not only continue but also escalate. Global aggression is on the rise, but so are the penalties for failure. While these acts must be confronted, they must be approached with a strategy that offers a reasonable hope for success.

DEWs, non-lethal by design with tailorable and scalable force, and invisible and silent effects, offer a class of weapons for defense in gray-zone battlespaces that provide de-escalatory effects, a key constraint when developing a peer and near-peer military strategy. As adversary anti-access area denial (A2AD) technologies and the weaponization of space increases, so does fog and friction in conflict, and with it, inevitable miscalculations, and potentially costly mistakes. In these highly unstable gray-zone arenas, militaries must be equipped with force options that foster political ends. Such equipment must ambidextrously include options to defend friendlies and offset conventional weapon

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[203] Walzer, *Just and Unjust Wars*, 67.

[204] Edmund Wilson, *Patriotic Gore; Studies in the Literature of the American Civil War* (New York: Oxford University Press, 1962), xi, xxxii; Walzer, *Just and Unjust Wars*, 69.

incompatibilities or escalation missteps. The military force calculus is complicated in these not so hypothetical strategic competition scenarios, and the penalty for failure has global repercussions. DEWs can make the difference when the only reasonable hope for success is de-escalation by ensuring the military has options and authorities to de-escalate threats prior to the necessity of conventional kinetic weapons.

3. End Purposes of a Better Peace

A net assessment to determine the possibility of a better peace is the final characteristic of the *jus ad Bellum* criteria for an ethical review whether it involves a crime of aggression from an outsider or the internal violations against basic human rights in a failing state. The better peace net assessment calculates whether potential ends outweigh the costs to ensure military efforts leave a vulnerable nation better off than its current dilemma. Major General John Sedgwick, an American Civil War soldier, argued that avoiding death in war can "avoid the dangers of provoking adversary reprisals and bitterness that will long outlast the fighting."[205] In the same Vietnam lesson described previously (to save the village), a utilitarian argument for the greatest good must outweigh the bad (both ongoing violations and the lasting Hells of war), calculations that must include the principle that conventional kinetic weapons have indefinite effects.[206]

A tragic example of this net assessment calculation, limited by binary options of conventional weapons, can be seen in the Organization of African Unity ceasefires, the United Nations (UN) charter peacekeeping forces, and the U.S. (and other able nations) failure to intervene in the 1993–1994 genocide of the Tutsis in Rwanda.[207] The international community ignored the *lethal politics* policy (soft language for murder)

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205 Walzer, *Just and Unjust Wars*, 132.

206 Walzer, "Destroying to Save."

207 Howard Adelman and Astri Suhrke, *The International Response to Conflict and Genocide: Lessons from the Rwanda Experience* (Copenhagen: Steering Committee of the Joint Evaluation of Emergency Assistance to Rwanda, 1996), 86, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjF4_OopsHzAhVY7J4KHYLCCNoQFnoECAkQAQ&url=https%3A%2F%2Fwww.oecd.org%2Fderec%2Funitedstates%2F50189764.pdf&usg=AOvVaw2FzXrPOm-cvJjWWhE-8OIA.

adopted in Uganda and Rwanda.[208] Ultimately, Rwanda's civil war caused 8,000 casualties per day, which led to the murder of 800,000 Tutsis and politically moderate Hutus.[209] Ceasefire negotiations and sanction efforts were pursued, but ultimately, the United States calculated a noninterference determination.[210] Geographically, the breadth of a better peace (and reasonable hope for success) net assessment extends far beyond the conflict zone and has a lasting institutional memory. According to the finding in the 1996 report, *The International Response to Conflict and Genocide: Lessons from the Rwanda Experience*, the Clinton administration's *jus as Bellum* intervention calculus was skewed by the 1992–1993 disastrous peacekeeping mission in Somalia during Operation RESTORE HOPE.[211]

Somalia and Rwanda are different, but their outcomes in the hope for a better peace have similarities in the peacekeeping-centric military presence, a mission set still used today, a mission anticipated to increase tomorrow. Similarly, in each of those scenarios, the desired end state was initially pursued by diplomatic means. According to authors Henk Houweling and Jan Siccama, the breakdown in Mogadishu was classic Clausewitzian "unwanted explosive escalation," accelerated by conventional kinetic weapons sensations.[212] A technological limitation of the time, conventional weapons used in Somalia manifested second- and third-order effects that resulted in significant losses. This limitation included the determination that continued military efforts toward a better peace was more damaging than the failing state of affairs and faction violence under the Aidid regime, a similar sentiment felt today with the United States' exit from Afghanistan (AFG). The same 1993 technological limitation resulted in predictable ends, ways, and means net assessment calculus for a better peace in Rwanda. With limited options of conventional

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[208] Helen Epstein, "America's Secret Role in the Rwandan Genocide," *The Guardian*, sec. News, September 12, 2017, http://www.theguardian.com/news/2017/sep/12/americas-secret-role-in-the-rwandan-genocide.

[209] Samantha Power, "Bystanders to Genocide," *The Atlantic*, September 1, 2001, https://www.theatlantic.com/magazine/archive/2001/09/bystanders-to-genocide/304571/.

[210] Epstein, "America's Secret Role in the Rwandan Genocide."

[211] Adelman and Suhrke, *The International Response to Conflict and Genocide*, 82.

[212] Houweling and Siccama, "The Risk of Compulsory Escalation," 44.

weapons and unilateral intervention, the United States determined the estimated costs for a better peace (vs. genocide) was too great, and thus deemed this civil war to be Rwandese business.[213]

The utilitarian math for the net assessment calculations of a better peace (aggregating time, resources, treasure, and blood) can finally change with new options to utilize non-lethal DEWs throughout many spectrums of conflict, including law enforcement, foreign humanitarian assistance (FHA), and peacekeeping missions. According to the Joint Evaluation of Emergency Assistance to Rwanda after-action report, the United States "had a legal right and a moral responsibility to intervene."[214] Seeking a better peace is humanely necessary, and the visceral memories of Rwanda and Somalia show it is a moral obligation. No longer limited to binary solutions, the United States now has options to use DEWs in conjunction with conventional force. DEWs add a new variable that may outweigh what was once too costly during future better peace calculations, and potentially recognize scenarios like the Rwandan Civil War as an atrocity to intervene. Finally, with DEWs that offered non-lethal, scalable, and discriminant effects, resulting in negligible CD and CIVCAS, military forces could now save the village and the people.

B. JUS IN BELLO

Jus in Bello, or the just conduct in war, is represented by many ethical considerations, two of which, discriminate and (tactical) proportionality, must be reconsidered as DEWs are introduced into battles around the world.[215] After determining that entering a conflict is justified, nations must then identify ways to meet political ends via military means and conduct those operations justly. Domestic and international institutions, including the UN and ICRC, historically shape norms and advance moral

213 Adelman and Suhrke, *The International Response to Conflict and Genocide*, 50–51.

214 Adelman and Suhrke, 86.

215 Seth Lazar, "The Decisive Role of Necessity and Proportionality," in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta (Stanford, CA: Metaphysics Research Lab, Stanford University, 2020), sec. 2.5, https://plato.stanford.edu/archives/spr2020/entries/war/. Discrimination: "belligerents must always distinguish between military objectives and civilians, and intentionally attack only military objectives." Jus in Bello Proportionality: "foreseen but unintended harms must be proportionate to the military advantage achieved."

progress, and establish guidelines and customary law for discrimination and proportionality codified in numerous conventions. This section assesses how DEW technologies align with theories on discriminating between civilians (non-combatants) and belligerents (lawful combatants) and proportionality of de-escalation and non-lethal incapacitation.

Discrimination and proportionality are closely related ideas. Whetham, a traditional just war theorist, articulates this *jus in Bello* relationship by stating:

> War itself must be a proportional response to the injury suffered, the means employed to pursue the war must also be proportionate. Under the principle of proportionality, would it be 'fair' to employ standoff precision-guided munitions (PGM) against an opponent who cannot defend against them? This is not the appropriate question—the principle of proportionality is not about being fair; it is about not using more force than is necessary to achieve the required ends. To use the same 'dumb' weapons as a less sophisticated opponent, thereby inflicting more CD and causing more unnecessary destruction and loss of life than necessary out of some sense of fair play, would, obviously, be obscene.[216]

Historically, the ethical use of emerging missile superiority (Chapter II) has been argued since the 1400s.[217] Whetham's symbiotic relationship of discrimination and proportionality and the fair use of missile superiority could be reread with the replacement of PGMs or dumb bombs with DEWs and conventional weapons. This interpretation suggests that PGMs could be excessive compared to emerging DEWs, and not utilizing DEWs would be indecent.

One Walzerian truth is that "war is hell even when the rules are observed, even when only soldiers are killed and civilians are consistently spared."[218] Spanning from ancient warrior codes to today's law, the modern-day understanding of morality has long focused on U.S. intent of action. The Greek articulator of virtue ethics, Aristotle, pontificates, "we do not act rightly because we have virtue or excellence, but rather we

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[216] Whetham, "The Just War Tradition," 22.

[217] Rogers, "The Military Revolutions of the Hundred Years' War," 249.

[218] Walzer, *Just and Unjust Wars*, 30.

have those because we have acted rightly."[219] Although the implementation of DEWs will not eliminate CIVCAS and CD from war, those weapons are a significant leap in the right direction of moral progress.

The challenge of these emerging DEW capabilities is that the conceptualization of moral intent and just military force are evolving in ways that Aristotle, ancient warriors, and even contributors to the numerous Laws of War drafted several hundred years ago, cannot have been imagined.[220] By understanding these rules of fighting well, a moral standing independent of the exigencies of war, it remains understood that deliberately killing civilians is unethical, a *jus in Bello* argument that must now be reassessed by considering the unique effects of DEWs.

1. Discrimination

The premise of discrimination depends on the clear delineation between combatants and non-combatants, principally individuals who can be harmed by force and those who should be protected from it. When applying force with similar distinction, discrimination also has a technological component in weapons accuracy (capabilities and limitations). The missile superiority of DEWs provides simplified precision targeting, scalable non-lethal non-lasting effects (Chapter I DEW capabilities). This section focuses on the nature of conflicts seen today and those that the U.S. military is preparing for in the future. Moreover, clarity of discrimination is increasingly more challenging. The *jus in Bello* concept of discrimination has two distinct points. The first is that discriminate conduct aids in limiting unnecessary CD and CIVCAS. Second, it resists excessive harm when the necessity of war begins to offset morality.[221] Adherence to this ethical principle directly affects domestic and international opinion, and political decision-makers resolve, but it also defines the essence of a nation's character.

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[219] Aristotle, "Thoughts on the Business of Life," *Forbes*, accessed November 18, 2021, http://www.forbes.com/thoughts/.

[220] Singer, "The Ethics of Killer Applications," 307–8.

[221] Walzer, *Just and Unjust Wars*, 130, 144. Walzer's necessity doctrine "justifies not only whatever is necessary to win, but also whatever is necessary to reduce the risk of losing, or simply to reduce the losses or the likelihood of losses in the course of the war…a particular COA would be necessary to that end only if no other course improved the odds of battle at all."

As the United States continues to fight terrorism and violent extremism, U.S. and coalition militaries will encounter similar adversary TTPs in the context of strategic competition. Throughout both operational environments, great power proxy belligerents carry out their objectives in irregular and unconventional warfare continuums.[222] Both sets of adversaries conduct comingling operations in populated areas to mask hostile intent, often seeking opportunities to reduce discrimination resulting in CD, including CIVCAS.[223] Like chameleons, hostile actors' co-mingling with non-combatants limits conventional weapon options as adversaries posture to capitalize on conventional kinetic operations and CIVCAS reporting.[224] Leveraging the world's 24/7 media coverage, VEOs seek to exploit these mistakes by presenting U.S. kinetic CD and CIVCAS reporting with critical narratives to shape an "us or them" propaganda message locally and shift international opinion.[225]

Looking at conventional war through a utilitarian lens, Walzer argues that all mischief that does not support the ends of war is impermissible, which leaves sizable latitude for guerrilla activities (sniping, ambushes, child soldiers) but at the cost of civilian immunity.[226] Regardless of this forward line of troops (FLOT) asymmetry, and contrary to the slippery slope immoral self-defense fallacy (discussed later), just soldiers are increasingly risking their own lives to ensure non-combatant immunity, and not out of kindness and magnanimity, but instead for professional conduct.[227] This increasingly unbalanced equation of co-mingling adversaries and rising risk to friendly forces can be balanced by implementing DEWs, but not without new costs that only shift risks.

Non-lethal DEWs offer considerable capabilities to de-escalate situations of fog and friction but do so with the potential cost of violating liberties and temporary pain. This

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222 Department of Defense, *Summary of the Irregular Warfare Annex to the National Defense Strategy*, 2; Cannin, "Directed-Energy Weapons," 58.

223 Davis, "Controlled Warfare," 51–53; Cannin, "Directed-Energy Weapons," 58.

224 Davis, 51–53; Cannin, 58.

225 Orbons, "Are Non-Lethal Weapons a Viable Military Option," 115; Cannin, "Directed-Energy Weapons," 60.

226 Walzer, *Just and Unjust Wars*, 129, 151.

227 Walzer, 151.

grounded reality of DEW effects violations should not be used independently from other force option outcomes when determining employment. DEW effects rightly translate into violations, but of a temporary nature. Non-lethal costs, however, outweigh more permanent options like lethal conventional weapons. Infringing against fundamental liberties is unethical and frowned upon on the world stage, but can be beneficial if DEWs are used as defensive tools to de-escalate nefarious activities. This intent to limit conventional kinetic weapons benefits the immediate utilitarian math with complementary second- and third-order effects. The use of DEWs for defense personifies the humane moral progress necessary to justify shifting risks and offsetting new costs of discrimination.

2. Tactical Proportionality

Humankind has creatively made killing more efficient with increased precision and accuracy while exacting the lethal radius of blast, fragmentation, incendiary, and cratering effects. Multiple revolutions can be seen through proportional weapon improvements from bows and arrows to air to ground munitions (AGM). Likewise, proportionality of employment has progressed from carpet bombing to precision strike, and ends with weapons like the AGM-114R9X being released by sixth-generation fighter aircraft. Despite these technological advantages, the common weapons evolution vector shows that escalation and increased lethality persist with only marginal mitigation to conventional weapons incompatibilities (that produce negative second- and third-order effects) and proportionality considerations. The use of traditional conventional force achieves short-term tactical victories but disproportionately misses strategic intent and long-term success. Implementing DEW capabilities to forces increases proportionality options to counter VEOs and is compatible with gray-zone limitations, with intentions to avoid unintentional deaths, CD, and retaliatory escalation.

Proportionality, one of the four basic principles (the others being necessity, discrimination, and suffering) in the laws of war, is defined institutionally and ethically in Just War Theory using acceptability of force and limiting reciprocal response. The DOD principle encapsulates the idea of proportionality and the obligation to take feasible precautions to avoid CD, and more explicitly, weigh CD and necessity against tactical

advantages.[228] The laws of war make clear distinctions between proportionality and proportional response. This imperative has been institutionally codified as Rule 14 with the ICRC, Proportionality in Attack, stating, "launching an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated, is prohibited."[229] Just War Theory and its ethical use of force assessment examine the relationship between how much force is morally appropriate.

Each of these derivatives between the *jus in Bello* and DOD principles of proportionality seeks to determine the risk versus reward of short-term tactical victories and long-term strategic goals. The short-term focus is most recognizable by the Chairman of the Joint Chiefs of Staff (CJCS) standing rules of engagement (SROE) that purposely prioritizes the inherent right of self-defense above all else. SROE generically states:

> Unit commanders always retain the inherent right and obligation to exercise unit self-defense in response to a hostile act or demonstrated hostile intent…military members may exercise individual self-defense in response to a hostile act or demonstrated hostile intent…unit commanders may limit individual self-defense by members of their unit. Both unit and individual self-defense include defense of other U.S. military forces.[230]

The opposite end of the spectrum is planned targeting, which must seek to shape both objectives and longer-term strategic effects to determine if (and how) such destruction helps or hurts the strategic and political intent toward victory. In the case of strategic competitions, notions of victory may be limited to defending sovereignty while ensuring escalation remains below the threshold of armed conflict.

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[228] Office of General Counsel, *Department of Defense Law of War Manual* (Washington, DC: Department of Defense, 2016), 60, https://www.hsdl.org/?view&did=797480. "Proportionality may be defined as the principle that even where one is justified in acting, one must not act in a way that is unreasonable or excessive. Proportionality has also been viewed as a legal restatement of the military concept of economy of force."

[229] "Rule 14. Proportionality in Attack," International Committee of the Red Cross, accessed October 11, 2021, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule14.

[230] Chairman of the Joint Chiefs of Staff, *Standing Rules of Engagement* (Washington, DC: Chairman of the Joint Chiefs of Staff, 2005), ch. INSTR. 3121.01B, 83, https://www.loc.gov/rr/frd/Military_Law/pdf/OLH_2015_Ch5.pdf.

Proportionality risks are spread across the entire FLOT with combatants and non-combatants, including civilians, even children. Walzer insists, and the U.S. military assumes, that just soldiers must go out of their way to maintain the rights of civilians, not as "good Samaritans," but because it is the soldiers who put the civilians at risk.[231] In recent conflicts, militaries operate within urban battle spaces against co-mingling belligerents, who work and operate among civilians. Friendly forces must accept some risk of personal safety to mitigate further endangering civilian lives. By living in population centers, these adversaries defend against conventional attacks, and limit defense options due to proportionality CD risks and increased overall risk to friendly forces.[232]

Non-lethal DEWs do not remove all the risks, but present complementary force options to bridge self-defense and targeting more productively to maximize the tenets of proportionality. Lethality is offset but not fully mitigated, which shifts deadly force to force that could violate life and liberty. Seth Gordon from the Georgia Institute of Technology explains that the fundamental questions to evaluate are "is it better to harm or to kill…and what are the effects of collateral damage when evaluated against this harm?"[233] It is also worth admitting that lethal force with permanent effects is often necessary and ethical in war. As a defensive option, DEWs used in conjunction with lethal force demonstrate proportionality and positively contribute to swift tactical applications and foster long-term strategy.

More militaries are operating in non-combat roles across the ROMO, which increases scenarios that can benefit from something other than conventional weapons. However, DEW effects are becoming the catalysts for a reconsideration of what constitutes a violation, but it may only be the lesser of two evils. Unlike kinetic weapons, non-lethal DEWs by design have little to no lasting effects resulting in only temporary violations that

231 Walzer, *Just and Unjust Wars*, 151.

232 Davis, "Controlled Warfare," 51–52.

233 Seth E. Gordon, "Directed-Energy Non-Lethal Weapons: An Evaluation of Their Ethical Use and Potential Applications," in *Disruptive and Game Changing Technologies in Modern Warfare: Development, Use, and Proliferation*, ed. Margaret E. Kosal, Advanced Sciences and Technologies for Security Applications (Cham: Springer International Publishing, 2020), 108, https://doi.org/10.1007/978-3-030-28342-1_6.

allows for greater focus on protected populations and overall long-term success. By utilizing DEWs, the DOD can better protect U.S. and coalition forces and more swiftly neutralize threats that offset second- and third-order effects inherent with conventional weapons, all of which demonstrate a balanced immediate and long-term proportionality.

C. THE DOCTRINE OF DOUBLE EFFECT

Correctly prioritizing non-combatant immunity is an imperative that must bookend military decision-making for the application of force. Laws of War and IHL prohibit attacks that target civilians and recognize these protections are an imperative fundamental human right.[234] Lionel McPherson, an ethics professor at Tufts University, argues, "Non-combatant deaths are a moral embarrassment to the standards of immunity."[235] However, driven by necessity, this ethical imperative is breached via lethal strikes on lawful targets, which occasionally results in acceptable CD, including CIVCAS. This rationale is embedded in the DOD's definition of proportionality with added caveats allowing for CD that is not excessive compared to its military advantage.[236] The DDE is one attempt to, as Walzer puts it, "reconcile the absolute prohibition against non-combatants with the legitimate conduct of military activities."[237]

It must be recognized that the United States' use of the DDE justifies acceptable CD, a necessity versus intent paradigm that has been written about and debated at length, yet remains unresolved. This section focuses on how DEWs can integrate into the existing DDE, examines the potential challenges, and synthesizes an understanding of non-lethal force upon the DDE intent on lethal considerations. It can best be accomplished using Walzer's recognition that "some degree of care be taken not to harm civilians," and a line

234 Alison McIntyre, "Doctrine of Double Effect," in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta (Stanford, CA: Metaphysics Research Lab, Stanford University, 2019), sec. 4.0, https://plato.stanford.edu/archives/spr2019/entries/double-effect/.

235 Ryan Jenkins, Michael Robillard, and Bradley Jay Strawser, eds., *Who Should Die? The Ethics of Killing in War* (New York: Oxford University Press, 2018), 210.

236 Chairman of the Joint Chiefs of Staff, *Standing Rules of Engagement*, 83.

237 Walzer, *Just and Unjust Wars*, 153.

of questioning that asks, "but to what degree…and a what costs?"[238] A cost and risk-benefit analysis can help frame the issues surrounding DEWs, and temper interpretations that non-lethal weapons induce, albeit temporary, pain and basic liberty violations.

DDE is an intent matrix (see 1–4 in the following list) that aids decision-makers in rationalizing the application of military force against a legitimate target but is also anticipated to harm, injure, or kill a person who would otherwise be beyond a legal or lawful target, with the justification of unintentional effects.[239]

The classic DDE has four consecutive conditions:

1. The act is good in itself or at least indifferent, which means, for our purposes, that it is a legitimate act of war. [a legal, lawful military target].
2. The direct effect is morally acceptable—the destruction of military supplies, for example, or the killing of enemy soldiers [the harmful effects are foreseen but not intended].
3. The intention of the actor is good—that is, he aims only at the acceptable effects; the evil is not one of his ends, nor is it a means to his ends [the harmful effect is not the means to good effect].
4. The good effect is sufficiently good to compensate for allowing the evil effect; it must be justifiable under Sidgwick's proportionality rule [proportionately grave reasons for allowing harmful effect, i.e., good outweighs bad].[240]

Walzer contests that this decision-making "is subject only to the proportionality rule—a weak constraint—double effect provides a blanket justification."[241] In a professional attempt to limit intentional CD and CIVCAS, CJCS Instruction 3162.02 provides targeting methodology guidance, including CD assessment methodology, commander's intent, and kinetic strike approval requirements for the DOD.[242] This intent of the DOD guidance

238 Walzer, 152.

239 Walzer, 154.

240 Walzer, 153.

241 Walzer, 154.

242 Joint Staff, *Methodology for Combat Assessment*, CJCS Instruction 3162.02 (Washington, DC: Joint Chiefs of Staff, 2019), C-1–14, https://www.jcs.mil/LinkClick.aspx?fileticket=ocY8VvrmVEI%3d&tabid=19767&portalid=36&mid=46626. DOD proportionality, as it is defined, embeds temporal and proportional caveats to the seemingly unarguable moral immunity of civilians.

elevated authorizations of DDE CD and CIVCAS events to higher approval authorities with greater experience is to ensure proportionality. McPherson recognizes intent in itself is a problem and warns, "Intentions of the users of force cannot carry as much moral weight as commonly believed with respect to non-combatants." [243]

The DDE grounds for this argument have authorized the use of deadly force via conventional weapons and its acceptability for the military use of force premise is expected to remain unchanged in the future.[244] Condition one rests with the threat being a lawful and justifiable target; no further analysis is warranted on that criterion. However, DEWs add some considerations to the last three DDE conditions.

Historically, condition two (the direct effect is morally acceptable) decision-making options yield only two responses, remaining cold (doing nothing) or utilizing lethal force via conventional kinetic munitions.[245] Introducing DEWs into the available options now shifts the old binary calculations with a third option. This option has not been widely addressed, but Gordon has made a significant contribution to this discussion. He rationally explains that non-lethal DEWs "will have fewer long-term repercussions than a traditional firefight due to minimization of permanent casualties. However, this necessitates the assumption that the engagement will occur regardless."[246] When the argument is correctly reframed between current conventional and emerging DEW options, non-lethal DEWs are the more ethical solution.

When assessing DEW effects against DDE condition three (the bad effect is foreseen but not intended), like conventional force arguments, it can be reasonably anticipated that microwave energy ADS may possibly infringe upon this rule. According to Gordon, this common argument "hinges on the ethics of employing of such systems against both combatants and any innocent civilians that might be caught in the area of

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[243] Jenkins, Robillard, and Strawser, *Who Should Die?*, 210.

[244] Walzer, *Just and Unjust Wars*, 153.

[245] Gordon, "Directed-Energy Non-Lethal Weapons," 112.

[246] Walzer, *Just and Unjust Wars*, 112, 153.

effect." [247] He adds, "These points rely on the assumption that the infliction of pain is a greater ethical evil than conventional killing, maiming, or injury of these parties."[248] This argument quickly fails because its premise assumes that only two options exist in a closed system, or that of using non-lethal DEWs or doing nothing (like condition two), which fails to recognize other historically acceptable means of force are a worse option. Condition three in the DDE also focuses on the goodness of intent and acceptability of effects and ends.[249] This intent is that DEWs positively contribute to matching means into scenarios that unavoidably risk the livelihood of protected civilians.

The final condition (the good effect outweighs the bad) centers on a simple cost-benefit analysis that uses utilitarian calculations to determine proportionality and economy of force. Condition four transparently seeks to reduce the total magnitude of suffering, an aim that can possibly be satisfied by using DEWs that inherently limits immediate and long-term escalation and offsets incompatible second- and third-order conventional weapons effects.

DEW effects marry well with the intent of DDE that seeks to balance military necessity and proportionality, but only when DEW effects are compared to other means. The DDE assessment of intent quintessentially justifies kinetic targeting, a tragedy only found in armed conflict. DEWs can offset those tragic scenarios with acceptable non-lethal effects that achieve immediate tactical objectives and positively contribute to strategic gains, while achieving better proportionality, necessity, and less total suffering. In a first of its kind argument, Gordon assesses:

> Due to the inherent reversibility and impermanence of non-lethal weapons (NLW), their application in lieu of conventional (and risking lethal) force is the ethically superior option. This counters the logic that NLW effects are somehow less ethical or permissible than lethal force, and this is especially true when taken in the context of preventing harm to other civilians from unchecked opponent activity. With regards to increasing military capability, NLW reduce the repercussions of combat operations, and therefore they decrease the threshold for what constitutes a "good effect." With a lower

[247] Gordon, "Directed-Energy Non-Lethal Weapons," 109.

[248] Gordon, 109.

[249] Gordon, 112.

> "good effect" requirement, there are more targets available to military planners without compromising the balancing act necessitated by DDE, assuming NLW can be employed.[250]

Therefore, any intent not to leverage DEWs could only be an unethical calculation due to perpetuating avoidable tragic ends and unmitigated adverse aggression both tactically and strategically.[251]

Walzer admits the DDE makes things easy for attackers.[252] Independent of conventional weapons or DEWs, the second condition (morally acceptable effects) must be scrutinized operationally and strategically prior to offensive attacks. Gordon warns military leaders authorizing the use of non-lethal DEWs must epistemically recognize that "inflicted pain or other short-term effects on civilians" creates new risks that will be ethically challenged.[253] He further magnifies this challenge against the status quo, by explaining "operators of conventional munitions could almost plead ignorance" due to its long-established use of lethal targeting, ethical or not.[254] Similarly, Alison McIntyre, Professor of Philosophy at Wellesley College, recognizes the same outcome from DDE as "a result of inadequate reflection or insufficient emotional engagement."[255] A moral requirement will always be necessary to mitigate CD with positive measures to avoid or minimize injury to civilians on the battlefield; until now, technology has limited this requirement. Walzer insists, "It is morally necessary to take such measures, that is, to be careful in the strongest sense, even if it appears likely that the number of deaths caused by the attack would not be disproportionate to whatever the relevant measure might be. The attacking force must protect civilians as best they can—period."[256] As nascent DEWs

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250 Walzer, *Just and Unjust Wars*, 111–12, 153.

251 Gordon, "Directed-Energy Non-Lethal Weapons," 111–12.

252 Walzer, *Just and Unjust Wars*, 159.

253 Gordon, "Directed-Energy Non-Lethal Weapons," 109.

254 Walzer, *Just and Unjust Wars*, 109, 153.

255 McIntyre, "Doctrine of Double Effect," sec. 4.0.

256 Walzer, "Responsibility and Proportionality in State and Nonstate Wars," 49.

technologies with numerous attributes that can achieve tactical solutions with non-lethal effects become fieldable, it is a moral responsibility to implement them.

D. RESPONSIBLE VS. RESPONSIBILITY

It is easy to lose focus on who is responsible for initiating escalation, violating rules of aggression, or wronging someone; along the same lines, it is the moral responsibility to fight justly regardless of the adversary's actions. Walzer insists, "The distinction of combatants and by-standards is enormously important in the theory of war."[257] Operationally, military planners must always consider an adversary's most deadly course of action, an assessment that prepares friendly forces to anticipate irregular and unconventional warfare, including terrorist TTPs. The heart of this issue is clearly and firmly assigning "responsibility for death and destruction," for, without it, war, as Generals Sherman and Clausewitz put it, would be limitless.[258] These unjust acts generate illegal and unethical risks, and responsibility must be assigned for associated losses to bad actors. Regardless of international law or adversary actions, friendly forces must always conduct operations justly and are responsible for defending civilians and non-combatants, and limiting CD, even during scenarios that jeopardize friendly forces' safety.

Just War Theory values categorically rule out deliberate attack of non-combatants, but that mandate is often violated.[259] U.S. forces are responsible for limiting lethal force whenever possible to avoid even the appearance of that crime. Walzer argues friendly forces have "to find another way, but not every action that is possible is acceptable; we can always surrender, or appease the enemy, or postpone the fighting."[260] Using DEWs during scenarios that require escalation near non-combatants is another potential solution; an alternative means that provides non-lethal effects. As terrorists, VEOs and TNTs increasingly operate in and around civilians; they create the risk for civilian deaths and, in

257 Walzer, *Just and Unjust Wars*, 30.

258 Walzer, "Responsibility and Proportionality in State and Nonstate Wars," 43; Walzer, *Just and Unjust Wars*, 33.

259 Walzer, "Responsibility and Proportionality in State and Nonstate Wars," 43.

260 Walzer, *Just and Unjust Wars*, 42, 153.

turn, inherit that responsibility.[261] David Kilcullen, the author of *The Snake and the Dragon*, believes that as the character of a VEO and TNT conflict changes, "it is morally necessary to fight; it may also be necessary, this time in the sense of inevitable, that civilians will die, and those who are fighting on the side of right will do some of the killings."[262] Walzer claims, "Proportionality without responsibility makes it possible for critics to condemn the military force that causes civilian deaths, whether or not it is responsible for them."[263]

This false perception penalty of CIVCAS is multiplied when large nations intervene against terrorists, VEOs, and TNTs. The responsibility lies on both sides, but being responsible always rests upon the larger nation's military to avoid escalation and unnecessary casualties, both epitomized by DEW capabilities. Therefore, Walzer's "proportionality arguments are favorable to the nonstate actor, while responsibility arguments are necessary discrimination" for friendly forces.[264] Accurately assigning responsibility and always acting responsibly are two sides of the same coin but disproportionally affect the friendly force's ability to fight justly.[265]

1. Responsibility (Bad Actors)

Terrorism, in the context of acts versus an organization, is a crime against humanity that is unjustifiable. Walzer describes terrorist conduct as "hatred, fear, and the lust for domination are the psychological marks of oppressors alike, and their acting out, can be said to be radically determined."[266] The North Atlantic Treaty Organization (NATO) defines terrorism as "the unlawful use or threatened use of force or violence, instilling fear and terror, against individuals or property in an attempt to coerce or intimidate governments or societies, or to gain control over a population, to achieve political, religious

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[261] Walzer, "Responsibility and Proportionality in State and Nonstate Wars," 51.

[262] David Kilcullen, *The Dragons and the Snakes: How the Rest Learned to Fight the West* (New York: Oxford University Press, 2020), 64.

[263] Walzer, "Responsibility and Proportionality in State and Nonstate Wars," 50.

[264] Walzer, *Just and Unjust Wars*, 50, 153.

[265] Walzer, "Responsibility and Proportionality in State and Nonstate Wars," 42.

[266] Walzer, *Just and Unjust Wars*, 205.

or ideological objectives."[267] With hallmarks of mass murder and massacres to deliver a message that transmits power, terrorists opportunistically kill regardless of identity, names, and occupations.[268] These influential acts, intentionally aimed at the indiscriminate killing of defenseless forces and ordinary innocent citizens, deliberately violate fundamental human rights, a violation that must be confronted with force.[269]

Whether socially learned or adopted externally, the growth of this informal doctrine shows that the international adaptation to co-mingling with innocent civilians is becoming increasingly advantageous.[270] Adversaries increasingly live and operate within heavily populated areas for protection against counter assaults and thus benefit from just fighting limitations. Kilcullen notes this "disaggregated battlespace" within urban environments "creates a shelf life for any particular countermeasure against guerrillas…the more effective a tactic is, the quicker it becomes obsolete because the more pressure it puts on the guerrilla group to adapt."[271] The silent, invisible, and often unattributable effects of DEWs are particularly advantageous in these learning and adapting environments. With the lack of shock and awe of conventional weapons, DEWs TTPs could increase tactical effectiveness and remain effective longer before they are countered.

In an excerpt from Walzer's 2020 article, "Responsibility and Proportionality in State and Nonstate Wars," he expounds upon the concept and effectiveness of co-mingling and human shields:

> City street locations were deliberately chosen to make any response to the rocket attacks morally difficult or, to make certain the response would be condemned around the world. Civilians were placed at risk; some were almost certain to be killed in any counterattack. These civilians were not

267 "NATO's Military Concept for Defence against Terrorism," NATO, August 19, 2016, http://www.nato.int/cps/en/natohq/topics_69482.htm.

268 Walzer, *Just and Unjust Wars*, 42, 203.

269 Walzer, 153, 203.

270 Kilcullen, *The Dragons and the Snakes*, 42.

271 Walzer, *Just and Unjust Wars*, 47, 52, 153.

> literally human shields; but they were being used similarly. The primary responsibility for their deaths then falls on who was using them.[272]

This battlespace dynamic creates complex necessity, proportionality, and value assessments. Kilcullen validates his theory on adversary dynamics with three practical military examples: "the evolution of the Pakistani Taliban under a decade of U.S. drone strikes, the effect of Israeli targeted killings on Palestinian terrorists, and the impact of U.S. surges and withdrawals on the population of Iraqi insurgents."[273] However, Walzer argues that morally, the responsibility argument displaces the proportionality argument to limit risk to civilians and their homes, even at the cost of increased danger to friendly forces.[274]

Atrocities against internationally recognized norms and common values generate the necessity of a global response from able nations to thwart terror activities, insulate defenseless non-combatants, and reduce bad actor terror capabilities. That insurmountable requirement comes at a cost. It is easier to justify offensive operations, like counterterrorism (CT), which is conducted against bad actors who use lethal force. The United States and its allies have become particularly good at conducting CT direct action missions after two decades of war in AFG and the ongoing operations in Iraq and Syria. These missions maximize speed, surprise, and violence of action using lethal force as its primary means to degrade terrorist networks and remove bad actors. The indirect nature of terrorism has shifted from the periphery into population centers, and with it, has led to a rise in CD and CIVCAS committed by friendly forces fighting justly.[275] Regardless of self-defense or DDE targeting, the responsibility for those tragic losses must be placed on the criminal who forced necessity of action upon themselves.

2. Responsible (Friendlies)

The United States strives to maintain the moral imperative for global fundamental human rights of life, liberty, and justice with its allies and like-minded partners. However,

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[272] Walzer, "Responsibility and Proportionality in State and Nonstate Wars," 47.

[273] Kilcullen, *The Dragons and the Snakes*, 55.

[274] Walzer, "Responsibility and Proportionality in State and Nonstate Wars," 47.

[275] Walzer, 52.

McMahan offers a warning that demonstrates how even a historical, just Democratic nation can find its way into an unjust war.[276] Regardless of historical missteps, future efforts must continue to support the same noble values that the United States was founded upon, with endurance to wage just wars against bad actors, and do so responsibly with an ethical vector to limit casualties, CD, and protect the innocent, even if that requires sacrificing friendly forces' safety.[277]

Protecting civilians' rights and protecting their immunity is a prime reason to enter conflicts and a fundamental responsibility for the United States.[278] According to Gordon, it is the "most important bedrock of both the codes and laws of war enshrined by professional militaries."[279] Reiterating Walzer's admission that "double effect is a way of reconciling the absolute prohibition against non-combatants" helps to highlight that the DDE decision-making model is challenging and controversial. Nevertheless, the DDE is still used today with no plans to change it in the future. A tragic Walzerian reminder that "war is Hell even when the rules" and accepted norms are followed.[280]

Even in Hell, though, murder is distinguishable from massacre by the restrictions established on the battlefield.[281] Independent from the facts that unjust adversaries create risk and own the responsibility for the CD losses and CIVCAS deaths, just friendly forces must assume the responsibility and risks to protect those same civilians. Here, DEWs present a dichotomy between non-lethal effects to protect against loss of life and poses risks from second-order effects as temporary pain and loss of liberties, violations that seemingly breach the same moral imperative that initiated the just response.

With no single solution for CD and CIVCAS inevitability, since 2015, the military has allocated almost five million dollars in sympathy and condolence *ex gratia* payments

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276 McMahan, *Killing in War*, 7.

277 David L. Perry, "The Code of the Warrior: Exploring Warrior Values Past and Present," *Parameters* 34, no. 1 (Spring 2004): 140–41.

278 Perry, 140–41.

279 Gordon, "Directed-Energy Non-Lethal Weapons," 109.

280 Walzer, *Just and Unjust Wars*, 30.

281 Walzer, 42, 153.

for losses in the Central Command and Middle East.[282] The Undersecretary of Defense, James Anderson, provided memorandum guidance and cited that these payments are "not legally required" and are not intended as "an admission or an acknowledgment of any legal obligation to provide compensation, payment, or reparations" for military miscalculations resulting in civilians losses in property damage, personal injury, or death.[283] Fully recognizing population CoG, the Secretary further explains that this responsible compensation "helps authorized commanders obtain and maintain friendly relations with and the support of local populations where U.S. forces are operating."[284]

In this case, the non-lasting effects of DEWs offer double edge considerations. First, using non-lethal DEWs could achieve similar effects as conventional weapons but offset the cost of miscalculations, and thereby gain both the hearts and minds (trust and confidence) of the population CoG while lowering *ex gratia* payments when miscalculations perceptions occur, or induced by the adversary.[285] Similar to the lesser of two evil assessments (discussed in Tactical Proportionality), the acceptability of DEW effects are becoming the catalysts for a reconsideration of what constitutes CD compensation. Conversely, if DEW effects are considered independent from alternative force options (lethal conventional weapons), DEWs will inaccurately migrate from their intended humane characteristics into unacceptable means, which leaves only the status quo binary solution of conventional kinetic weapons.

Identifying that responsibility and the judgment of justice in military operations other than war (MOOTW) comes before tactical proportionality, and due care of civilian non-combatants is not the same calculations found in the DDE. Walzer argues, "The rights

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[282] Matt Gluck, "An Examination of U.S. Military Payments to Civilians Harmed during Conflict in Afghanistan and Iraq," Lawfare, October 8, 2020, https://www.lawfareblog.com/examination-us-military-payments-civilians-harmed-during-conflict-afghanistan-and-iraq.

[283] Gluck.

[284] Gluck.

[285] James H. Anderson, "Interim Regulations for Condolence or Sympathy Payments to Friendly Civilians for Injury or Loss that is Incident to Military Operations" (official memorandum, Washington, DC: Undersecretary of Defense, 2020), 1, https://media.defense.gov/2020/Jun/23/2002320314/-1/-1/1/Interim-Regulations-For-Condolence-Or-Sympathy-Payments-To-Friendly-Civilians-For-Injury-Or-Loss-That-Is-Incident-To-Military-OperationS.PDF.

of civilians—more precisely the right of the civilians that we endanger must be protected," regardless of who is responsible for the risks.[286] These considerations become increasingly complex across the ROMO with law enforcement missions and gray-zone below the threshold of armed conflict aggression. Sufficiently identifying who put the civilians at risk during the double effect or second intention (even self-defense) is arguably unachievable. Furthermore, any escalation to lethal force, including self-defense, an option offered to U.S. forces in the SROE during all operations, can be detrimental to strategic goals. DEWs offer a complementary set of options to de-escalate scenarios unfit for immediate lethal force. As U.S. operations increase in the non-combat role, the DOD is inherently responsible for the OT&E of forces with tactical requirements to meet operational and strategic goals.

The priority to protect civilians during combat operations from adversaries' attacks comes at a cost for U.S. forces, as just fighters, to accept increased risks to personal safety due to limited response options. This restraint and self-control are doctrinally annotated and are captured in the ROEs as a responsibility that can result in friendly losses due to unavoidable fogs of war. Former Secretary of Defense James Mattis discussed the acceptance of risk and harm to friendly forces and described his mental process when reviewing and authorizing deployment orders. He stated, "Will this deployment benefit the U.S. people by deploying this force into harm's way and potentially losing their lives."[287] As a great power, and a leader in the free world, the United States is responsible to intervene against aggression, but that does not relinquish its responsibilities or diminish risk tolerances. A precedent that Walzer agrees is "worth dying for."[288]

The moral equality of combatants against crimes of aggression changes very little when introducing non-lethal DEWs into the equation. The same argument hinges upon prohibiting excess harm versus military necessity. As DEW technologies become battle-

286 Walzer, "Responsibility and Proportionality in State and Nonstate Wars," 43; Walzer, *Just and Unjust Wars*, 157.

287 Jim Mattis, *An 'Oh So Social' Conversation between Sec. Jim Mattis and Dr. Mike Vickers* (Falls Church, VA: Office of Strategic Services Society, 2021).

288 Walzer, *Just and Unjust Wars*, 53.

ready, it must now be considered if lethal force is excessive when compared to non-lethal DEWs. Sedgwick offers it is a nation's duty to win as fast as possible with a calculated economy of force.[289] That strictly utilitarian calculus would be insufficient when only accounting for the adversary and civilian lives lost. It must also recognize the loss of non-combatant liberty and dignity (even suffering) from lethal force and the anguish of those required to apply it.

E. MORAL INJURY

Across the spectrum of conflicts that span from policing and law enforcement to CT, U.S. forces face adversaries who resort to irregular warfare strategies like guerilla tactics and terrorist activities. In no way are these TTPs new; the only difference today is the rise of VEOs, terrorists, and TNTs in battlefields spanning nearly every continent on earth. Churchill famously stated, "People sleep peaceably in their beds at night because rough men stand ready to do violence on their behalf."[290] Even with superior technological advantages, U.S. and coalition forces often find themselves prosecuting legal and lawful targets through the ROEs that, as Walzer (borrowing from Thucydides) puts it, produces "agony."[291] Between the dichotomy of authorized killing and agonizing decisions lives moral anxiety, which has created a quandary increasingly filled with collective guilt at the cost of thousands of U.S. forces and $240 billion annually.[292] Recognized as PTSD, these injuries affect a growing percentage of individuals in uniform.[293]

Accounts of moral injuries have many names and were first documented in 490 BC by Herodotus in the battle of Marathon. Hamid and Hughes, authors of "Nothing New

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289 Walzer, 130, 153.

290 Richard Langworth, "Rough Men Stand Ready..," Hilldale College Churchill Project, *Richard M. Langworth* (blog), September 30, 2015, https://richardlangworth.com/rough.

291 Walzer, *Just and Unjust Wars*, 15; Thucydides et al., *The Landmark Thucydides: A Comprehensive Guide to the Peloponnesian War*, rev. ed. of the Richard Crawley translation (New York: Simon & Schuster, 1998), 469.

292 Walzer, *Just and Unjust Wars*, 15; Thucydides et al., *The Landmark Thucydides*, 672; "Annual Reports—PTSD: National Center for PTSD," Department of Veterans Affairs, FY 2019, https://www.ptsd.va.gov/about/work/annual_report.asp.

293 Department of Veterans Affairs.

Under the Sun," theorized, "That ancient soldiers experienced the stresses of war in much the same way as their modern-day counterparts."[294] A product of the American Civil War, the country's bloodiest conflict, the psychological effects of military combat were identified as "neurocirculatory asthenia" or "irritable heart" by U.S. Army doctor J. M. da Costa, for the condition's medical manifestation of symptoms ranging from shortness of breath and elevated pulse to increased fatigue, stress, and fear.[295] WWI references this psychological injury as shell shock; WWII called it battle fatigue; then again in Vietnam, which delivered the first research efforts for PTSD-like symptoms, identified over 700,000 people (almost a quarter of the U.S. soldiers between 1964–73) who were affected in a conflict barely shorter than the U.S. war in Afghanistan.[296]

Warfighters are expected to anticipate and apply tactically sound judgment to mitigate risks when possible. Simply put by Walzer, "worry about the dangers and take steps to avoid them."[297] For military leaders, this operational art must weave tactics with strategy and moral decision-making. Walzer continues by stating political decision-makers "ought to know the dangers of cruelty and injustice, worry about them and take steps to avoid them."[298] DEWs, when used effectively, could reduce the cruelty of war from both sides of the rifle, especially for those who routinely engage adversaries and discharge their weapons, thereby assuming the most significant risk of succumbing to the moral injury PTSD.

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294 Miriam Reisman, "PTSD Treatment for Veterans: What's Working, What's New, and What's Next," *Pharmacy and Therapeutics* 41, no. 10 (October 2016): 623–34; Walid Abdul-Hamid and Jamie Hughes, "Nothing New under the Sun: Post-Traumatic Stress Disorders in the Ancient World," *Early Science and Medicine* 19, no. 6 (2014): 549–57, https://doi.org/10.1163/15733823-00196p02.

295 J. M. da Costa, "On Irritable Heart; A Clinical Study of a Form of Functional Cardiac Disorder and Its Consequences," *The American Journal of Medical Science* 61, no. 121 (1871): 17, 17–52, 37–40, https://archive.org/details/americanjournalo61philuoft/page/18/mode/2up; Reisman, "PTSD Treatment for Veterans," 263.

296 Marc-Antoine Crocq and Louis Crocq, "From Shell Shock and War Neurosis to Posttraumatic Stress Disorder: A History of Psychotraumatology," *Dialogues in Clinical Neuroscience* 2, no. 1 (March 2000): 47–55.

297 Walzer, *Just and Unjust Wars*, 16.

298 Walzer, 16, 153.

The moral, ethical, and emotional impact of combat affects military personnel dramatically. Syracuse University's *Moral Injury Project* has a dedicated team of interdisciplinary researchers seeking to understand veterans coping with experiences "that inflicted a mental toll on their well-being."[299] Moral injuries, historically categorized as PTSD, can be traced back to specific decisions or actions and can have long-term compounding effects. Gordon highlights that morally injurious experiences can manifest when kinetic actions injure or kill "civilians accidentally, giving orders in combat that result in the death of allies or subordinates, and any news about actions taken against allies" and partners in the area of responsibility (AOR).[300]

A Veterans Affairs PTSD researcher, Miriam Reisman, assesses that the constant evolution of new weapons has "greatly increased destructiveness in battle and left those who survived with a myriad of physical and psychological injuries."[301] The philosopher Thomas Hill Green noted, "The power of a state compels. This is equally true whether the army is raised by voluntary enlisted or by conscription."[302] In his article, "The Ethics of Killer Applications," P. W. Singer, a technocratic fiction author, acknowledges recent anguish in the "sad reality of child soldiers; contrary to our idealized visions of war and who fights it? One of every ten combatants today is a child."[303] A muddy definition to designate a child as a combatant was highlighted in recent wars with the language shift from *military-age male*, an insinuation, to that of an *adult male*, which is more definitive.[304] Regardless of being an adult or of military age, enlisted, conscripted, or enslaved, the key delineator is the act of hostility that transitions an individual into a legal and lawful target provides no less anguish for those forced to prosecute a human target

299 "The Moral Injury Project," Syracuse University, accessed July 20, 2021, https://moralinjuryproject.syr.edu/.

300 Gordon, "Directed-Energy Non-Lethal Weapons," 109.

301 Reisman, "PTSD Treatment for Veterans," 623.

302 Thomas Hill Green, *Works of Thomas Hill Green: Philosophical Works* (New York: Longmans, Green, and Company, 1906), 469.

303 Singer, "The Ethics of Killer Applications," 303.

304 Sarah Shoker, "Military-Age Males in U.S. Counterinsurgency and Drone Warfare" (PhD thesis, McMaster University, 2018), ii, 35–36, https://macsphere.mcmaster.ca/handle/11375/24294.

lethally. This decision-making is further complicated with lasting moral injury when tactical objectives or acts of self-defense necessitate engaging (directly or as CD) a child soldier.

Shannon French focuses on the moral and "ethically haunting" elements in her book T*he Code of the Warrior*.[305] French describes how combatants must "consider themselves as though they are 'fighting the good fight' and are not morally or ethically sullied by what happens in wartime."[306] Today, as a superpower, the United States intervenes in crises all over the globe against a myriad of adversaries. Gordon anticipates DEWs can "address one of the most common sources of moral injury: that of inflicting permanent or deadly harm on civilians."[307] Even if Gordon's estimates are wrong, the rise of PTSD is motivation enough for the United States to try.

However, the antithesis of past military hardware, each designed to increase killing efficiency, is DEWs. As previously elaborated, DEW effects offer humane, minimum use of non-lethal force to induce a positive response instantaneously; essentially, an escalation of force that can preclude further escalation to avoid lethal force or lasting effects. The growing danger of PTSD concerns political decision-makers and military leaders alike, who must take steps to avoid or at least mitigate the condition with new technologies and matching strategies and ROEs.[308] By equipping U.S., ally, and partner forces with a variety of DEWs, the number of moral injuries and rate of PTSD susceptibility could be significantly reduced.

F. SLIPPERY SLOPE

A textbook definition of the logical fallacy Slippery slope, offered by the *Encyclopedia Britannica*, is an argument that "leads to an undesirable or implausible conclusion via a series of tenuously connected premises, each of which is understood to

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[305] Shannon E. French, *The Code of the Warrior: Exploring Warrior Values Past and Present* (Lanham, MD: Rowman & Littlefield Publishers, 2003), 241.

[306] Gordon, "Directed-Energy Non-Lethal Weapons," 108; French, *The Code of the Warrior*, 241.

[307] Gordon, "Directed-Energy Non-Lethal Weapons," 109.

[308] Walzer, *Just and Unjust Wars*, 34–35.

lead, causally or logically, to the premise (or conclusion) that follows it."[309] The arguments against DEWs conclude that DEW adoption would only result in undesirable extrajudicial use. This slippery slope analogy is a flawed but easy add-on argument against DEWs; it is also an identical argument for every other use-of-force fielded by the DOD. As seen in the allegations against DEWs (Chapter II/Appendix B), the argument begins with a legitimate use, for defense. Then incrementally implied, DEWs will be casually misapplied, overused, or used in excess to aid in subsequent lethal force or torture. Another slippery slope example is offered by Amnesty International with the claim, "Given the stressful situations which military personnel are often placed in, the risk to life and limb that they may face, and the tendency of such personnel to de-humanize their enemies, it seems a near certainty that some types of NLW would be misused by military personnel if they were to be issued to them."[310]

Other arguments infer that because of the unique silent and invisible properties of non-lethal DEWs, it can be theorized that cruel, inhuman, degrading treatment with abuses of power will inevitably result.[311] Wheeler, from Article32, considered that, as ADSs mature, so will their effectiveness to subdue threats via instantaneous heat sensation pain "without necessarily leaving visible marks or physical evidence of their use—making their abuse easy to conceal and raising concerns about accountability for harm done and the availability of an effective remedy to victims" and bystanders alike.[312] Additionally, if fielded, ADS-type capabilities will be used, not as non-lethal weapons defensive in nature, but as offensive acts as a lethal force multiplier, versus a less than lethal avoidance.[313] Simply put, these concerns state that DEWs inevitably would be used to stop a moving target to increase the accuracy of lethal means.

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309 *Encyclopedia Britannica*, s.v. "slippery slope argument logic," accessed July 15, 2021, https://www.britannica.com/topic/slippery-slope-argument.

310 Coleman, "Possible Ethical Problems with Military Use of Non-Lethal Weapons," 199.

311 Wheeler, "Directed Energy Weapons," 4.

312 Walzer, *Just and Unjust Wars*, 4, 153.

313 Coleman, "Possible Ethical Problems with Military Use of Non-Lethal Weapons," 190.

The final slippery slope argument against non-lethal DEWs suggests that long-range incapacitation capabilities will quickly evolve to selfish, but unnecessary, risk reduction to friendly forces engaging in defensive and offensive activities. The concern presented here is that military operations pose an inherent risk that must be accepted to protect innocent civilians. That unavoidable risk cannot always be mitigated without extreme measures that disproportionately violate bystanders' (civilian and non-combatant) fundamental rights. Colman argues DEW employment, in that case, will be less about "reducing the level of risk faced by the community, but rather about reducing the level of risk to which military forces themselves are exposed," which will lead to unneeded and unethical risk reduction intent.[314]

The weakness of these assertions is that each series of steps—beginning with the correct (legal and lawful) use for DEWs—will eventually be used to reduce the inherent risk of friendly forces out of laziness or fear. In addition, such an effective tool will only be used to facilitate unethical results, including lethal targeting, torture, and causing more harm than good.[315] Each point started at a reasonable and logical beginning, slipped to intermediate conclusions lacking clear language and pejorative assumptions, and resulted in arguments leading to false conclusions more egregious than the previous conclusions.[316]

The slippery slope argument relies on a foundation of unprofessional conduct and poor training by the DOD. These puzzling slippery slope arguments are then reduced to a vague personal attack against the profession of arms.[317] Recent polls and historic trends conclude that the military and the DOD are the most trusted organizations in America across all government institutions. Gordon agrees these fallacies have "little to no evidence that each chain of events will come to pass and scant evidence that such a chain is actually

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314 Walzer, *Just and Unjust Wars*, 153, 197.

315 Gordon, "Directed-Energy Non-Lethal Weapons," 107.

316 Hans Hansen, "Fallacies," in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta, (Stanford, CA: Metaphysics Research Lab, Stanford University, 2020), sec. 1.0, https://plato.stanford.edu/archives/sum2020/entries/fallacies/.

317 Hansen, sec. 1.0.

possible in the first place."[318] He is correct, but because these arguments span both ethical and legal circles, DEWs as a community can satisfy their opposition with explicit ROE guidance, commander intent, and training to avoid future counterarguments.

G. CONCLUSION

The spirit of the Just War Theory attempts to limit confrontations and human suffering by focusing on the right to enter a conflict and the proper conduct of fighting it. The challenge of this new class of DEW capabilities is that the conceptualization of virtuous intent and just military force is advancing in ways that ancient warriors, decision-makers, leaders, and even contributors to the numerous conventions could not have ever imagined.[319] Moral philosophers have not considered non-lethal forms of force in war, a technology only recently offered by DEWs.[320] The lack of consideration has resulted in premature unethical arguments against DEWs, and these ungrounded claims have greatly limited the fielding of emerging DEWs, and have left only lethal conventional weapons on battlefields. Moreover, DEWs are not on any future agendas for discussion within U.S. or international institutions.[321] In lieu of that discussion, this chapter attempted to answer the ethical question for DEW implementation, just because we can, does it mean we should?

Force as a means (within the ends, ways, and means model) offered by DEWs positively affects *jus ad Bellum* threshold criteria and *jus in Bello* tenets. However, DEWs can negatively influence political framing toward an intervention or noncommitment with tempting pitfalls. For global proportionality across the spectrums of conflict, reducing the total suffering and limiting the loss of life is morally good, both of which are synonymous with DEWs. Traditionally, this tenet is framed toward combat operations, which overlooks the complexities of the ROMO. DEWs offer many advantages; however, overreliance on these effects can possibly encourage democracies to enter a conflict unjustly using the rationale of non-lethal ways, while failing to recognize temporary side effects. This

318 Gordon, "Directed-Energy Non-Lethal Weapons," 106.

319 Singer, "The Ethics of Killer Applications," 307–8.

320 Walzer, *Just and Unjust Wars*, xxvii.

321 Wheeler, "Directed Energy Weapons," 2.

approach to global proportionality is designed to ensure non-lethal DEW variables do not circumnavigate the traditional utilitarian calculations to maintain the highest *jus ad Bellum* threshold with mutually recognized, unintended second- and third-order DEW violations and impressions

Weapons discrimination, accuracy, and lethality have continually improved over time, but the missile superiority of DEWs now adds non-lethal force options. These means are humanely centered on people, property, and perceptions in a manner that can engineer battlefield scenarios, shorten the duration of a conflict, and offer an increased reasonable hope for success.[322] In highly unstable gray-zone domains, militaries must be equipped with force options that achieve political ends. Such equipment must ambidextrously include options to defend friendlies and offset conventional weapon incompatibilities or escalation missteps. DEWs are non-lethal by design, tailorable, invisible, and silent, fostering de-escalatory effects, a key constraint when developing peer and near-peer military defense strategies.

Rwanda represented an example whose outcome in determining hope for a better peace was offset by the net assessment costs to achieve it. The net assessment in determining a better peace varies significantly across the spectrums of operations, but the utilitarian calculus has always been limited to binary conventional force options. The unilateral intervention in peacekeeping-centric missions and MOOTW are anticipated to increase in the future. Conventional kinetic weapons options in these scenarios are limited due to inherent indefinite effects provoking adversary reprisals and bitterness that will long outlast the fighting, which thus ultimately increases risk that outweighs calculations for a better peace.[323] The utilitarian math for the net assessment of a better peace can finally change with new options to utilize non-lethal DEWs throughout many spectrums of conflict, including law enforcement, FHA, and peacekeeping missions.

Discrimination seeks to limit excess harm and unnecessary CD and CIVCAS with components that rely on technological limitation in precision and accuracy, and the use of

[322] International Committee of the Red Cross, "Article 27."

[323] Walzer, "Destroying to Save"; Walzer, *Just and Unjust Wars*, 132.

force.[324] DEW effects are more humane than conventional weapons, but only reshape risk into new costs manifesting in temporary violations. The grounded reality of DEW violations should not be considered independently from other available force options when determining weapons employment because non-lethal costs outweigh the more permanent effects of lethal weapons. Discrimination is an ethical principle that must be adhered to even when facing an imbalanced risk to friendly forces, which defines the essence of a nation's character.

The vector in the evolution of weapons depicts increased escalation and lethality that disregards conventional weapons incompatibilities and proportionality considerations. These technologically superior capabilities do offer tactical victories, but disproportionately miss strategic intent and long-term success. Implementing DEW capabilities to forces does not remove all the risks, but increases proportionality options to counter VEOs to avoid unintentional deaths, CD, and retaliatory escalation. DEWs offer solutions to gray-zone confrontations against gray-zone adversaries who require calculated responses. This solution is especially true for strategic competition when notions of victory that may be limited to defending sovereignty while ensuring escalation of force remain below the threshold of armed conflict.

Unlike kinetic weapons, non-lethal DEWs by design have little to no lasting effects and result in only temporarily violating liberties and momentary pain while allowing for greater focus on protected populations and overall long-term success. By utilizing DEWs, the DOD can better protect U.S. and coalition forces, more swiftly neutralize threats, and offset second- and third-order effects inherent with conventional weapons, all of which demonstrate a balanced immediate and long-term proportionality. The use of DEWs for defense personifies the humane moral progress necessary to justify new DEW risks and offset new costs of discrimination.

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[324] Walzer, 130, 144. Walzer's necessity "doctrine justifies not only whatever is necessary to win, but also whatever is necessary to reduce the risk of losing, or simply to reduce the losses or the likelihood of losses in the course of the war" a particular COA "would be necessary to that end only if no other course improved the odds of battle at all."

Driven by the Hells of war and necessity, the ethical imperative of civilian immunity is breached often to conduct strikes on lawful targets. The DDE intent decision matrix tragically justifies deadly force, occasionally resulting in CD, including CIVCAS. DEWs introduce new considerations into the old binary calculations as a third non-lethal option that is more ethical than conventional weapons, most notably in scenarios that unavoidably risk the livelihood of protected civilians. DEWs marry well with the DDE that seeks to balance military necessity and proportionality, with the intent to focus on the acceptability of non-lethal effects, and ends that aim to reduce the total magnitude of suffering.[325]

Bad actors increasingly live and operate within urban landscapes, and use populations for protection from prosecution. These acts unethically place protected persons at an increased risk, which leads to CD and CIVCAS, a responsibility ethically assigned to the bad actors. This co-mingling dynamic creates complex necessity and proportionality assessments against highly adapting adversaries, and often limits friendly response options. DEWs are beneficial in these battlespaces because they replace conventional weapons' shock and awe with silent, invisible, and often unattributable effects.

Intervention in response to aggression and human rights violations is a moral imperative for an all-powerful nation, but friendly forces are also responsible for protecting civilian immunity, defending civilians from adversary assaults, and limiting friendly force CD.[326] DEWs present a dichotomy between non-lethal effects to protect against loss of life but, at the same time, pose new risks like temporary pain and loss of liberties. Although these violations exist, non-lethal DEWs present a superior alternative to status quo conventional weapons lethality. Accurately assigning responsibility and acting responsible are two sides of the same coin but disproportionally affects friendly forces' ability to fight justly.[327]

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[325] Gordon, "Directed-Energy Non-Lethal Weapons," 112.

[326] Perry, "The Code of the Warrior," 140–41.

[327] Walzer, "Responsibility and Proportionality in State and Nonstate Wars," 42.

The growing danger of the moral injury PTSD was assessed and it was determined that DEW effects offer humane, minimum use of non-lethal force to induce a positive response instantaneously, which precludes further escalation and often avoids the permanent anguish of lethal force. This option is particularly advantageous when friendly forces face conscripted or enslaved adversaries, especially when forced to engage child soldiers, often leading to moral injury. Political decision-makers and military leaders alike can reduce the number of persons who have PTSD and the growing associated cost by implementing DEW technologies with integrated strategies and ROEs.[328]

Finally, the logical fallacy slippery slope argument against DEWs was examined. The root of this attack describes the U.S. military as poorly trained and vaguely unprofessional, illogically arguing that inevitable misuse of DEWs would lead to torture.[329] The DEW COI can avoid future DEW opposition with dedicated DEW training, commander intent, and specific ROE guidance.

DEWs are the next revolutionary step to fight more justly in combat and across the ROMO. These capabilities offer discrimination and proportionality with silent and invisible force, speed of light targeting, unaltered by distance, gravity, or wind, with scalable instantaneous effects with little to no unintended CD. Non-lethal by design, these capabilities create de-escalation effects that preserve the sanctity of human life. With these nascent abilities, friendly forces can thwart VEOs and reduce the violence of terrorists, and disrupt strategic competition adversaries while maintaining below the threshold requirements. As nascent DEW technologies, with numerous attributes that can achieve tactical solutions as non-lethal effects become fieldable, it is a moral responsibility to implement them. All of which leads to the consideration that DEWs are the most ethical use of force today, and any further delay of fielding battle-ready capabilities will only be immoral.

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328 Walzer, *Just and Unjust Wars*, 34–35.

329 Hansen, "Fallacies," sec 1.0.

IV. CONVENTIONS AND POLICY

War, and the resulting death and destruction from armed combat, is often deemed immoral by modern societies. However, that tragic reality of this unavoidable human activity must not limit the improvement of conduct and boundaries of military actions established by international conventions and domestic policies to lessen violence during military force in the pursuit of shaping future wars to be more moral.[330] According to military historians, Robert O'Connell and John Batchelor, WWI was "a war dominated by implements that killed randomly and senselessly," which resulted in the 1925 first Geneva Conventions.[331] These international Laws of War sought to protect both victims and the innocent, denounce reprisal or retribution as wartime criminal activities, single out chemical weapons prohibitions, and declare prisoner of war immunity.

A short 21 years later, WWII, a conflict that saw the enthusiastic development and employment of virtually every form of weaponry, resulted in the 1945 fourth Geneva Conventions. According to O'Connell and John Batchelor, this international law reiterated the same spirit and added, "wounded, sick, and shipwrecked members of the armed forces and for civilian persons in occupied territory" to the protections.[332] A traditional Just War theorist Michael Walzer, emphasizes, "The final provision effectively bars the killing of hostages, the paradigm case of using innocent people for one's own military purposes."[333]

As recognized by O'Connell and Batchelor, "even in an era of total war, some limits still remain."[334] Shaped by volumes of conventions, protocols, and nation's policies, the concept of benevolent quarantine, limited suffering, and immunity remains the quintessential moral foundation for the Laws of War. Institutions, such as the ICRC and the UN, interpret and manage these democratically created customary IHL and rules.

330 P. W. Singer, *Wired for War* (New York: Penguin Press, 2009), 367.

331 O'Connell and Batchelor, *Soul of the Sword*, 259; Walzer, *Just and Unjust Wars*, 213.

332 O'Connell and Batchelor, 259.

333 Walzer, *Just and Unjust Wars*, 213.

334 O'Connell and Batchelor, *Soul of the Sword*, 59.

Together, these non-government organizations participate as leaders to negotiate weapons limitations, employment boundaries, and appropriateness of conduct. The importance of these limitations cannot be overstressed. As Walzer warns, ignoring the altruistic spirit of recognized norms "would be a breach of faith as well as a violation of the positive Laws of War."[335]

Modern DEWs are largely unrecognized by the Laws of War, while some have been preemptively banned by being categorized as inhumane with ongoing efforts to abolish future developments of specific technologies. According to U.S. Army Colonel Siegfried Ullrich, there are concerns "DEWs raise a multitude of legal and moral issues that do not apply to today's conventional weapons. International laws and treaties have been unable to adapt to the fast rate at which DEWs technology is advancing."[336] Not only are technological advancements like DEWs outpacing legislation, but the complex nature of the systems has also negatively translated into perceived increased risk for political decision-makers and military leaders. National Defense University researchers Elihu Zimet and Christopher Mann have echoed Ullrich's concern in a 2009 report, *Directed Energy Weapons*, stating:

> The ethical and legal implications of DEWs technology remain largely undefined. There exists a misperception among mid-level policy officials that DEWs systems risk violating international treaties and domestic laws. Several participants suggested these fears could be alleviated by involving attorneys early in the requisition process. Others argued that DEWs devices might be designed to accommodate legal considerations, by creating options for "dialed" intensity level, focus, or beam visibility.[337]

According to Ullrich, some institutions believe that "DEWs can blind, burn, and create long-term psychological effects, and they may be categorized under the Geneva Conventions as weapons designed to cause excessive suffering."[338] Many concerns have been raised that DEWs violate the conventions and articles, but many fail to specify which

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335 Walzer, *Just and Unjust Wars*, 209.

336 Ullrich, *Directed-Energy Warfare*, 16.

337 Zimet and Mann, *Directed Energy Weapons*, 15.

338 Ullrich, *Directed-Energy Warfare*, 16–17.

ones. This assessment will narrow the options using their distinct language (torture, suffering, brutality).

This chapter explores how DEWs fit into existing Laws of War (Geneva Conventions, PBLW, CWC, and the CCW) and U.S. policies, through both a legal and customary spirit lens, to validate the compatibility of current interpretations and competing DEW violations allegations. Maintaining the grounded understanding established in the previous chapter on the ethical review of DEWs, DEW effects cause non-lasting pain and temporarily violate some basic liberties, these systems remain non-lethal, non-lasting, and more humane than conventional kinetic weapons alternatives.

The first section briefly looks at the Geneva Convention origins and the protection of immunity. This assessment focused on Article 27-Protection of Civilians and Non-Combatants in the fourth Geneva Conventions and is further subdivided into an IHL interpretation of Rule 87-Protection of Civilians and Rule 89-Protection of Violence to assess if DEWs violate the text and spirit of each. With numerous allegations that DEWs effects are torturous, Article 32-Prohibition of Torture text and Rule 90-Torture and Cruel, Inhuman or Degrading Treatment interpretations are assimilated against nascent DEW capabilities to assess compatibility and validity of torture claims.

Next, this chapter explores the origins of PBLW and the intent of Rule 86-Blinding Laser Weapons to determine if the banning attempts of emerging HELs DEWs meet the protocol's intent. This section continues to assess banning within the CCW to compare if DEW effects align with other historically banned weapons deemed indiscriminate, inhumane, and overly brutal. This section ends with a brief comparison between the CWC and its riot control agents (RCA) determination against the ADS *Silent Guardian* capabilities. Each section addresses opposition concerns and assesses the validity of their claims as they seek to ban DEWs.

This chapter concludes by exploring the available unclassified DOD guidance that shapes the U.S. DEW adoption, development, and implementation. This final section assesses how each directive aligns with the Laws of War and if the U.S. DEW and non-lethal weapons posture fosters adoption. While the previous chapter answered the DEW

implementation question, just because we can, does it mean we should, this chapter attempts to answer that same DEW premise by asking, just because we should, does it mean we can?

A. GENEVA CONVENTIONS

Efforts to limit suffering in war can be seen as early as the 16th century with the Peace of Westphalia and is considered the first significant attempt to codify humane conduct in war.[339] Over 109 belligerent delegates attended the 1648 conventions to bring peace to the Roman Empire (Europe) and provided a model for future institutions like the League of Nations and the UN.[340] These international norms, reactionarily created from historical atrocities, have incrementally improved customary wartime laws over the centuries.

Beginning with the 1899 Hague Conventions, later codified in Geneva Conventions I through IV, internationally adopted humanitarian laws initially sought to regulate armed conflict and limit its effects.[341] Managed by the ICRC, these protocols sought to "limit the barbarity of war" and protect distinctly identified groups.[342] Altmann, a physicist and peace researcher at Technical University (TU) Dortmund states, these democratic crafted customary laws also established procedures to "ensure that, in the introduction of new weapons, the rights and interests of victims, as well as bystanders are considered when determining whether a new weapon, means or methods of warfare would be prohibited by international law."[343]

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339 Anuschka Tischer, "Peace of Westphalia (1648)," Oxford Bibliographies, July 28, 2021, https://www.oxfordbibliographies.com/view/document/obo-9780199743292/obo-9780199743292-0073.xml.

340 *Encyclopedia Britannica*, s.v. "Peace of Westphalia," accessed October 7, 2021, https://www.britannica.com/event/Peace-of-Westphalia.

341 "The Geneva Conventions and Their Commentaries," International Committee of the Red Cross, July 28, 2014, https://www.icrc.org/en/war-and-law/treaties-customary-law/geneva-conventions.

342 "The Geneva Conventions of 1949 and Their Additional Protocols," International Committee of the Red Cross, March 8, 2016, https://www.icrc.org/en/document/geneva-conventions-1949-additional-protocols.

343 Jürgen Altmann, "Non-Lethal Weapons Technologies: The Case for Independent Scientific Analysis," in *The Future of Non-Lethal Weapons: Technologies, Operations, Ethics and Law*, ed. Nick Lewer (London; Portland, OR: Frank Cass, 2002), 122.

The fourth Geneva Conventions focusing on protecting civilians and non-combatants is contained throughout 159 separate articles and was, according to the IHL, the "most progressive development of the international law of armed conflict" of the period.[344] The following section focuses on Article 27 (Protection of Civilians) and Article 32 (Torture) due to recent compelling arguments against non-lethal DEWs and HEL employment on the grounds of discrimination and (unnecessary) suffering.[345] DEWs, by nature, are intended to limit the violence and suffering seen in war, but those same capabilities are being diagnosed contrary to their intent and are being preemptively banned using these articles and IHLs, which has significantly limited these new weapons of war.

1. Article 27—Protection of Civilians

The 1949 fourth Geneva Convention Article 27 focuses on protecting civilian personnel in times of war. The ICRC expounds upon this protection as a fundamental guarantee in IHL Rule 87 (Humane Treatment) and 89 (Violence of Life).[346] An excerpt from Article 27 reads:

> Protected persons are entitled, in all circumstances, to respect for their persons, their honor, their family rights, their religious convictions and practices, and their manners and customs. They shall at all times be humanely treated and shall be protected, especially against all acts of violence or threats thereof and against insults and public curiosity. However, the Parties to the conflict may take such measures of control and security in regard to protected persons as may be necessary as a result of the war.[347]

These guarantees form the foundation of basic human rights, and each IHL rule clarifies analogous language between similar circumstances found repeated in war. According to

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344 International Committee of the Red Cross, "The Geneva Conventions and Their Commentaries"; "Customary IHL—Introduction to Fundamental Guarantees," International Committee of the Red Cross, accessed September 28, 2021, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_intofugu.

345 Victor Wallace, "Non-Lethal Weapons: R2IPE for Armed Control Measures?" in *The Future of Non-Lethal Weapons: Technologies, Operations, Ethics and Law*, ed. Nick Lewer (London; Portland, OR: Frank Cass, 2002), 142.

346 International Committee of the Red Cross, "Customary IHL—Introduction to Fundamental Guarantees."

347 International Committee of the Red Cross, "Article 27."

the ICRC, the majority of the provisions captured in Article 27 "are listed in the major human rights treaties as rights that may not be derogated from in any circumstance, and these treaties are widely ratified," but only to voluntarily participating nations.[348]

a. IHL Rule 87—Humane Treatment

IHL Rule 87 attempts to define humane treatment and elaborates upon Article 27's intent. The rule stipulates that both civilians and wartime "prisoners" (hors de combat) "dignity" must be respected while prohibiting "ill-treatment."[349] This rule uses similar language found throughout international humanitarian and human rights laws of war. It is widely recognized that such treatment shall be extended to "the wounded, sick and shipwrecked, persons deprived of their liberty, displaced persons, women, children, the elderly, the disabled and infirm."[350] Rule 87 and Article 27 fail to establish requirements defining humane treatment, and that ambiguity allows for flexibility in interpretations that offer both nations and military "options," as well as loopholes for abuse. Warned by James March, an American political scientist whose work focused on organizational decision-making, such ambiguity offers the potential for misapplication of the "appropriateness" of this positive law.[351]

b. IHL Rule 89—Violence of Life

War by nature is a violent struggle seen through the authorized use of military force, including lethal force, deemed either lawful killing or unjustified murder. Such an irreversible act as the use of lethal force must weigh heavily upon political decision-makers and military leaders. The essence of "respect," with protections against violence, is captured in Article 27, and IHL Rule 89 expands upon this historically accepted mandate.[352] Fog and friction in war will unavoidably result in accidental CIVCAS and

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348 International Committee of the Red Cross, "Customary IHL—Introduction to Fundamental Guarantees."

349 "Rule 87. Humane Treatment," International Committee of the Red Cross, accessed September 28, 2021, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule87.

350 International Committee of the Red Cross.

351 March, *A Primer on Decision Making*, 218–19.

352 International Committee of the Red Cross, "The Geneva Conventions and Their Commentaries."

fratricide, but Rule 89 focuses on the purposeful violence to life and the intent of force application.

As a moral high ground avoiding murder seems unarguable, but the immutable nature of war perpetually results in acceptable CD, including CIVCAS, during combat operations, an atrocity of war that Walzer calls "hell."[353] Similar to the previous example, an absence of specific language exists regarding protecting innocent civilians from violence. This vague wording can be seen in the African Charter on Human and Peoples' Rights and the European Convention on Human Rights, both of which only generally refer to the "prohibition of arbitrary deprivation of the right to life" during hostilities.[354] Similar ambiguous language is also seen with the Inter-American Commission on Human Rights and the Inter-American Court of Human Rights, which "stresses the need for proper precautions to be taken, for limitation of the use of force to the degree strictly necessary and for investigations to be undertaken in the case of suspicious deaths in order to ensure that a loss of life is not arbitrary."[355]

An egregious example omitted by many powerful nations was the international community's willful blindness to the 1994 Rwanda genocide that resulted in 8,000 casualties per day, totaling 800,000 Tutsis and politically moderate Hutus arbitrarily murdered by the end of the violent 100-day "civil war."[356] A relevant, yet unresolved example of atrocity in recent conflicts is the use of, and conduct of, armed RPA by the United States and allies that occasionally result in both anticipated and unforeseen CD and CIVCAS.[357] A technological character shift that has stretched the seemingly unarguable mandate against violence to life, rationalized using the DDE, occasionally accepts non-combatant losses when necessity warrants such an atrocity. Each of these examples

353 Walzer, *Just and Unjust Wars*, 30.

354 "Rule 89. Violence to Life," International Committee of the Red Cross, accessed September 29, 2021, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule89#Fn_EC42E6AF_00020.

355 International Committee of the Red Cross.

356 Power, "Bystanders to Genocide."

357 Eric Schmitt and Helene Cooper, "Pentagon Acknowledges Aug. 29 Drone Strike in Afghanistan Was a Tragic Mistake that Killed 10 Civilians," *New York Times*, sec. U.S., September 17, 2021, https://www.nytimes.com/2021/09/17/us/politics/pentagon-drone-strike-afghanistan.html.

infringes upon the spirit of respect, with the gateway made available by soft, often incomplete, customary legal language.

Assessing this subjectivity of violence to life and humane treatment, when applied to the effects of DEWs, more specifically to the ADS, has led to the diagnosis of its non-lethal capability as inhumane with effects that cause unnecessary suffering toward recognized protected individuals by human and civil rights activists.[358] Other concerns about the seemingly non-lethal effects that have yet to satisfy the opposition or rule out all potential effects that *Silent Guardian*, purposely designed and built with non-lasting effects, is physically harmful.[359] These arguments capitalize on the key language for Article 27 and IHL Rules 87 and 89 but do so without regard for the spirit of the law, recognition of adversary actions, or as in Rwanda's case, the FHA mission intent.

The interpretation discrepancies between lasting and non-lasting DEW effects and interpretation of force intent create a chasm between ethical and legal implementation. Strictly targeting intent bolsters arguments regarding theoretical violation of numerous conventions and commissions and the spirit of IHL determinations; however, that argument for any use of force is not specific to DEWs. These discrepancies are crucial because, together, they limited the microwave class of non-lethal DEWs when fielded to AFG, which left only historically acceptable alternatives of conventional lethal force. Weapons like the *Silent Guardian* do cause pain by design, but in the same respect, are non-lethal, non-lasting, and, as assessed in the previous chapter, are more humane than conventional weapons. The subjectivity of the argument hinges on identifying differences between irreversible lethal conventional munitions that only take life against the temporary pain and loss of civil liberties when people are momentarily incapacitated with non-lethal DEWs.

[358] Elfrink, "Safety and Ethics Worries"; Shachtman, "Pain Ray Recalled."

[359] Physicians for Human Rights, "Health Impacts of Crowd-Control Weapons."

2. Article 32—Prohibition of Torture

More controversial is the prohibition of corporal punishment and torture found in the Fourth Geneva Convention, Article 32. According to the ICRC, this customary law prohibits belligerents from:

> Taking any measure of such a character as to cause the physical suffering or extermination of protected persons in their hands. This prohibition applies not only to murder but to torture, corporal punishment, mutilation, and medical or scientific experiments not necessitated by the medical treatment of a protected person, but also to any other measures of brutality whether applied by civilian or military agents.[360]

The Article 32 text finalized in 1949 provides three sources of controversy for the U.S. and the DEW COI. Most notable is the 2012 finding of torturous EIT conducted by the United States.[361] Next is the human rights argument against the development and ethical testing of DEWs on humans.[362] Finally, Article 32.org highlights physical suffering and brutality, a key argument for watch groups who oppose DEWs.[363]

a. IHL Rule 90—Torture and Cruel, Inhuman or Degrading Treatment

The ICRC significantly expounds upon Article 32, with IHL Rule 90 (torture and cruel, inhuman or degrading treatment), by integrating interpretations of numerous conventions, protocols, agreements, and statutes.[364] The Conventions against Torture and

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360 "Article 32—Prohibition of Corporal Punishment, Torture," Geneva Convention (IV), 1949, https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Article.xsp?action=openDocument&documentId=0146C998773B1496C12563CD0051BC2F.

361 Senate Select Committee on Intelligence, *Central Intelligence Agency's Detention and Interrogation Program* (Washington, DC: Senate Select Committee on Intelligence, 2014), 2–3, 13–14; Anne D. Miles, *Perspective on Enhanced Interrogation Techniques*, CRS Report No. R43906 (Washington, DC: Congressional Research Service, 2016), 2–3, 13.

362 "Blinding Laser Weapons, the Need to Ban a Cruel and Inhumane Weapon," Human Rights Watch, September 1995, https://www.hrw.org/reports/1995/General1.htm; Physicians for Human Rights, "Health Impacts of Crowd-Control Weapons."

363 Wheeler, "Directed Energy Weapons," 4.

364 "Customary IHL—Rule 90. Torture and Cruel, Inhuman or Degrading Treatment," International Committee of the Red Cross, accessed October 6, 2021, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule90.

other Cruel, Inhuman or Degrading Treatment or Punishment (CAT) offers the most complete definition of torture.[365] CAT Part I, Article 1 defines torture as:

> Any act by which severe pain or suffering, whether physical or mental, is intentionally inflicted on a person for such purposes as obtaining from him or a third person information or a confession, punishing him for an act he or a third person has committed or is suspected of having committed, or intimidating or coercing him or a third person, or for any reason based on discrimination of any kind, when such pain or suffering is inflicted by or at the instigation of or with the consent or acquiescence of a public official or other person acting in an official capacity. It does not include pain or suffering arising only from, inherent in or incidental to lawful sanctions.[366]

Rule 90, codifying over 63 torture interpretations across hundreds of nations beginning as far back as the 1863 Lieber Code, all find torture or other cruel treatment as both unlawful and immoral.[367]

Human Rights and Civil Liberties advocates question the U.S. intent for DEWs, arguing its effects are inhumane, overly brutal, and will quickly migrate to torture. This opposition is using the slippery slope claim, using the EIT final fallout evidence.[368] The 2016 Senate Select Committee on Intelligence Committee Study of the Central Intelligence Agency Detention and Interrogation Programs reported 20 individual findings that concluded EITs used were torture and violated the Geneva Convention and universal human rights.[369] The report also determined that the program was unethical, incompatible with American values, political intent, and strategic interests.[370] The ease and willingness to use EIT that was later condemned as torture has rightfully created ongoing leverage for the argument that the intent of the DEWs could migrate to torture. Together, these failures

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365 Miles, *Perspective on Enhanced Interrogation Techniques*, 9.

366 "Convention against Torture Part 1," United Nations, June 26, 1986, https://www.ohchr.org/en/professionalinterest/pages/cat.aspx.

367 International Committee of the Red Cross, "Customary IHL—Rule 90."

368 Senate Select Committee on Intelligence, *Central Intelligence Agency's Detention and Interrogation Program*, 2–16; Coleman, "Possible Ethical Problems with Military Use of Non-Lethal Weapons," 190–99.

369 Miles, *Perspective on Enhanced Interrogation Techniques*, 6; Senate Select Committee on Intelligence, 15.

370 Miles, 5–6; Senate Select Committee on Intelligence, 6.

created third-order effects that are now seen as anchored outcries of the inevitable misuse for DEWs that create excess suffering, are extra brutal, and amount to helpless torture without discrimination.

B. BANNING OF DIRECTED-ENERGY WEAPONS

The legendary account of "focusing intense light against an enemy" begins in 212 BC with the Siege of Syracuse when Greek forces set Roman ships ablaze using copper-plated mirrors to create a "flaming death ray" of sunlight.[371] Fast forward to modern times, HEL technologies exist that would have been unfathomable to the early Laws of War creators, including the 1949 fourth Geneva Conventions. The ICRC first discussed the first accounts of modern-day laser weapons in 1973, speculated as future weapons, and identified human eyes as "the most vulnerable part of the body to lasers."[372] Early experts attending the CCW forecasted HEL technology to be more than 10 years away, citing "the use of lasers as anti-personnel devices was unlikely, but throughout the 1980s, concerns grew about potential humanitarian impacts of 'battlefield' or 'tactical' laser weapons."[373]

Today, DEWs like HELs offer more than the typical notions of sensationalized capabilities. New laser-induced plasma effect technology can be used in multiple modes, from verbal communication at long distances with modulated plasma to more forceful applications comparable to a "flashbang effect" to stun, even incapacitate personnel with non-lethal applications and no lasting effects.[374] This short section examines three similar customary laws, PBLW, IHL Rule 86-Blinding Laser Weapons, and CCW, all of which aim to limit the production and implementation of inhuman weapons, including lasers. This

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[371] Jeremy Hsu, "Archimedes' Flaming Death Ray Was Probably Just a Cannon, Study Finds," *Christian Science Monitor*, June 29, 2010, https://www.csmonitor.com/Science/2010/0629/Archimedes-flaming-death-ray-was-probably-just-a-cannon-study-finds; Rossiter, "High-Energy Laser Weapons," 43.

[372] International Committee of the Red Cross, *Weapons That May Cause Unnecessary Suffering or Have Indiscriminate Effects* (Geneva: International Committee of the Red Cross, 1973), 9, 69, https://www.loc.gov/rr/frd/Military_Law/pdf/RC-Weapons.pdf.

[373] *Weapons Law Encyclopedia*, s.v. "1995 protocol on blinding laser weapons," August 8, 2017, http://www.weaponslaw.org/instruments/1995-protocol-on-blinding-laser-weapons.

[374] "Talking Lasers and Endless Flashbangs: Pentagon Develops Plasma Tech," July 19, 2019, Military Times, video, 1:34, https://www.youtube.com/watch?v=UYr3zPP5rCw.

section helps understand the distinct claims seeking to ban DEWs, and offers insight into recommendations and lessons to best posture DEWs through international institutions.

1. Protocol on Blinding Laser Weapons

The 1995 and 1998 PBLW "prohibits the employment of laser weapons specifically designed, as their sole combat function or as one of their combat functions, to cause permanent blindness to unenhanced vision, that is to the naked eye or to the eye with corrective eyesight devices."[375] This international concern was identified after several state-sponsored laser weapon programs announced HEL R&D efforts. According to Anna Wheeler from Article 36.org, some of these programs were "allegedly" engaging in dual-use anti-personnel blinding laser weapons development.[376] Human Rights Watch reported as early as 1995 on blinding laser weapons, highlighting that China, France, Germany, Israel, Russia, Ukraine, the United Kingdom, and the United States were pursuing HEL programs.[377]

As expected, the PBLW text's concise seven short sentences offer significant latitude for interpretation to legitimize or ban lasers. Furthermore, the spirit of this protocol will become more significant as HEL SWaP-C improves and HEL evolves into anti-personnel weapons. Brian Rappert, contributing author in *The Future of Non-Lethal Weapons*, considers how "contrasting interpretations about lethality will create proliferation control of laser weapons."[378] On the one hand, this control would prevent the proliferation of heinous weapons; on the other, it would also limit a variety of anti-suffering non-lethal DEW capabilities that are ultimately more humane than existing alternatives.

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375 Office of Disarmament Affairs, "The Convention on Certain Conventional Weapons," United Nations, accessed September 30, 2021, https://www.un.org/disarmament/the-convention-on-certain-conventional-weapons/.

376 "Rule 86. Blinding Laser Weapons," International Committee of the Red Cross, accessed September 27, 2021, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule86; Wheeler, "Directed Energy Weapons," 2.

377 Human Rights Watch, "Blinding Laser Weapons."

378 Brian Rappert, "Towards an Understanding of Non-Lethality," in *The Future of Non-Lethal Weapons: Technologies, Operations, Ethics and Law*, ed. Nick Lewer (London; Portland, OR: Frank Cass, 2002), 56.

2. Rule 86—Blinding Laser Weapons

The ICRC recognized the need to expand upon the PBLW to limit purposeful blinding of adversaries and non-combatants and, in 2005, codified Rule 86.[379] This rule reads similar to the CCW and states, "the use of laser weapons that are specifically designed, as their sole combat function or as one of their combat functions, to cause permanent blindness to unenhanced vision is prohibited."[380] The ICRC provides further amplification to the discussion in an attempt to "establish norms of customary international law applicable in both international and non-international armed conflicts."[381]

Finally, as a precision capability, overt dazzling lasers, covert targeting lasers, and laser targeting designators (LTD) are used globally, limited only by "the requirement to take feasible precautions in the employment of laser systems to avoid permanent blindness."[382] Nonchalantly fulfilling the requirements of Rule 86 Article 2 of Protocol IV, it states, "In the employment of laser systems, the High Contracting Parties shall take all feasible precautions to avoid the incidence of permanent blindness to unenhanced vision. Such precautions shall include training of their armed forces and other practical measures."[383]

The ICRC noted, "China stated at the adoption of the Protocol that 'this is the first time in human history that a kind of inhumane weapon is declared illegal and prohibited before it is actually used.'"[384] This statement is both ironic and fortuitous. China's long-term aggression-based strategy seeks to procure and develop disguised dual-use programs to commit sovereignty violations.[385] In the same thread, the dual-use HEL programs discovery initiated a widespread prohibition intending to ban the suffering weapon. On the other hand, it highlights the need for the United States to lead efforts to normalize emerging

379 International Committee of the Red Cross, "Rule 86. Blinding Laser Weapons."

380 International Committee of the Red Cross.

381 International Committee of the Red Cross.

382 International Committee of the Red Cross.

383 International Committee of the Red Cross.

384 International Committee of the Red Cross.

385 Secretary of State, *The Elements of the China Challenge*, 7, 12, 19, 24, 40, 45–46.

HELs to ensure that the beneficial systems can be employed while the true suffering weapons are banned.

3. Convention on Conventional Weapons

In 1980, the CCW was established under Article 36 additional Protocol I of the Geneva Conventions. The salient purpose of the CCW is to "ban or restrict the use of specific types of weapons that are considered to cause unnecessary or unjustifiable suffering to combatants or to affect civilians indiscriminately," like the effects of anti-personnel landmines.[386] Before the PBLW and Rule 86 were codified, lasers found their provisions integrated into the initial three protocols focused on non-detectable fragments, booby traps, and incendiaries (IHL rules 79–81).[387] According to Human Rights Watch, the CCW added theoretical lasers to "preemptively band a weapon still in development with the hope to limit human suffering in war to counter the silent and invisible threat to human sight."[388]

Mitigating weapons that violate customary laws is noble and necessary; however, the subsequent prohibition of new weapons, initiated prematurely at the acquisition phase, ultimately limits S&T advances and the complete understanding of emerging yet unknown capabilities.[389] Ullrich notes that lasers were thought of as a "weapon designed to cause excessive suffering."[390] The 1980s understanding of lasers and its forecasted assessment of how HEL technology would evolve was only partially correct, and the unchanged early CCW's analysis significantly limited the uses of this budding technology.

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386 Office of Disarmament Affairs, "The Convention on Certain Conventional Weapons"; David Fidler, "'Non-Lethal' Weapons and International Law: Three Perspectives on the Future," in *The Future of Non-Lethal Weapons: Technologies, Operations, Ethics and Law*, ed. Nick Lewer (London; Portland, OR: Frank Cass, 2002), 28.

387 "Precedent for Preemption: The Ban on Blinding Lasers as a Model for a Killer Robots Prohibition, Memorandum to Convention on Conventional Weapons Delegates," Human Rights Watch, November 2015, https://www.hrw.org/news/2015/11/08/precedent-preemption-ban-blinding-lasers-model-killer-robots-prohibition.

388 Human Rights Watch.

389 Justin McClelland, "The Review of Weapons in Accordance with Article 36 of Additional Protocol I," *International Review of the Red Cross* 85, no. 850 (June 30, 2003): 397, 397–415. https://www.icrc.org/en/doc/resources/documents/article/other/5pxet2.htm.

390 Ullrich, *Directed-Energy Warfare*, 17.

Gordon, from the Georgia Institute of Technology, refutes the previous slippery slope argument and the ungrounded theory that using lasers on the battlefield would be "specifically used to blind combatants systematically and intentionally," an act that, according to Brooks, would be considered "excessive and indiscriminate."[391] Wheeler's argument links to these inaccurate conclusions "such as burning, eye damage or radiation sickness," as well as to DEW effects, and suggests such properties "may raise concerns under the prohibition of causing superfluous injury or unnecessary suffering."[392] As discussed in Chapter II, similar effects from conventional and chemical weapons historically have been banned, which provides rounds for concern regarding the acceptability of DEWs if the incorrect relationship goes unrefuted.[393] In essence, premature capability and intent determinations ultimately deny advancements in new technologies, like DEWs, and inevitably limit future military defense options while simultaneously creating future legal hurdles.[394]

As HEL and DEW technologies evolve, delineation of norms must be continuously reconsidered within these international organizations and agreements. Human and civil rights advocates seek to blanket ban such weapons, which further drives the need to quantify the rapidly evolving DEW class of HEL capabilities. Yet, adding blinding lasers to the existing banned categories (sea mines, non-detectable fragments, booby traps, and incendiaries) offer opposition correlation by association that denotes HELs as indiscriminate and unjustified.[395] Together these associations foster anchored narratives and manufacture artificial risk on policymakers and military leaders when assessing HEL implementation.

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391 Gordon, "Directed-Energy Non-Lethal Weapons," 106–7; Brooks, "The Ethics of Directed Energy Weapons."

392 Wheeler, "Directed Energy Weapons," 3–4.

393 "Basic Principles on the Use of Force and Firearms," United Nations Human Rights, Office of the Higher Commission, September 7, 1990, https://www.ohchr.org/en/professionalinterest/pages/useofforceandfirearms.aspx.

394 McClelland, "The Review of Weapons in Accordance with Article 36 of Additional Protocol I," 409, 414.

395 Fidler, "'Non-Lethal' Weapons and International Law," 29.

Ultimately, the spirits of the conventions, protocols, and IHL rules are all beneficial in their attempts to limit the cruelty of superfluous injury and purposeful unnecessary suffering.[396] However, that spirit can no longer be adapted using existing text to the technology of emerging DEWs. Rulings on laser capabilities are all about intent to avoid injury and suffering. That intent must guide the international community to abide by the spirit of these rules while not limiting the development and use of DEWs, which results in lethal force as the only available means.

C. CHEMICAL WEAPONS CONVENTIONS

Another agreed-upon principle, restricting the wartime use of RCA, is grounded in the desire to limit area incapacitation effects against personnel, codified in the 1993 CWC.[397] The spirit of limiting the development and use of chemical and biological weapons, a means that is inarguably inhumane for its suffering and sometimes permanent effects, traces its origins to 1921.[398] Before the CWC, this ban was refined through numerous preceding agreements, including the 1972 Bacteriological and Toxic Weapons conventions, the 1972 Biological Weapons Conventions, and the 1980 UN Inhumane Weapons Convention.[399] Noted by Gordon, the interpretation of the CWC has seeped into the discussion of NLWs and has attached similarities of atrocious chemical weapons to laser and ADS capabilities, systems that do not employ chemical agents.[400] These associations muddy NLW debates and are placing incompatible associations for chemical and biological weapons into DEW discussions.[401]

The original 193 participants of the 1997 CWC overwhelmingly agreed to limit the use of chemical weapons due to the not-so-distant memory of the U.S. WWII incendiary

396 Fidler, 29.

397 Wallace, "Non-Lethal Weapons: R2IPE for Armed Control Measures?," 153.

398 Neer, *Napalm*, 52.

399 David I. Goldman, "The Generals and the Germs: The Army Leadership's Response to Nixon's Review of Chemical and Biological Warfare Policies in 1969," *The Journal of Military History* 73, no. 2 (2009): 567, https://doi.org/10.1353/jmh.0.0242.

400 Gordon, "Directed-Energy Non-Lethal Weapons," 105.

401 Rappert, "Towards an Understanding of Non-Lethality," 54.

napalm firebombing and early chemical agents used on the battlefield, including the use of RCA as a method of warfare.[402] Article 2 of this extensive document states that RCA is "any chemical not listed in a schedule, which can produce rapidly in human sensory irritation or disabling physical effects which disappear within a short time following termination of exposure."[403] However, the convention does allow for the development and implementation "of such incapacitation agents for law enforcement purposes," which creates a significant "loophole" in the spirit of the CWC agreement.[404]

The RCA discussion is significant for three reasons of ambiguity.[405] First, the RCA definition reflects the essence of non-lethal DEWs, specifically, the microwave energy ADS, and is now being discussed interchangeably with RCA.[406] Although rendering similar first-order effects, chemical RCA and ADS possess two distinctly opposite means of force. Second, Article 2's definition is effects-based and reads identical to what ADS *Silent Guardian* effects produce. However, it lacks system delineation. CWC RCA's intent to limit violence, suffering, and permanence of chemical weapons is being misconstrued to limit ADS, a non-lethal, non-lasting DEW. This definition is being argued under the pretext of the RCR definition; weapons that "produce rapidly in human sensory irritation or disabling physical effects which disappear within a short time" are already prohibited.[407]

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402 Daryl Kimball, "Chemical Weapons Convention Signatories and States-Parties," Arms Control Association, Arms Control, June 2018, https://www.armscontrol.org/factsheets/cwcsig; Gordon, "Directed-Energy Non-Lethal Weapons," 104–5.

403 "Article II—Definitions and Criteria," Organization for the Prohibition of Chemical Weapons, accessed September 27, 2021, https://www.opcw.org/chemical-weapons-convention/articles/article-ii-definitions-and-criteria.

404 Nick Lewer, ed., *The Future of Non-Lethal Weapons: Technologies, Operations, Ethics, and Law* (London; Portland, OR: Frank Cass, 2002), 9.

405 Fidler, "'Non-Lethal' Weapons and International Law," 31; Malcolm Dando, "Future Incapacitating Chemical Agents: The Impact of Genomics," in *The Future of Non-Lethal Weapons: Technologies, Operations, Ethics and Law*, ed. Nick Lewer (London; Portland, OR: Frank Cass, 2002), 168.

406 Weinberger, "U.S. Military Heat-Ray."

407 Organization for the Prohibition of Chemical Weapons, "Article II—Definitions and Criteria."

The effects of association in the CWC text, but omitting the spirit and intent, were seen in *Silent Guardian's* removal in 2012, which was being cited as an unethical and inhumane RCA weapon.[408] Gordon argues CWC guidance focuses on weapons' "effects rather than the source of incapacitation," and only delineates agents and not systems that further inhibits implementation for non-lethal DEWs, which is "discouraging the effects of such systems."[409] This muddled relationship is criticized by John Alexander, contributing author of *The Future of Non-Lethal Weapons*, where he articulated his concern that "objections to non-lethal weapons are based on emotions rather than facts," and moreover, "arguments against most non-lethal systems become isolated and focused on specific aspects of a given technology" versus humane intent and non-lethal effects.[410]

Finally, the CWC loophole preventing RCA in wartime but deeming incapacitation agents during law enforcement appropriate inevitably creates a battle of legal interpretations over the ROMO, including peacekeeping missions, FHA, and security enforcement operations.[411] The CWC loophole is broadened by allowing such prohibited anti-personnel capabilities under a non-lethal anti-material application "so long as such weapons do not cause permanent harm to or incapacitate humans."[412] Although a loose interpretation offered flexibility to justify HEL for anti-material (M/K-Kill), it could also allow, via the DDE, band chemical capabilities against material targets near people.

D. U.S. DEPARTMENT OF DEFENSE GUIDANCE

The following section shifts focus from Laws of War to DEW policy to assess if the U.S. DOD guidance is postured to adopt and implement emerging DEWs and identify if each aligns with the Laws of War text and spirit of intent.

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408 Shachtman, "Pain Ray Recalled"; Weinberger, "U.S. Military Heat-Ray"; Elfrink, "Safety and Ethics Worries."

409 Gordon, "Directed-Energy Non-Lethal Weapons," 105.

410 Lewer, *The Future of Non-Lethal Weapons*, 5; John Alexander, "An Overview of the Future of Non-Lethal Weapons," in *The Future of Non-Lethal Weapons: Technologies, Operations, Ethics and Law*, ed. Nick Lewer (London; Portland, OR: Frank Cass, 2002), 22.

411 Fidler, "'Non-Lethal' Weapons and International Law," 29.

412 Fidler, 28.

Implementing DOD weapons systems, including DEWs, must satisfy the expected hurdles throughout the Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, and Policy (DOTMLPF-P) process. In this process, political decision-makers and senior military leaders analyze and vet a new capability to determine if strategic changes are necessary to any DOTMLPF components.[413] Each weapon system must also pass legal review requirements and second- and third-order perceptions analyses before implementation.[414] After which, DEWs will also face scrutiny domestically and internationally from allies and adversaries alike. These high-tech systems-of-systems are relatively new and rapidly maturing. Moreover, many policymakers and military leaders lack exposure and opportunity to understand DEWs sufficiently, a disconnect that has led to previous unemployment of DEWs, as well as recent updates in DOD guidance.

According to the Undersecretary of Defense, the DOD "recognizes the advantages of DEWs as an increasingly critical part of electronic-warfare" for its many advantages, including the reduction of conventional weapons' second- and third-order effects.[415] As anti-material offensive and defensive DEW options become more readily employable, the DOD organizational adoption and tactical implementation challenges must be managed to foster operator faith in capability to leverage DEW unique advantages. Effective implementation will also require rules of engagement that authorize DEW capabilities and authorities willing to accept DEW associated risks. However, as these systems exponentially evolve, DEWs will also evolve beyond the current policies, processes, and approvals, which further limits DEW fielding and employment of its unique capabilities.

1. Department of Defense Directed-Energy Weapon Policy

Data from the documents and commentary regarding the document(s) are available as a supplemental appendix to this thesis from the Naval Postgraduate School Dudley Knox library at rrlibrary@NPS.edu. See para. 4.1 in the document.

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413 "DOTMLPF-P Analysis," AcqNotes, accessed October 24, 2021, https://acqnotes.com/acqnote/acquisitions/dotmlpf-analysis.

414 David J. Trachtenberg, *Department of Defense Directed Energy Weapons (UNCLASS/FOUO)*, USD(P) (Washington, DC: Undersecretary of Defense, 2017).

415 Trachtenberg.

Some sections of the policy are UNCLASSIFIED//FOR OFFICIAL USE ONLY; classification releasability is LIMITED (NOT APPROVED FOR PUBLIC RELEASE). The directive is approved for .mil/.gov access only in NIPRNET.

The 2017 DEW policy supplements the broader electronic warfare policy (DODD 3222.04) that historically addresses EW capabilities, including "electronic warfare support, electronic protection, and electronic attack weapon systems."[416] This same guidance previously directed the United States to seek capabilities to maintain electromagnetic spectrum superiority across the joint environment, including allies and partner forces.[417] DODD 3222.04 also directs Combatant Commanders (CCDR), through the CJCS, to "integrate, plan, and execute electronic warfare when conducting campaigns across the range of military options, and identify and prioritize EW operational requirements."[418] These responsibilities of domain superiority are significant and doubly magnified by the overlapping strategic requirement to prepare and posture for strategic competition in a joint all domain operations (JADO) environment. The DOD DEW policy is also significant operationally and authorizes Commanders to incorporate novel DEW effects into the ROEs, which indicates DOD leadership is ready to accept the shift in risks of DEW implementation and battlefield effects.

2. Directed-Energy Weapon Initial Operational Employment Review and Approval Process

Data from the documents and commentary regarding the document(s) are available as a supplemental appendix to this thesis from the Naval Postgraduate School Dudley Knox library at rrlibrary@NPS.edu. See para. 4.3 in the document.

416 Department of Defense, *Electronic Warfare Policy*, DOD Directive USD (A&S), DoDD 3222.04 (Washington, DC: Department of Defense, 2018), 1.

417 Department of Defense, 1–3.

418 Department of Defense, Enclosure 2, Responsibility 14.

3. Department of Defense Joint Service Weapons and Laser System Safety Review Processes

Focusing solely on the joint use of laser weapon systems, the 2018 DOD Joint Services Weapon and Laser System Safety Review Processes (Department of Defense Instruction (DODI) 5000.69) addresses safety to DOD personnel and the public to "protect against the risk of death, injury, illness, or property damage."[419] This instruction is significant because it aligns laser capabilities as a military munition and expands the previous posture limitation of defensive anti-material capabilities to signal the potential for additional targeting options as HEL incrementally becomes weapons quality.[420] A reality that is quickly approaching with the addition of the non-lethal airborne high energy lasers (AHELs) on the Air Force Special Operations Command (AFSOC) AC-130J Ghostrider aircraft.[421] This game-changing HEL capability is expected to be demonstrated in 2022.[422] According to Lieutenant General Bradley Heithhold, former AFSOC Commander, said he wanted "a high energy laser on an AC-130 gunship by the close of this decade."[423] This science-fiction technology is quickly manifesting into a real weapon system and should also anticipate similar real criticisms as previous DEWs.

4. Department of Defense Executive Agent for Non-Lethal Weapons and Policy

The directive, DOD Executive Agent for Non-Lethal Weapons, and NLW Policy (DODD 3000.03E), broad by design and not exclusive to, but including, DEWs, assigns responsibilities managing DOD NLW to the United States Marine Corps (USMC).[424] This

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419 Pentagon, *DOD Joint Services Weapon and Laser System Safety Review Processes*, change 2, vol. USD (R&E), DODI, 5000.69 (Washington, DC: Department of Defense, 2018), 2.

420 *Northrop Grumman*, "Solid-State High-Energy Laser Systems."

421 Kyle Mizokami, "How Could the AC-130 Gunship Get Any Better? (The Answer Is Lasers.)," *Popular Mechanics*, May 18, 2020, https://www.popularmechanics.com/military/aviation/a32580060/ac-130-gunship-lasers/.

422 Nathan Strout, "Airborne Laser Weapon on Track for 2022 Demonstration," C4ISRNET, June 10, 2020, https://www.c4isrnet.com/battlefield-tech/2020/06/09/airborne-laser-weapon-on-track-for-2022-demonstration/; Mizokami, "How Could the AC-130 Gunship Get Even Better?"

423 Strout.

424 Carter, *DOD Executive Agent for Non-Lethal Weapons (NLW), and NLW Policy*, 1.

directive includes any capabilities "designed and primarily employed to incapacitate personnel or material immediately, while minimizing fatalities, permanent injury to personnel, and undesired damage to property, facilities, materiel, and the environment."[425] NLW capabilities, including those found in DEWs, according to this policy, "reinforce deterrence, and expand the range of military options available to commanders" seen in Figure 1.[426]

1. Deter, discourage, delay, or prevent hostile and threatening actions.
2. Deny access to and move, disable, and suppress individuals.
3. Stop, disable, divert, and deny access to vehicles and vessels.
4. Adapt and tailor escalation of force options to the operational environment.
5. Employ capabilities that temporarily incapacitate personnel and materiel while minimizing the likelihood of casualties and damage to critical infrastructure.
6. De-escalate situations to preclude lethal force.
7. Precisely engage targets.
8. Enhance the effectiveness and efficiency of lethal weapons.
9. Capture or incapacitate high-value targets.
10. Protect the force.[427]

Figure 1. DODD 3000.03E NLW Capabilities.[428]

The Joint Intermediate Force Capabilities Office (JIFCO), formerly Joint Non-Lethal Weapons Directorate (JNLWD), is the Directorate exploring intermediate force capabilities (IFC), which includes non-lethal DEW defense technologies (excluding HELs), and how to apply them across conventional warfare and the competition continuum, including activities below the threshold of armed conflict.[429] Colonel Wendell Leimbach, JIFCO Director, explains that much of the organization's focus is leveraging

[425] Carter, 1.

[426] Carter, 2.

[427] Carter, 2.

[428] Source: Carter, 2.

[429] David H. Berger, *Intermediate Force Capabilities Executive Agent's Planning Guide 2020* (Washington, DC: Pentagon, Department of Defense, 2020), 3.

emerging technologies "to accomplish the mission while protecting friendly forces without unnecessary destruction that initiates or prolongs expensive hostilities."[430] Strategic competitor proxies deliberately operate below the threshold of armed conflict, which limits U.S. response options and renders many conventional kinetic weapons incompatible for joint force commanders.[431] According to Leimbach, non-lethal intermediate force capabilities (including DEWs) "bridge the gap between presents and lethality" with various emerging technological advances, and provide multiple non-lethal options to deter, deny, and incapacitate threats.[432]

With the predominant success of adversarial population-centric insurgencies and realistic potential for strategic competitors to use the similar TTP, DODD 3000.03E mandates developers to conduct "thorough human effects characterization" to understand "weapons' effects and limitations prior to operational employment."[433] This directive recognizes that non-lethal force is not a sole solution and calls for NLW capabilities to complement conventional lethal weapons, but not to exclude lethal force.[434] This realistic yet flexible implementation guidance is key for tactical adoption and encourages the development and use for NLW when appropriate. Finally, DODD 3000.03E established the requirement for U.S. joint interoperability and unity with allies and partners. This directive mandates "where appropriate, NLW should be considered for integration into applicable joint and doctrinal publications, joint and service concept and operational plans, and rules of engagement and rules for the use of force."[435] Incorporating U.S. allies and partners and "strategic communication" is significant, and will be necessary to overcome existing and future claims of conventions violations and allegations of inhumane suffering and torture now anchored against DEWs.[436]

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[430] Wendell Leimbach, personal communication, September 16, 2020.

[431] Barnes, "Military Legitimacy in OOTW," 38–39.

[432] Wendell Leimbach, personal communication, September 16, 2020.

[433] Carter, *DOD Executive Agent for Non-Lethal Weapons (NLW), and NLW Policy*, 3.

[434] Carter, 3.

[435] Carter, 3.

[436] Carter, 3, 7.

The DOD DEWs policy, directives, and guidance indicate that the U.S. military is ready to implement DEWs. Additionally, many of the regulations utilize Laws of War language to ensure that intent of non-lethal DEWs mirrors the conventional and IHL text. As international laws update, U.S. DEW policy must be as well to ensure the language remains similar and allow existing DEWs to remain on the battlefield. Finally, DODD 3000.03E calls for strategic communication and integration with allies and partners. Moving forward, this messaging will be the crucial difference to expose political decision-makers and military leaders to nascent DEW capabilities, but it will also communicate the U.S. intent of the systems, an intent towards less harm and de-escalation.

E. CONCLUSION

This chapter looked at the Geneva Convention protections of immunity under Article 27 (Protection of Civilians and Non-Combatants) and Article 32 (Prohibition of Torture) with expanded IHL interpretations from Rule 87 (Protection of Civilians), Rule 89 (Violence of Life), and Rule 90 (Torture and Cruel, Inhuman or Degrading Treatment) to assess the Laws of War text and spirit of intent, as well as the validity of the DEW opposition claims. In the United States' short world history, it has conducted acts, deemed after the fact, as inhumane and indiscriminate. Some examples include the incendiary bombing of WWII, the insidious migration of EIT or torture, with ongoing RPAs strikes that occasionally produce CD and CIVCAS to providing evidence for this concern.[437] Today, this concern affects emerging DEWs with questions regarding DEW capabilities and U.S. intent for force application.

Next, this chapter explored the various protocols and rules built to limit weapons that produce indiscriminate, inhumane, and overly brutal effects like blinding lasers. Although the Laws of War do not specifically recognize most DEWs, this assessment looked at the PBLW, Rule 86 (Blinding Laser), and the CCW. The intent of the CCW is to "ban or restrict the use of specific types of weapons that are considered to cause unnecessary or unjustifiable suffering to combatants or to affect civilians

[437] Schmitt and Cooper, "Pentagon Acknowledges Aug. 29 Drone Strike."

indiscriminately," like the effects of anti-personnel landmines.[438] Illegitimate correlation by association limitations, like those argued via the CCW that preemptively bans DEWs, negatively influence current and future restrictions of DEWs.[439] Similarly, in the PBLW, findings against HEL lead to preemptively banning a weapon still in development with the hope to limit human suffering in war.[440] These prohibitions fail to assess the benefits of emerging technologies that are truly revolutionary but also more humane. These technological advances are also outpacing legislation, and the complex nature of the systems has also negatively translated into perceived increased risk; an organizational reality that could unnecessarily render lethal force as the only available force option across future battlefields.

This chapter also briefly looked at the CWC, RCA to assess how an argument against chemical weapons migrated to ban an ADS DEW. The muddy relationship is primarily caused by the CWC defining effects versus systems using ambiguous text. The results are legal loopholes that provide flexibility that simultaneously provides implementation options for good and bad capabilities. The CWC assessment is important because it depicts how artificial risk is created for DEW implementation and how truly effective it is against political decision-makers and military leaders to field them.

A limitation of the Conventions, IHL, and Articles is that each has a spirit that strives for moral conduct but is limited to the often ambiguous text that offers significant latitude for interpretation. Some interpretations by opponents have misrepresented DEW effects and manufactured hypothetical future human rights violations that have resulted in the non-lethal anti-suffering capabilities like the ADS *Silent Guardian* to seep into prohibition found in unrelated conventions. Adding DEWs into existing Laws of War often introduces unintended loopholes that create legal battles for future employment, or worse, exploitation opportunities for weapons intended to be rightfully banned. Additional

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[438] Office of Disarmament Affairs, "The Convention on Certain Conventional Weapons"; Fidler, "'Non-Lethal' Weapons and International Law," 28.

[439] Gordon, "Directed-Energy Non-Lethal Weapons," 105.

[440] Human Rights Watch, "Precedent for Preemption"; *Weapons Law Encyclopedia*, "1995 Protocol on Blinding Laser Weapons."

challenges exist for the United States, UN, and ICRC in their abilities to craft meaningful policies that will not be misinterpreted and exploited to permit the use of weapons intended to be banned. The discrepancies between lasting and non-lasting DEW effects, and interpretations of DEW application, conflict with its true nature. These capabilities do cause pain by design, but in the same respect, many DEWs are non-lethal, non-lasting, and are unarguably more humane than conventional kinetic weapons. Moreover, arguments regarding theoretical violations to numerous conventions and commissions are ungrounded, and current DEWs meet the spirit of IHL determinations.

This chapter concludes by exploring the U.S. DOD DEW guidance, policies, and directives to assess how the military is posturing to leverage DEWs and how it aligns with the Laws of War. It also attempted to answer the final DEW question asking, just because we should, does it mean we can? The subjectivity of the argument hinges on identifying differences between lethal conventional munitions that only take life against the temporary loss of fundamental human rights and liberties when people are temporarily subjected to non-lethal DEW force. Ultimately, yes, the United States can (and should) implement DEWs when necessity requires force escalation.

The DOD DEW policy, directives, and guidance indicate that the U.S. military is ready to implement DEWs but will require new efforts to overcome existing anchored notions. Future strategic communication and integration with allies and partners will be necessary for DEWs to move beyond the current stigma negatively associated with human and civil rights violations. A narrative will also have to communicate the U.S. intent for less harm and de-escalation, and that non-lethal DEWs are legal and represent the altruistic nature of American and ally values. This strategy will also expose political decision-makers and military leaders to emerging DEW capabilities to lower the risk associated with the unknown of complex technologies. Finally, the community must insist on only recognizing the actual effects of DEWs in relation to alternative means of force.[441] Any failures to recognize these lessons can create third-order effects of future outcries of excess suffering,

[441] Senate Select Committee on Intelligence, *Central Intelligence Agency's Detention and Interrogation Program*, 7, 13.

extra brutality, and torture against future DEW capabilities and implementation, and with them, future bans.

The United States and its allies are not the only nations exploiting the plethora of emerging DEW capabilities. By abdicating judgments on DEWs across the global arena to international institutions, the United States could lose negotiating leverage in determining the acceptability of future DEWs.[442] Maintaining leverage is significant to the United States as it attempts to understand (and defend against) the unknown variables of the *Havana Syndrome*, anonymous attacks that create undetermined physiological and neurological injuries potentially induced by an unconfirmed DEW derivative.[443] It is an act that truly violates the Laws of War (both aggression and a hostile act). As previously stated, fear of the unknown can migrate and anchor in unrelated ecosystems, like the unknown fear of the *Havana Syndrome* injuries affecting the legal and moral decision-making for implementation of all future DEWs.[444]

Refer to 4.18-4.21 (see Appendix B).

442 McClelland, "The Review of Weapons in Accordance with Article 36 of Additional Protocol I," 409–10.

443 Byron Tau, "What Is Havana Syndrome and What Are Its Symptoms?" *Wall Street Journal*, sec. World, September 28, 2021, https://www.wsj.com/articles/havana-syndrome-symptoms-11626882951.

444 Iain Boyd, "Directed Energy Weapons Shoot Painful but Non-Lethal Beams—Are Similar Weapons behind the Havana Syndrome?" The Conversation, accessed October 1, 2021, http://theconversation.com/directed-energy-weapons-shoot-painful-but-non-lethal-beams-are-similar-weapons-behind-the-havana-syndrome-167318.

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V. CONCLUSION AND RECOMMENDATIONS

A. CHAPTER I: INTRODUCTION

DEWs, used in the application of military force, offer various silent and invisible options to incapacitate threats with concentrated electromagnetic energy without employing the traditional effects of conventional kinetic weapons.[445] The tactical benefits of this budding technology are simplified targeting with speed of light effects that are unaffected by wind, distance, or target and platform movement. DEWs provide capabilities to target threats at greater distances than traditional small arms, with unparalleled precision and accuracy, and with options for non-lethal, non-lasting minimum use of force that can mitigate CD and avoid CIVCAS.

This nascent high-tech capability is listed in the top eight emerging technologies in the 2018 NDS for the military to develop and leverage to ensure the United States is "able to fight and win wars of the future."[446] The high utility of DEW effects provides a menu of force options that can be useful across the entire spectrum of conflict from peacekeeping operations to irregular warfare battlefields, including gray-zone continuums.

Conventional weapons offer tactical solutions when countering terrorism and VEOs; however, their properties (blast, fragmentation, cratering, incendiary, and penetration) negatively induce second-order effects, including sensational perceptions of violence, CD, CIVCAS, and retaliatory escalation. Third-order effects include subsequent adversary IO propaganda and messaging toward support and recruiting, all of which protract conflicts.[447] Moreover, as the United States pivots to posture against gray-zone adversaries and strategic competitor proxies, who deliberately operate below the threshold

445 Department of Defense, "directed energy." DEW is "technologies that relate to the production of a beam of concentrated electromagnetic energy or atomic or subatomic particles."

446 Mattis, *Summary of the 2018 National Defense Strategy of the United States of America*, 3.

447 Mattis, 3, 5.

of armed conflict, conventional weapons could unintendedly raise the level of conflict and trigger all-out war.[448]

Despite the multitude of benefits that DEWs bring to the battlefield, significant hurdles severely limit the fielding of nascent DEWs. Implementation obstacles against new high-tech capabilities arise over ethical concerns of DEW effects and U.S. intent. Numerous human and civil rights organizations claim that DEWs are inhumane and apply overly brutal effects indiscriminately. Similarly expressed concerns claim that DEWs violate multiple Laws of War that have already banned similar weapons effects. Together, these allegations have increased the risks for political decision-makers and military leaders regarding the implementation of DEWs.

DEW ethical controversy first peaked in 2010 when the U.S. Army deployed the ADS *Silent Guardian*, a microwave ray-gun, to Afghanistan.[449] The ADS was deployed to incorporate population-centric benefits by reducing the losses and suffering that can only be found in war. However, it was met with allegations citing legal and ethical violations and safety concerns (see Appendix A) that have remained anchored ever since. Sensationalized media headlines presented DEWs as crippling, brutal, and torture, like "being exposed to a blast furnace" or "making people feel like they are on fire."[450] These claims, unsubstantiated by research and field tests, resulted in the immediate removal of the ADS, weeks after its arrival, but prior to its operational use. This event has increased the political risk of using DEWs to the point that its benefits are now outshadowed by the threats of unethical practices, which drastically stunt the progress of DEW implementation.[451]

The current resistance to field DEWs leaves political and military leaders with only conventional munitions with traditional binary decision-making options, allows threats to dangerously close on friendly positions, or escalates with lethal force and incurs

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448 Department of Defense, *Summary of the Irregular Warfare Annex to the National Defense Strategy*, 2, 7.

449 Weinberger, "U.S. Military Heat-Ray."

450 Elfrink, "Safety and Ethics Worries."

451 Elfrink; Shachtman, "Pain Ray Recalled."

accompanying adverse second- and third-order effects. As the penalties of conventional weapon incompatibilities increase, DEWs offer a third option that presents tactical solutions, fosters operational de-escalation, and promotes strategic goals.

B. RESEARCH CONCENTRATION

The concept of using DEWs and non-lethal force is relatively new, with employable systems only coming online in the past decade. Some literature is available on this subject; however, a literature review reveals much of it is theoretical, which results in significant gaps in applicable knowledge. With many supposed benefits of DEWs going unused, this research aimed to identify the innovation implementation obstacles surrounding the ethical considerations for DEWs. This thesis examined both the validity of ethical allegations against non-lethal DEW effects and the claims that DEWs violate multiple Laws of War. Finally, this research reviewed current U.S. policy and DOD directives to assess U.S. posture on DEW implementation and operational considerations in leveraging this new technology and its unique attributes.

C. CHAPTER II: HISTORY

Chapter II of this thesis established a historical foundation built upon three parallels. First, the common vector of missile superiority improvements has focused on ever-increasing lethality, which, predictably, has triggered escalation into attrition wars. Second, this historical look also showed that although the accuracy of weapons evolved and systems became more precise, the intent of use became increasingly less discriminant. Third, while some weapons technologies were rejected over status quo capabilities, some missile superiorities were adopted regardless of the norms of the period. Adoption was primarily based on the necessity to win a battle, regardless of concerns over the morality of use. These historical parallels of military technologies all generated ethical considerations confronting DEWs today.

The historical analysis in Chapter II cited the noble intents of 12th century medieval knights, who fought with chivalry to maintain the strictest principles of discrimination. Knights were a costly but well-trained group of nobles who respected the military profession and moral equality of fellow combatants. The humane intent and limited force

of these altruistic professionals often limited the scale of conflicts through the 15th century, prior to the historical counterpoint innovation of the longbow.

Like DEWs, the longbow offered improved range, precision, accuracy, and increased lethality at a minimal cost compared to the knights. However, the emerging longbow weapon lacked the honor of close-quarters combat, and the long-range force was considered indiscriminate. Some medieval societies chose not to adopt the longbow because they deemed it an unethical weapon. However, maintaining the status quo triggered the end of close-quarters combat, offset by less discriminant lethality at a greater range, which resulted in wars of attrition. This chief lesson, leading to the knight's ultimate decline, is reminiscent of the words offered by Charles Q. Brown, Air Force Chief of Staff, who put it, "accelerate change or lose."[452]

Next, Chapter II assessed the evolution of early torpedoes, beginning in the American Civil War and continuing through the aerial bombing of WWII. Rudimentary torpedoes, maneuvered silently and invisibly, were disproportionately effective against capital ships, but were considered *gloryless* or lacking any honor of victory against defenseless ships and helpless crews.[453] This mode of warfare equated to what the world today considers an IED and was regarded as equally immoral. However, that opinion did not stop the adoption and improvements that evolved. Torpedoes' capabilities changed the tide in the maritime domain during WWII.

Similarly, the devolution of bombing intent in WWII shifted from strategic targets to indiscriminate area bombings that, as Biddle constituted a "gloves off all-out aerial assault against cities" and populations of innocent civilians, intended to stifle productivity and reduce morale.[454] This conduct was ethically debated among the Allied Air Forces and even deemed immoral. However, necessity drove the implementation of the indiscriminate intent. The steady increase of indiscriminate lethality during offensive

[452] Brown, *CSAF Releases Action Orders to Accelerate Change across Air Force*, 2–4.

[453] Neer, *Napalm*, 64–65; Mindell, "The Clangor of That Blacksmith's Fray," 250–51; Brock and Southern Historical Society, *Southern Historical Society Papers*, 78.

[454] Biddle, *Rhetoric and Reality in Air Warfare*, 69–70.

bombing predictably triggered an explosive escalation into unrestricted submarine warfare and aerial napalm bombing; acts of killing that some consider equal to the holocaust or acts of terrorism.[455]

This section also described the rise of clustering interdependent technologies and improvements that matured torpedoes over 30 years and bomber aircraft in less than 10 years, which foreshadowed the anticipated improvements in SWaP-C in DEW subsystems with similar rates. Finally, this section reinforced the lesson that weapon improvements narrowly focused on increased lethality and perpetuated uncontrolled escalation. This focus illustrates the need to seek minimum use of force options that resist escalation as a moral imperative to respect human life, a character trait that DEW effects personify.

Chapter II correlated similar consistencies in the historical vector for missile superiority improvements in modern-day weapons with a corresponding decline of discrimination. The DOD has a wide array of lethal force options, all of which face the same adoption and implementation challenges and tug-of-war decision-making struggles of necessity versus morality. Yet, due to necessity, DOD leaders still accept conventional weapons' binary lethal force options with adverse second- and third-order effects.[456]

D. CHAPTER III: ETHICS

Chapter III discovered that DEW capabilities are largely undefined, yet judged legally before any moral and ethical assimilation of their unique effects is established. Moral philosophers have not considered non-lethal DEWs force in war.[457] This absence of consideration creates a vacuum in the DEW COI and makes it vulnerable to negative influence against what is intended to provide anti-suffering, discriminant, and non-lasting battlefield effects.[458] Moreover, DEWs are not on any future agendas for discussion within the U.S. or multilateral institutions.[459] With status quo inertia now resisting DEWs, these

[455] Houweling and Siccama, "The Risk of Compulsory Escalation," 44.

[456] Rogoway, "U.S. Executes Revenge Drone Strike on ISIS-K 'Planner' In Afghanistan."

[457] Walzer, *Just and Unjust Wars*, xxvii.

[458] Ullrich, *Directed-Energy Warfare*, 16–17.

[459] Wheeler, "Directed Energy Weapons," 2.

emerging capabilities were thoroughly assessed in Chapter III using utilitarian foundations and philosophical criticisms.[460] Morality and legality are often misrepresented. Therefore, Chapter III focused on the moral rightness (or wrongness) of DEW effects to assist political decision-makers and military leaders in understanding the ethical issues surrounding DEWs. In doing so, the chapter answered the question, just because we can, does it mean we should?[461]

Chapter III identified two principal findings for DEWs. The first is that DEWs do not eliminate all the immoral and inhumane side effects of conventional weapons, but that non-lethal effects greatly reduce many incompatibilities found in conventional weapons. Second, DEW effects add new risks for political decision-makers and military leaders seen as temporarily infringing liberties and induced pain, both of which must be recognized. Furthermore, DEWs can only be considered unethical or inhumane when assessed in isolation from conventional weapons effects. A binary argument that fails when DEWs are assessed as a third option, in addition to conventional kinetic weapons, of justified force between no action, lethality, and non-lethal force results in DEWs being a better option.

Initially, Chapter III assessed the DEW ethical and moral vacuum by applying multiple interpretations of its ethical use in war, with moral points of view toward non-lethal DEW capabilities using the doctrine of human rights and the Just War Theory.[462] *Jus ad Bellow* (or the right in going to war) contains three tenets for consideration that DEWs will influence: global proportionality, a reasonable hope for success, and a better peace. These conditions are used as a threshold to limit the pursuit into conflict, by often employing utilitarian net assessment calculations across the ROMO. DEWs shift the calculus in decision-making when assessing future participation due to the non-lethal force component of DEWs that result in benefits to *jus ad Bellow* tenets. However, if DEW non-lethal effects are overestimated, both political decision-makers' thinking and military

460 Walzer, *Just and Unjust Wars*, xxvii.

461 Coleman, "Possible Ethical Problems with Military Use of Non-Lethal Weapons," 187; Singer, "The Ethics of Killer Applications," 311.

462 Walzer, *Just and Unjust Wars*, 152–153.

leaders' planning could negatively shift into entering a conflict that might otherwise be unjust.

The other half of Just War Theory is *jus in Bello* (or the right conduct in war), and Chapter III assessed two tenants most influenced by DEWs, discrimination and tactical proportionality. The concept of discrimination has two distinct points for DEWs. The first is that discrimination limits unnecessary CD and CIVCAS. Second, it resists reprisal or excess harm when the necessity of victory begins to offset morality in war.[463] When applying force, discrimination has a technological component in weapons accuracy, a precision attribute that makes DEWs beneficial. Allegations against DEWs that claim a lack of discrimination are intent-based claims that question how the United States will apply DEWs, arguments that attack the conduct of U.S. military professionals and not DEWs themselves. The new costs of using DEWs outweigh more permanent force and personifies the humane moral progress necessary to justify shifting risks and offset the costs of non-lethal discrimination.

The historical weapons lethality evolution vector depicts conventional weapons becoming increasingly more incompatible across the spectrum of military operations, due to proportionality considerations. Conventional capabilities provide tactical victories but disproportionately miss strategic intent and long-term success. Implementing DEW capabilities increases proportionality options to counter VEOs, avoids unintentional deaths, CD, and retaliatory escalation. DEWs are beneficial in these scenarios by displacing conventional lethal weapons that inherently increase the risk of protected personnel and mission success. Additionally, DEWs offer solutions to gray-zone confrontations against strategic competitors who require calculated responses, where theories of victory may be proportionally limited to ensure escalation remains below the threshold of armed conflict.

Chapter III also assessed the growing danger of moral injury PTSD and determined that DEW effects may offset the anguish of lethal force. This concept is historically recognizable in the *gloryless* emotions of sailors employing early torpedoes and the crumbling morale of WWII bomber crews who bombed population centers. Similarly,

463 Walzer, 130, 144.

DEWs are particularly advantageous when friendly forces face conscripted or enslaved adversaries, especially child soldiers, estimated to be one out of every 10 combatants.[464] Political decision-makers and military leaders alike can reduce the number of persons with PTSD and the growing associated cost by implementing DEW technologies with integrated strategies and ROEs.[465]

DEWs are the next revolutionary step to fight more justly in combat and across the ROMO. Non-lethal by design, these capabilities create de-escalation effects that preserve the sanctity of human life. With these nascent abilities, friendly forces can thwart VEOs, reduce the violence of terrorists, and disrupt strategic competition with force options below the threshold of armed conflict. As nascent DEW technologies with numerous attributes that can achieve tactical solutions with non-lethal effects become fieldable, it is a moral responsibility to implement them. Chapter III concluded that DEWs are an ethical use of force option, and any further delay of fielding battle-ready capabilities would only be immoral.

E. CHAPTER IV: CONVENTIONS AND POLICY

Building upon the historical parallels in Chapter II and the ethical assessments in Chapter III, Chapter IV then asked the question regarding DEWs, just because we should, does it mean we can? Acceptable conduct and boundaries of military actions, established by international conventions and domestic policies, are constantly improved with the hope of limiting future wars to be more moral. Historically, major battles and the evolution of weapons have shaped new conventions and professional military codes with norms that parallel society's values to fight well. Various organizations, including the UN and the ICRC, participate as leaders to expand upon the legal interpretations of the Laws of War, negotiate weapons limitations, and set employment boundaries and appropriateness of conduct.

464 Singer, "The Ethics of Killer Applications," 303.

465 Walzer, *Just and Unjust Wars*, 34–35.

Historically, these Laws narrowly focused on lethality and limiting losses of human life but failed to conceptualize non-lethal capabilities and could never have fathomed DEWs as a means of force. Emerging DEW capabilities remain largely unrecognized in academia, law, and military strategy, while some have been preemptively banned with efforts to limit future development of DEWs. International institutions and domestic laws have been unable to adapt to DEW technological advancements, and emerging capabilities are already outpacing future legislation. Furthermore, the complex nature of these systems has negatively translated into perceived increased risk for political decision-makers and military leaders; an organizational reality that could unnecessarily render lethal force as the only available force option across future battlefields.

Chapter IV captured three major takeaways for managing DEWs within the Laws of War and highlighted one unmet imperative within U.S. DOD DEW policy. First, discussions of DEWs must not be forced into existing guidelines focused on binary lethality. While non-lethal DEW effects meet the spirit of the Geneva Convention's and the CCW's intent, the same conventions legal text is increasingly incompatible with the nature of DEW characteristics. Second, the DEW COI must no longer perpetuate discussions that illegitimately correlate DEWs by association to historical weapons that manifest superfluous injury, suffering, or psychological harm. Third, this research exposed loopholes in Laws of War texts that, on the one hand, banned beneficial capabilities like DEWs, yet, on the other, could allow truly malicious (rightfully banned) capabilities to be used across battlefields.

Regarding U.S. policy, the DOD is postured to implement DEWs; however, these capabilities are complex and remain unclear across the department. This uncertainty creates additional risks, on top of the perceived risk created by ethical violations, for political decision-makers and military leaders when attempting to field DEWs. The DOD Executive Agent for NLW and NLW Policy (DODD 3000.03E) calls for a "strategic communication" plan to foster implementation. This intent will be necessary to overcome existing and future claims of convention violations and allegations of inhumane suffering and torture now

anchored against DEWs.[466] For the DOD to fulfill the requirement of the 2018 NDS and avoid another *Silent Guardian* outcome, DEWs as a class of systems will require a bolstered strategic narrative that must be delivered prior to the implementation of any future DEW capabilities.

International laws and treaties rightfully prohibit the deployment of weapons specifically designed to cause superfluous injury, unnecessary suffering (like blindness), or long-term psychological harm while requiring distinction, proportionality, and discrimination. However, few policies, treaties, or laws prohibit the deployment of non-lethal DEWs. Chapter IV addressed this void by exploring how DEWs fit into existing Laws of War. Specifically, the Geneva Conventions, PBLW, CWC, and the CCW were examined, as well as U.S. policies. The Laws of War assessment was two-fold and looked at the Laws of War through its legal text and through the IHL spirit of intent lens. Additionally, this chapter attempted to ground the compatibility of competing DEW violations with each applicable convention and article.

Chapter IV looked at Article 27 in the Fourth Geneva Conventions and was further subdivided into the IHL interpretation of Rules 87 and 89. The analysis confirmed the shift of risk findings (discussed in Chapter III) and further edified the new legal costs that briefly violate liberties and cause pain. However, those temporary violations greatly outweigh the cost of conventional lethal force, and as a result, DEWs adhere to the spirit of each Article and IHL. With numerous allegations that DEW effects are extra brutal and torturous, Chapter IV also assessed Article 32 and Rule 90 and found that torture arguments are intent-based (versus DEW effects) presented as a slippery slope argument. This finding was significant when considering the incapacitation effects of DEWs, if misused, would be considered cruel, brutal, and torturous.

Next, Chapter IV explored the PBLW and IHL Rule 86 that together seek to ban weapons with the primary intent to blind, and the CCW that seeks to limit indiscriminate weapons that cause unnecessary suffering that has affected HELs and ADS (variants of

[466] Carter, *DOD Executive Agent for Non-Lethal Weapons (NLW), and NLW Policy*, 3.

DEWs).[467] Early PBLW findings against HELs led to preemptively banning DEW capability still in development and limited the employment of various technologies that can incapacitate personnel with non-lethal applications and no lasting effects.[468] This analysis identified an illegitimate correlation by association that negatively influences current and future restrictions of DEWs against historically banned weapons.[469]

The banning section in Chapter IV ended with assessing how the ADS *Silent Guardian* capability seeped into prohibitions found in unrelated CWC text. This analysis revealed legal loopholes in the text that could allow for the implementation of egregious chemical weapons while simultaneously limiting ADS. Similar to the CCW, this CWC ban, under the RCA definition, was used to align ADS with other banned weapons. This false correlation with chemical weapons depicts how artificial risk is created for DEW implementation and how truly effective it is on political decision-makers and military leaders who seek to field capabilities that meet the spirit of the Laws of War.

A limitation of the Laws of War is that each convention, protocol, and article has a spirit of intent that strives for moral conduct but is limited to ambiguous text that offers significant latitude for interpretation. Challenges exist for the United States in its ability to craft meaningful policies that will not be misinterpreted or exploited to permit the use of weapons intended to be banned. Additionally, the conventions that preemptively prohibited DEWs fail to assess the benefits of emerging DEWs that are unarguably more humane than conventional kinetic weapons, and unintentionally render lethal force as the only available military option across future battlefields.

Chapter IV concluded by exploring the unclassified DOD guidance that shaped DEW adoption and implementation, confirming that each directive aligns with the Laws of War and that the DOD is postured to field DEWs. Though this concept is still new, this policy shift indicates that the U.S. military is postured to absorb the real risk of limited

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467 Office of Disarmament Affairs, "The Convention on Certain Conventional Weapons"; Fidler, "'Non-Lethal' Weapons and International Law," 28.

468 Human Rights Watch, "Precedent for Preemption"; Military Times, "Talking Lasers and Endless Flashbangs."

469 Gordon, "Directed-Energy Non-Lethal Weapons," 105.

rights violations and temporary pain during DEW and target prosecution and the artificial risks from false accusations of legal violations.

F. CONCLUSION

With a shared common morality, the United States must lead global efforts to reestablish with its allies and partners DEW defense technologies as an ethically acceptable and morally necessary means. Failure to recognize this thesis's historical parallels, ethical findings, and conventions takeaways could perpetuate avoidable legal and ethical outcries against future DEWs—capabilities intended to provide precision, humane, and de-escalatory effects—and with them, future bans. This historically predictable reality would result in the continued withholding of DEWs from operational use for status quo binary options of incompatible conventional kinetic weapons for the United States across the ROMO, with its adverse second- and third-order outcomes.

G. RECOMMENDATIONS

As a result of this research, this thesis concludes with three recommendations to break through the current allegation cycle and limit implementation resistance for future DEWs:

1. Change the DEW narrative to normalize the domestic and international conversation.
2. Unite DEWs under one overarching military program vs. lethal and non-lethal DEWs.
3. Reintroduce DEWs to political decision-makers and military leaders as a class of systems with a collective interoperability demonstration.

1. Recommendation 1: A New Narrative

A multilateral effort is critical to shaping future normative behaviors in DEW conduct and boundaries for acceptable and unacceptable applications of military force capabilities throughout the spectrums of conflict.[470] Future strategic communication and integration with allies and partners will be necessary for DEWs to move beyond the current stigma negatively associated with human and civil rights violations. A narrative will also

[470] Walzer, *Just and Unjust Wars*, xxvi.

have to communicate the U.S. intent for less harm and de-escalation, and that non-lethal DEWs are legal and represent the altruistic nature of American and ally values. Appendix C offers connecting principles in a strategic narrative that reframes the ethical reality of DEW capabilities with alternative messaging to realign ungrounded beliefs; it is inclusive to allies and like-minded partners and those we seek to protect. Appendix D offers a similar narrative framed for a tactical audience to bridge operators' adoption implementation gaps in DEW appropriateness and force safety.

The United States and its allies are not the only nations exploiting the plethora of emerging DEW capabilities. By abdicating judgments on DEWs across the global arena to international institutions, the United States could lose negotiating leverage in determining the acceptability of future DEWs; a reality that limits beneficial DEWs while leaving conventional force as the only available means.[471] Maintaining leverage is significant to the United States as it attempts to understand (and defend against) the unknown variables of the *Havana Syndrome*. These anonymous attacks violate the Laws of War (both aggression and a hostile act) and create undetermined physiological and neurological injuries potentially induced by an unconfirmed DEW derivative.[472] As previously stated, fear of the unknown can migrate and anchor in unrelated ecosystems, like the unknown fear of the *Havana Syndrome* injuries affecting the legal and moral decision-making for implementation of all future DEWs.[473]

2. Recommendation 2: A United Directed-Energy Weapon Community of Interest

DEWs as a class of capabilities include various equipment and weapons spanning from IFC, to non-lethal anti-personnel force DEWs, and anti-material HELs. Although individually unique in their own right, these capabilities as a class of systems have common attributes that only DEW effects offer, and they face similar domestic implementation obstacles and international concerns. Approaching it as a class, similar to what the JIFCO

471 McClelland, "The Review of Weapons in Accordance with Article 36 of Additional Protocol I," 409–10.

472 Tau, "What Is Havana Syndrome and What Are Its Symptoms?"

473 Boyd, "Directed Energy Weapons Shoot Painful but Non-Lethal Beams."

conducts, will accelerate the implementation of emerging capabilities, lessen predictable obstacles, and synergize past successes while avoiding previous missteps.

As the United States shifts from its well-developed understanding of CT toward strategic competition, the potential exists that it will face unpredictable near-peer competitor proxies across unstable gray-zone battlespaces, while still conducting FHA, security assistance, and peacekeeping missions. The ROMO varies; yet, each will require military presence and corresponding force options. The changing character of U.S. and ally adversaries renders conventional weapon incompatibilities more hazardous to operational goals and long-term strategic success. In a 2017 Article 36 discussion paper, Anna Wheeler identifies a lack of international leadership and scrutiny for emerging DEWs.[474] That vacuum should be filled with U.S. led leadership to ensure appropriate capabilities proliferate, while others like those that produce the *Havana Syndrome*, are banned. Additionally, Wheeler reiterated a warning for oversight and care offered by the 1990 UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials (BPUFF), applicable to emerging DEWs and their operators to avoid any theoretical misuse of non-lethal firearms weapons.[475]

These revolutionary capabilities, with a different mindset than lethal force, present unique challenges that must be united organizationally to ensure CCDR have dedicated OT&E forces that understand DEWs, TTPs and CCDR intent on achieving tactical success via operational de-escalation, while fostering long-term strategic success. With the predictable similarities in implementation obstacles, rapidly evolving technology, and change of prosecution intent, DEWs as a class would best serve the DOD by residing under one chain of command.

[474] Wheeler, "Directed Energy Weapons," 5.

[475] United Nations Human Rights, Office of the Higher Commission, "Basic Principles on the Use of Force and Firearms"; Wheeler, 4.

3. Recommendation 3: A Collective Directed-Energy Weapon Demonstration

According to multiple open-source media reports, the newest DE capability is quickly approaching with the addition of a 60KW AHEL on the AFSOC AC-130J Ghostrider aircraft.[476] It is anticipated that this game-changing HEL capability will be demonstrated in 2022.[477] This observable event will attract a large population of influential personnel, during which the DEW community should expose the collective audience to a variety of capabilities beyond the AHEL demonstration. Political decision-makers and military leaders should also anticipate sustaining similar criticisms as previous DEWs, and the demonstration should only proceed after recommendation one is completed.

According to Everett Rogers' innovation adoption research, an "observable" event, like the approaching AHEL demonstration, should highlight DEW "relative advantages" as a class of systems to "enhance the raw appeal" by demonstrating their variety of effects and offer hands-on "trialability" to a collective audience of political decision-makers and military leaders, as well as influential members from the international community.[478] Additionally, such a highly visible event should be leveraged to communicate a clear strategic narrative message, and re-educate old anchored beliefs and simplify complex technologies to reshape DEW perceptions. Together, the risk associated with the unknown of complex technologies, and ground ethical and legal allegations can be lowered and thereby increase the adaptability and implementation of current and future DEWs.

H. ADDITIONAL RESEARCH

Portions of this section were previously published by the *Air & Space Power Journal* in Fall 2021.[479]

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476 Mizokami, "How Could the AC-130 Gunship Get Even Better?"

477 Strout, "Airborne Laser Weapon on Track for 2022 Demonstration"; Mizokami, "How Could the AC-130 Gunship Get Even Better?"

478 John Gourville, *Note on Innovation Diffusion: Rogers' Five Factors* (Cambridge, MA: Harvard Business Publishing, 2006), 6, https://hbsp.harvard.edu/product/505075-PDF-ENG

479 Cannin, "Directed-Energy Weapons," 57–65.

Future research should aim to quantify whether effects across the ROMO can offset conventional kinetic weapon incompatibilities, de-escalate battlefield scenarios, deter adversaries, and shape battlespace information, influence, and perceptions.[480] Furthermore, additional research must address the current escalation of force model, coercion, and first use policies to validate benefits for a DEW escalation of force methodology.[481] Moreover, future research must quantify a DEW cost-benefit analysis to identify financial implementation obstacles and simplify the highly technical DE complexities for political decision-makers and military leadership to minimize resistance of future adoption and encourage the implementation of these emerging DEW capabilities.[482] Finally, research must identify if merging JIFCO intermediate force capability NLW doctrine is compatible with current HEL capabilities and operational intents, to overcome loss aversion implementation obstacles of distinct niche capabilities when attempting to unite the growing DEW COI.

[480] Cannin, 63.

[481] Cannin, 63.

[482] Cannin, 62–63.

APPENDIX A. ALLEGED VIOLATIONS

A. *SILENT GUARDIAN* HYPER-SENSATIONALIZED MEDIA CLAIMS

1. Sharon Weinberger "describes it as a controversial nonlethal weapon that uses microwave energy to create intense pain...The weapon is designed to shoot an invisible beam of energy at people, creating an **intense burning sensation** that forces them to flee."[483]

2. *Wall Street Journal*'s Nathan Hodge, "Even though I was standing several hundred meters downrange, I could immediately feel the heat when the operator fired. It was like someone had opened an oven door right in front of me. But it quickly became **unbearable**."[484]

3. Noah Shachtman at *Wired*: "I'm sure they're telling themselves that generally, non-lethal microwave weapons are a better, safer crowd control alternative than an M-16. But those ray-gun advocates better think long and hard about the Taliban's propaganda bonanza when news leaks of the Americans zapping Afghans **until they feel roasted alive. A flesh frying killer**."[485]

4. *Digby's Hullabaloo*: "Setting aside the fact that using a 'pain ray' in general is a horrible idea, how much more horrible is it to use in a country that already sees itself invaded by men who look like robot insects and where unmanned planes kill targets from a distance? It's hard not to see that as a weapons laboratory on a **people who have no means to protest**."[486]

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[483] Weinberger, "U.S. Military Heat-Ray."

[484] Nathan Hodges, "What's It Like to Get Zapped by Pentagon's 'Pain Ray'?" *Wall Street Journal*, June 21, 2010, https://www.wsj.com/articles/BL-WB-21032.

[485] Noah Shachtman, "Pain Ray, Rejected by the Military, Ready to Blast L.A. Prisoners," *Wired*, accessed October 14, 2021, https://www.wired.com/2010/08/pain-ray-rejected-by-the-military-ready-to-blast-l-a-prisoners/.

[486] Hudson, "Raytheon Microwave Gun Recalled Amidst Controversy."

5. Philip Sherwell at Harper's: "It felt as if I had opened a '**furnace with my face too close and been hit by a wall of scorching heat**,' calling the pain intolerable. Five years later, Spencer Ackerman from *Wired* said it felt like he'd 'been exposed to a blast furnace.'"[487]

B. ALLEGED DIRECTED-ENERGY WEAPON HUMAN AND CIVIL RIGHTS VIOLATIONS

1. "It seems fundamentally a weapon that's designed to create a great deal of pain and fear, Douglas Johnson, then the executive director of the Center for Victims of Torture, told the Sacramento Bee in 2004. Once this kind of technology is available and there's a perception that it's safe and nonlethal, it seems like a natural device to be used in interrogations."[488]

2. Anna Wheeler from Article32.org believes DEW will inevitably be used as a "torture device."[489]

3. Ethical concerns from Human Rights Watch adviser William Arkin questions: "how it might affect children or pregnant women who happened to be in a crowd."[490]

4. Journalist Tim Elfrink stated, "the U.S. was microwaving Afghans and giving them cancer."[491]

5. The ADS non-lethal weapons result in permanent physical injuries.[492]

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487 Elfrink, "Safety and Ethics Worries."

488 Elfrink.

489 Wheeler, "Directed Energy Weapons," 2–3.

490 Elfrink, "Safety and Ethics Worries."

491 Elfrink.

492 Elfrink; Physicians for Human Rights, "Health Impacts of Crowd-Control Weapons."

APPENDIX B. U.S. DIRECTED-ENERGY WEAPON POLICY (SUPPLEMENTAL)

This supplement contains an assessment of U.S. and DOD DEW policy that is not currently authorized for public release.

Data from this document and commentary regarding the document(s) can be obtained from the NPS Dudley Knox Library at rrlibrary@nps.edu.

Some sections of the supplemental are UNCLASSIFIED//FOR OFFICIAL USE ONLY. Classification releasability is LIMITED (NOT APPROVED FOR PUBLIC RELEASE). The supplemental is approved for .mil/.gov access only in NIPRNET.

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APPENDIX C. STRATEGIC NARRATIVE

A. STRATEGIC META-NARRATIVE

With our Allies and Partners, the United States continues to battle malign terrorist, violent extremist organizations, and transnational threats aggression around the world. Our enduring priorities to keep the homeland and our troops abroad safe remain, not only valuing our livelihood but the life of all mankind—and it is our duty to support and defend these missions striving toward a higher code of ethical and moral responsibilities in the same way we do in our own lives here at home. America's commitment and ingenuity have created great technological advances, and today, Directed Energy offers our Coalition new options that complement capabilities providing increased safety to our forces while preserving the sanctity of humanity. As a surgically discriminant defensive option, early Directed Energy effects can de-escalate hostilities using non-lethal force and anti-suffering capabilities while preserving life, with little to no lasting negative effects to vulnerable civilians. Providing these tools to military forces are the most ethical responsible military adaptation of emerging technologies that ensure we not only retain the hearts and minds of those we serve and protect but also serve to gain the long-term trust and confidence of those we defend while influencing bad actors, rejecting their hostile efforts—rendering them harmless. Together, Directed Energy solutions can preserve all the U.S. stands for while bringing liberty to unstable regions and justice to those that wish to harm our way of life.

B. 280-CHARACTER TWITTER STRATEGIC NARRATIVE

As the U.S. battles malign aggression, it is our moral responsibility to leverage humane defense technologies. New Directed Energy capabilities allow Coalition forces to deescalate hostility while protecting vulnerable civilians in a manner that fosters our Hearts & Minds priority.

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APPENDIX D. TACTICAL NARRATIVE

Combat operations in pursuit of our military objectives have become increasingly more complex than ever before. As we fight malign terrorist, violent extremist, and transnational threats, one common link to long-term success is our ability to retain the hearts and minds of those we protect and fosters trust and influence in those we defend. New military technological advances, like Directed-Energy Weapons, provide non-lethal incapacitation options to combat nefarious actors, rejecting their hostile actions—rendering them ineffective. Although these capabilities do not replace traditional means or the inherent right of self-defense, DEWs increase safety for our forces while preserving the sanctity of humanity with a high code of ethical conduct. As a highly discriminant option, DEW effects can neutralize adversaries using early non-lethal force while preserving life with nominal CD and CIVCAS. Although not always applicable, when situations offer early DEW application, it is our ethical responsibility to escalate with non-lethal, minimum use of force prior to lethal application. The risk to adversary recruitment and civilian support outweighs that risk of early escalation upon nefarious activity prior to hostile acts. Striving toward a higher code of ethics, non-lethal escalations of force are a tactical solution that preserves the sanctity of humanity in a manner that represents all the U.S. stands for, allowing us to bring liberty to unstable regions and justice to those that wish to harm our way of life.

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