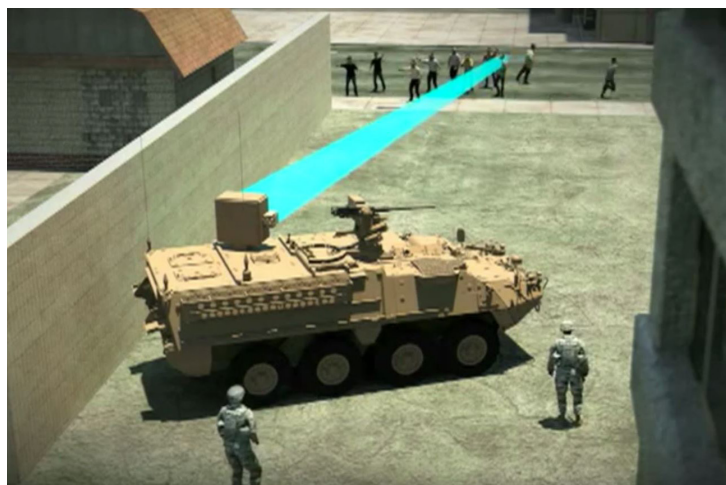


The Death of Public Protest

Directed-Energy Weapons and Their Hidden Consequences

Mitchell | Croom



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Please direct inquiries to:

The Project on International Peace and Security (PIPS)
Institute for the Theory and Practice of International Relations
The College of William and Mary
427 Scotland Street
Williamsburg, Virginia 23185
tele. 757.221.1441
fax. 757.221.4650
pips@wm.edu

Electronic copies of this report are available at www.wm.edu/pips

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Amy Oakes
Dennis A. Smith
Co-directors

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Mitchell Croom

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Directed-Energy Weapons and Their Hidden Consequences

Advancements in nonlethal directed-energy weapons (N-DEWs) significantly increase American military capability. However, oppressive governments that possess this technology will become highly resistant to domestic opposition. As democratic movements lose the ability to challenge illiberal regimes, a global rollback of democracy could ensue. The efficacy of these weapons, coupled with the lack of international governance, makes proliferation inevitable. The United States should enact a multilateral arms-control regime to limit the spread of N-DEWs. At the same time, Washington should create and propagate standards for the appropriate use of these weapons.

Introduction

No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be.

– Isaac Asimov, 1978¹

For 40 years, the U.S. defense community has forecasted the “imminent” arrival of directed-energy weapons (DEWs).² In the last decade, advancements in defense technology have finally delivered on those predictions. The military is in the process of fielding both lasers and other directed energy weapons.³ These weapons are no longer wishful thinking, but will soon be real tools on the battlefield. Yet not all DEWs are created equal. Due to their high potential for abuse, the United States must treat nonlethal DEWs (N-DEWs) differently than lethal DEWs.⁴ N-DEWs, such as Active Denial Technology, are highly effective tools for crowd control.⁵ These weapons can easily disperse public gatherings without causing injury. With N-DEWs, governments will gain unprecedented power to limit public protest.

The foreign policy and defense communities have not accounted for this political outcome, and so have not fully analyzed the true cost of these weapons for global democracy. To prevent the silencing of popular movements around the world, Washington should set global standards for the use of N-DEWs. And it should construct and lead an international effort to limit N-DEW proliferation.

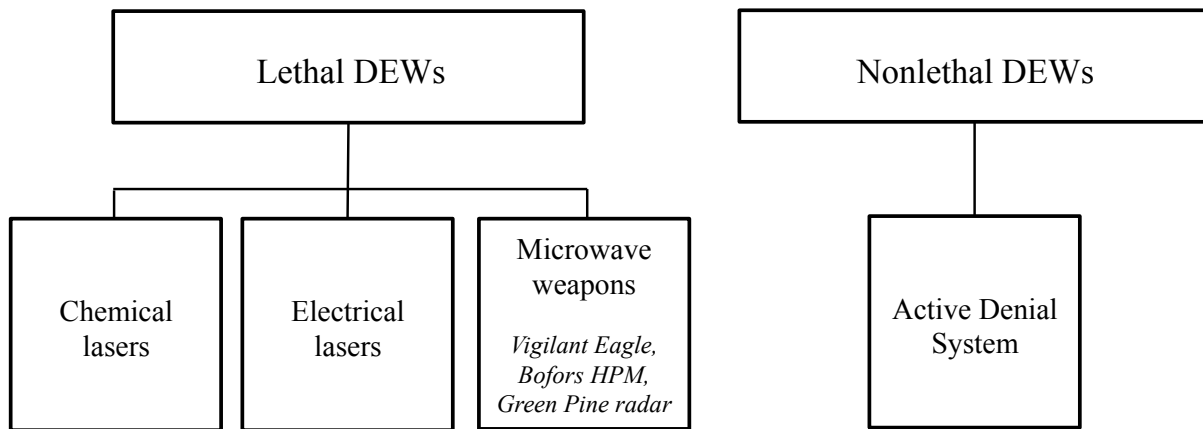
Directed-Energy Weapons and Their Problems

Few weapons have held as much promise – and failed to live up to that promise – as directed-energy weapons.

– Jason D. Ellis, 2015⁶

DEWs offer significant benefits to the U.S. military. Laser weapons allow warships to destroy targets at a distance, with practically infinite ammunition. The emerging Vigilant Eagle system will allow airports and other installations to defend themselves against incoming projectiles. The advantages of these weapons are clear, but they come with hidden costs. With DEWs come N-DEWs, a highly effective class of nonlethal weapon. Given the modest technological sophistication of N-DEWs, they will likely proliferate to developing nations, which often feature fragile institutions and repressive governments. In the absence of nonproliferation efforts, many regimes may possess these weapons by 2025.⁷ While lethal DEWs serve to enhance our own military capability without posing additional problems for global civil society, N-DEWs challenge people’s ability to publicly assemble, a basic right in the United States and a major tool for democratic movements.

Figure 1: Classification of DEWs



Lethal DEWs

Lethal DEWs focus electromagnetic energy to destroy targets, usually incoming projectiles or enemy vehicles. These weapons function much the same as conventional weapons, but with some added benefits, such as lower cost. Additionally, lethal DEWs pose no greater threat to global civil society than traditional weapons.

- *Laser weapons.* Until the last decade, laser weapons systems relied primarily on chemical lasers. Chemical lasers produce highly destructive beams, which can be projected over sizeable distances. Yet the Pentagon has refrained from fielding chemical lasers because

the chemical mixtures involved are highly unstable, and such lasers are limited in the number of targets that can be engaged before the chemicals need to be replaced.⁸ Electric-based lasers do not use chemicals, but emit beams generated from electrical current. With sufficient electrical generators, these lasers have practically endless ammunition magazines. And no risk comes from the fuel source of electrical lasers. The U.S. Navy fielded its first electrical laser, the Laser Weapons System (LaWS), on the USS *Ponce* in 2014. Trials are ongoing, but overall evaluations have been positive.⁹

- *Emerging microwave weapons.* Several microwave weapons are currently under development and are scheduled to be fielded in the near future. Vigilant Eagle is an airport missile-defense system, which uses microwave radiation to jam anti-aircraft weapons.¹⁰ The Bofors High-Powered Microwave Blackout weapons system acts as a directed electromagnetic pulse, destroying all electronic devices and components in a narrow area.¹¹

Nonlethal DEWs

N-DEWs target people instead of incoming missiles, vehicles, or fixed targets. The U.S. military has developed and deployed an N-DEW called the Active Denial System (ADS), one weapon under the broader program of Active Denial Technologies (ADT).¹² ADS generates millimeter-wave radiation that penetrates a very thin layer of skin, causing a burning sensation and forcing the target to flee involuntarily from the weapon's beam.¹³ Once targets vacate the beam's path, the pain disappears. Damage is minimal-to-nonexistent.¹⁴ No one has yet withstood more than a few seconds in the beam.¹⁵ Other ADT weapons achieve the same effect, but have been made smaller and more portable than the first version of ADS.¹⁶ The current version is the Solid State Active Denial Technology (SS-ADT) and has been miniaturized to be mounted on an array of military vehicles.¹⁷

The technology behind ADT is relatively unsophisticated and does not require a high degree of technological capability to develop. ADT uses millimeter-wave radiation to superheat the first layer of skin cells.¹⁸ The same technology powers airport body scanners, which operate at much lower intensity.¹⁹ There also has been some effort to sell ADT on the international market. Until recently Raytheon, for example, marketed a system known as the Silent Guardian.²⁰

Potential for N-DEW Abuse

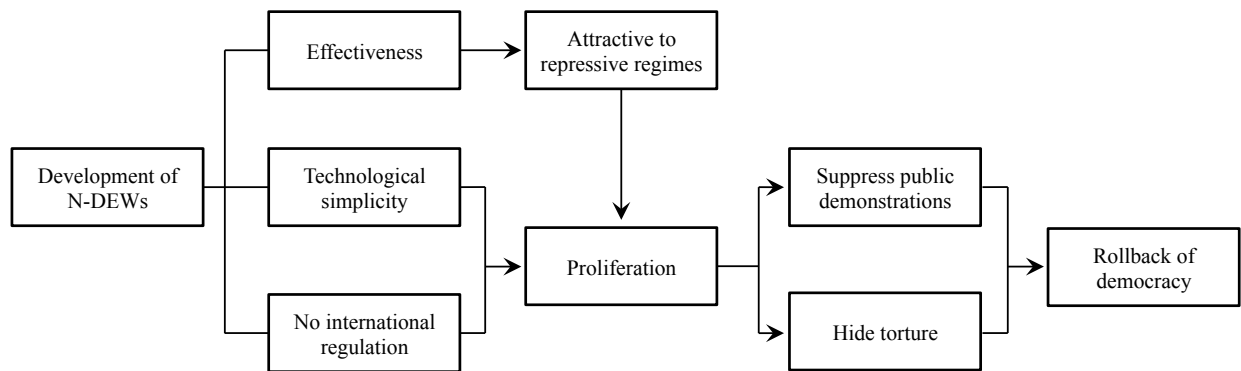
Without question, there is an ominous side to the development of such innovative weaponry as the high-energy laser and the particle-beam weapon.

— E. Anthony Fessler, 1979²¹

N-DEWs offer repressive regimes significant benefits. Such regimes gain the ability to control crowds quickly, effectively, and at a distance. Repressive governments can use N-DEWs as tools of torture, which leave no physical evidence of their use. The technological simplicity of these

weapons and their improved efficiency over traditional non-lethal weapons will ensure that oppressive regimes will desire and attempt to acquire them.

Figure 2: How N-DEW Abuse Rolls Back Democracy



Dispersing Protests

States can use N-DEWs to achieve virtually complete crowd control. The ADS triggers a person’s automatic flight response, forcing those targeted to flee its beam involuntarily.²² ADS units mounted on rooftops in Tahrir Square, for example, could have cleared the Arab Spring protestors in a few minutes.²³

To date analyses have focused on the tactical advantage of N-DEWs for the U.S. military.²⁴ The United States will have sole control of these weapons in the near term; however, within a few decades, N-DEWs will proliferate to less-developed nations, and anti-American and undemocratic regimes will become highly resilient to domestic unrest.²⁵

Undetected Torture

Current versions of ADS can be mounted on vehicles and aircraft; however, there are no barriers for further reducing the size of ADS. Miniaturized versions of ADS have already been developed, and these hand-held, battery-powered devices cause the same pain as the full-scale version, except that the device must touch the target to induce pain.²⁶ Such mini-ADS’s lack the abilities of larger systems, but could serve as a tool of torture by repressive regimes. The pain that the mini-ADS inflicts mimics a hot lightbulb being pressed onto one’s skin, but without causing burns or other marks. The pain is real, but no physical evidence remains. Human rights monitors depend on physical evidence to detect torture and alert international organizations.²⁷ N-DEWs will allow repressive governments to torture people with minimal risk of detection.

Traditional non-lethal weapons can perform the functions mentioned above, but N-DEWs perform these functions with much greater efficiency. Rubber bullets, pepper spray, and tear gas all injure their targets, sometimes mortally. They also require close proximity to be used. N-

DEWs operate from a distance and leave no lasting marks. Their ammunition is endless, and they can only be countered in a few ways, which are unlikely to be available to protestors.²⁸

States will desire these new and improved weapons of repression, and they will obtain them. The technological basis for ADS is the same as airport body-scanners, which states already possess. Companies have already attempted to sell ADS technology to foreign corporations, and currently sell airport scanners all over the world.²⁹ Without significant changes to the status quo, unscrupulous actors will obtain N-DEWs in the near future. In light of their potential for abuse, the United States cannot ignore N-DEWs or treat them as simply the latest instrument in the military's toolbox. N-DEWs are qualitatively different than their predecessors, and failure to address that reality will have potentially devastating consequences on democratic movements around the world.

Benefits of Prompt Action

A new international arms race in [nonlethal weapons] could further burden our military budget and complicate the battlefield.

– David Koplow, 2006³⁰

The United States has adopted policies regulating the deployment of N-DEWs in foreign theaters. Memos from the Department of Justice (DOJ) and directives from the Pentagon govern their usage within the United States and the U.S. Armed Forces. However, failing to enact a proliferation-control regime will allow these weapons to fall into the hands of foreign powers hostile to American interests. Refraining from enacting responsible use and nonproliferation agreements will likely have significant costs for the spread of global democracy, while proactively establishing standards and limiting the technology's spread will have long-term benefits for the United States. The real benefits of DEWs to the U.S. military are relatively limited, yet the costs of inaction are quite high.

Lack of International Regulation

Some of the potential negative international consequences of N-DEWs are foreshadowed by the use of Tasers by police forces in the United States.³¹ Since their use became widespread, critics have argued that Taser-armed police have overused the technology at the expense of verbal de-escalation techniques.³² A study by the DOJ found that Orlando police were more likely to use force after receiving Tasers than before their adoption.³³ This behavior, which has been documented in many police departments, has provoked concern among watchdogs of the criminal justice system.³⁴ Although the police in the United States usually handle Tasers (and their cousins, N-DEWs) responsibly, it is unlikely that security services in repressive states would follow suit.

Regulations have been promulgated by the DOJ to address the use of Tasers by U.S. police.³⁵ These guidelines show police how to use these weapons in such a way as to minimize subject

injury, at what stage of confrontation their use is appropriate, and what measures (both weapons and verbal tactics) they can use in lieu of Tasers.³⁶ Similarly the Department of Defense has enacted regulations to limit where and how the military may use N-DEWs, including safeguards on ADS systems to prevent operators from firing the weapon indiscriminately or for too long, and additional training to ensure that operators employ them in appropriate situations.³⁷ The Pentagon and the DOJ have been proactive in regulating the use of these weapons, but little regulation exists at the international level.

Benefits of Proactivity

Proactively seeking to establish rules for the proper use of N-DEWs and to limit their proliferation delivers a “first regulator bonus” and lets Washington continue legitimate DEW technology research and development.

- *First Regulator Bonus.* As the first state to propose significant international regulations for these weapons, the United States should take the lead in authoring relevant international law. This proactivity would allow Washington to enact a version of international law that advances American interests, enabling the United States to limit wider use of N-DEWs, while securing the right to use and develop lethal DEWs.³⁸
- *Preserving lethal DEWs.* Lethal DEWs do not pose the same threat to global civil society as N-DEWs. The United States should continue to develop lethal DEWs to enhance its own operational capacity. Taking the lead in regulating N-DEWs will allow Washington to ensure a future for lethal DEWs in the U.S. military, by including provisions safeguarding the development of these weapons. Failing to act will force Washington to accept whatever guidelines proposed by foreign nations, potentially curtailing further American development of these highly useful weapons. Alternatively, Washington may have to reject nonproliferation agreements concerning N-DEWs because they threaten the legitimate use of lethal DEWs in military operations. U.S. withdrawal would cripple the international regime by removing the support of the world’s only superpower.

In order to secure a “first regulator bonus,” Washington cannot wait for other states to take up the torch of nonproliferation. Washington’s window of opportunity will disappear, and the United States then becomes one among many voices in the debate. Under those circumstances, other nations may force the United States to choose between accepting regulations that undercut its efforts to develop lethal DEWs, or backing out of the negotiations altogether and allowing N-DEWs to proliferate. By seizing the initiative, the United States can ensure a privileged place in international negotiations and write advantageous statutes.³⁹ While N-DEWs have not yet come to prominence on the international stage, their technological simplicity will facilitate their spread, and other nations will become concerned about their use within a few years.⁴⁰ If the United States fails to act, other powerful states may seek to stall regulation, share the technology with their allies before regulations are enacted, write ineffective regulations, close the door to future revision, or include provisions hostile to the United States.⁴¹ Acting now prevents these outcomes.

Costs of Delaying

Deferring action out of a desire to preserve American power will only cause greater problems for the United States in years to come. A rollback of global democracy, even on a limited scale, only furthers the cause of anti-Western regimes and prevents illiberal regimes from becoming democratic allies.

- *Proliferation makes regulation nearly impossible.* Once N-DEWs proliferate to countries around the world, opportunities for abuse multiply.⁴² When scores of states hold a stake in these weapons, they will become less compliant and may resist attempts to introduce new international regulations.
- *Foreign-made rules interfere with legitimate technology advances.* Foreign governments could take the initiative and advance a regulatory agenda that interferes with legitimate DEW technology. Weapons without the potential for abuse, like lasers, could be outlawed by such agreements. By writing these provisions, foreign actors would force the United States into abandoning the DEW arms-control effort, reducing its scope and force. This pattern of events has unfolded before, including during the international effort to ban landmines.

Washington failed to take an early stance against the use of landmines, even after technological advances rendered those weapons obsolete for decades. With activists around the world calling for reform, the government of Canada organized and led an international convention on landmines in 1996. The Ottawa Treaty banning landmines was signed in 1997, without significant participation or approval by Washington.⁴³ To this day, the United States is not a signatory, because the treaty does not include an exemption for U.S. landmines still in South Korea.⁴⁴ China and Russia also remain outside the treaty. American proactivity could have resulted in a very different treaty, one which every major world power could have signed.

The benefits of acting early far outweigh any benefits derived from failing to act. Proactivity gives the United States the “first regulator bonus” and permits Washington to develop lethal DEWs, legitimate weapons of war. Accounting for all the costs of delaying, proactivity is the best course.

Policy Recommendations

The U.S. government’s current approach to lawfare represents tremendous missed opportunities.

– Orde F. Kittrie, 2016⁴⁵

The United States, if it adopts a proactive posture, has a variety of available options. Washington should first seek to limit the proliferation of N-DEWs. It should then regulate N-DEW usage to

combat scenarios only, outlawing their use in domestic policing. Finally, Washington should clarify the role of nonlethal weapons in general, establishing norms for their appropriate use.

Nonproliferation

The United States should strengthen its export-control regime to keep N-DEWs from developing and anti-American regimes. Repressive governments will desire N-DEWs—their low cost-per-use and high efficacy make them perfect tools for autocrats. Additionally, more powerful countries may seek to give N-DEWs to their client states, propping up allied governments and solidifying the patron-client relationship. Wealthier states already have the ability to develop this technology. Failing to act will allow developing states to do the same in quick succession.

- *The challenge: No limits on proliferation.* No meaningful restrictions on the proliferation of N-DEWs currently exist, either in international or domestic law. No comprehensive statute exists to ban the use, sale, or transfer of N-DEWs. Provisions that might be applied, like the Convention on Certain Conventional Weapons, are ignored or dismissed by states due to their reluctance to embrace new regulations, as well as the incompleteness of the current provisions. The CCW does not specifically consider N-DEWs, and many countries are not eager to broaden its scope. In the absence of public attention, these legal shortcomings will not be addressed, and proliferation will occur on a large scale.
- *Recommendation: Export controls.* Keeping N-DEWs from fragile states could be critical to preventing a rollback of democracy. Washington should first tightly control the development of DEWs to prevent corporate espionage or commercial resale of the technology to other states. At a minimum, the U.S. government should review and strengthen the requirements placed upon American corporations, prohibiting them from selling this technology to foreign countries and corporations.⁴⁶ The Department of Defense should consider classifying the sale of ADT to foreign entities as an action that does not “promote the strategic and foreign policy interests” of the United States, preventing any American company from selling the ADT to a foreign government or corporation.⁴⁷ By preventing proliferation, the United States avoids having to punish later abuses, saving time and resources. Washington should also provide incentives for great powers to refrain from giving DEW technology to client states, as those states could collapse or proliferate the technology to third parties.⁴⁸

Appropriate Use

Due to the relative simplicity of N-DEW technology, some foreign countries will acquire N-DEWs and the United States will have to respond to their use by those countries. Washington should establish international standards to limit N-DEW usage to combat only, outlawing their use for domestic policing, and punishing their abuse.

- *The challenge: Enabling use in combat.* In combat, these weapons can help militaries save civilian lives, and concerns about governmental repression abate. Militaries cannot be expected to prioritize civil rights over their own objectives, and so in combat situations, the focus shifts to saving lives while accomplishing military goals. The armed forces ought to employ N-DEWs as the most humane way of achieving their ends. All that stops N-DEWs from being fielded in combat are fears about proliferation and their negative impact on civil society. To enable the military to use N-DEWs in combat, the United States must address the potential for abuse in non-combat scenarios.
- *Recommendation: Employ in combat, ban in policing.* The United States should prohibit the use of N-DEWs in policing. These weapons will tempt many countries to use them for crowd control. But the use of N-DEWs to end domestic protest will only entrench illiberal governments. For all the reasons discussed above, public protest would become impossible without the government's consent, and the state would acquire the ability to scatter protestors at will. States already have the ability to use lethal force against protestors and refrain from doing so out of fear of backlash. The introduction of N-DEWs reduces the cost of repression, allowing states to more easily prevent displays of public discontent. The risk to global civil society outweighs any utility these weapons might have. The United States should seek an international ban on the use of N-DEWs for domestic policing.

As part of this undertaking, the United States must be willing to punish states that obtain and abuse the technology, in partnership with our international allies.⁴⁹ Smaller states will be deterred from developing these weapons if the great powers demonstrate their willingness to punish abuse. Sanctions and other diplomatic penalties should dissuade most countries from developing and abusing N-DEW technology. Establishing N-DEWs as weapons of war, not policing tools, will prevent abuse by repressive regimes.

The United States can preserve its own military capability and protect global civil society at the same time. By creating an export-control regime and establishing standards against N-DEW use in policing, Washington can allow the legitimate use of these weapons in war, while preventing their abuse by repressive regimes.

Conclusion

A little rebellion now and then is a good thing.

— Thomas Jefferson, 1787⁵⁰

The twentieth century saw the development of nonlethal weapons that could be mass-produced. Tear gas and rubber bullets led to Tasers at the turn of the new century. ADT is the most recent, most effective manifestation of the nonlethal weapons trend. As with Tasers, measuring the success of the newest nonlethal weapon in terms of “lives saved” is deeply problematic. Police became less likely to kill suspects if they used a Taser, but they also became *more* likely to use force. Lethality decreased while the use of force increased. If the United States does not guard

against the proliferation and misuse of systems like ADT, the same pattern may be seen at the international level.

Nonlethal weapons are not the *deus ex machina* they may appear to be at first sight. Their use has serious consequences for human rights and the spread of democracy. The loose restrictions surrounding their use help create an environment where their deployment is not questioned. Creating norms limiting the use of nonlethal weapons, even when directed-energy is not a component, will help to realign states' attitudes over time. Nonlethal weapons of all varieties pose serious issues, and a culture of careful consideration concerning their use should be promoted by the United States.

DEWs have the potential to change how militaries fight wars and how governments keep the peace. N-DEWs will fundamentally alter the nature of policing, permitting effective crowd control from a distance with no lasting damage to the victims. Such power in the hands of repressive regimes constitutes a threat to democratic movements around the world, particularly when that threat is so easy to acquire. The United States can avert this looming danger to global civil society and lead the international effort to regulate N-DEWs. Early action will allow Washington to both enact rules favorable to itself and protect the right of people all across the globe to petition and protest. If democracy is valued, it is worth protecting.

¹ Isaac Asimov, "My Own View," in *The Encyclopedia of Science Fiction*, ed. Robert Holdstock (London: WH Smith, 1979).

² E. Anthony Fessler, *Directed-Energy Weapons: A Juridical Analysis* (New York: Praeger Publishers, 1979), 2.

³ The USS *Ponce* fielded a solid-state laser weapon for the first time in 2014. The U.S. Army deployed a nonlethal ray gun, designed to inflict temporary pain and disperse people, in Afghanistan in 2010.

Jon Harper, "Navy Authorized to Use New Laser Weapon for Self-Defense on USS Ponce," *Stars and Stripes*, December 11, 2014, <http://www.stripes.com/news/us/navy-authorized-to-use-new-laser-weapon-for-self-defense-on-uss-ponce-1.318735>; "The Active Denial System: Obstacles and Promise," The Project on International Peace and Security, (Williamsburg, VA: The College of William and Mary, April 2013), https://www.wm.edu/offices/itpir/_documents/pips/ADS.Report.Final.6.28.2013.Printer.pdf, 7.

⁴ By the term N-DEWs, I refer to those weapons which are intended to be nonlethal, and which target people. Some DEWs do not target people at all, but rather unmanned aerial vehicles or incoming projectiles. While these weapons are not designed to kill people, I do not include them in my discussion of N-DEWs. The anti-personnel nature of these weapons is critical to an accurate consideration of their impact.

⁵ Other variants of N-DEWs target technology instead of people. These weapons act as small, directional electromagnetic pulses (EMPs), destroying all electronic components in a small area. Regimes can use this capability to deprive citizens of their access to communications and information.

⁶ Jason Ellis, "Directed Energy Weapons: Promise and Prospects," Center for a New American Security, accessed March 17, 2016, http://www.cnas.org/sites/default/files/publications-pdf/CNAS_Directed_Energy_Weapons_April-2015.pdf.

⁷ No rigorous scholarship exists to estimate a timeline for proliferation. However, it seems reasonable that developing nations could acquire or develop this version of a common technology in ten years.

⁸ If a warship carrying the chemical mixture took a direct hit from an enemy missile, the chemicals could create a secondary, toxic detonation, contributing to the damage and poisoning the crew. "Ammunition" for the laser was naturally limited to how much chemical mixture a ship could reasonably carry without risking leakage or critical destruction from accidental combustion. As a result, lasers accomplished roughly the same purpose as conventional ordnance, but came with much higher potential costs.

⁹ Laser weapons, while overtly destructive to physical structures, depend on beam cohesion to deliver damage. Refraction causes the beam to dissipate and lose all destructive properties. Consequently, the laser cannot fire through water or in severe storms. It should also be noted that the energy supply required to fire an electrical laser is quite large, and the chemicals needed to fire a chemical laser are quite expensive. Lasers also easily overheat, slowing their rate of fire and potentially damaging the laser (if overheating persists).

¹⁰ “Vigilant Eagle,” GlobalSecurity.org, accessed March 18, 2016,

<http://www.globalsecurity.org/security/systems/vigilant-eagle.htm>.

¹¹ It penetrates through walls and into the ground, so long as thick metal barriers do not impede its progress. Users can destroy electrical components and deprive their adversaries of communications.

¹² Project on International Peace and Security, “The Active Denial System: Obstacles and Promise;” David Law, “Active Denial Technology (ADT)” (presentation, DOD Non-Lethal Weapons Industry Day, Quantico, VA, June 22, 2012).

¹³ The ADS produces millimeter-wave radiation at 95 gigahertz (GHz). This frequency is far higher than conventional microwave ovens (2.45 GHz). Higher frequency radiation cannot penetrate the skin as far as lower-frequency radiation. Consequently, the 95-GHz ADS penetrates only about 1/64th of an inch of skin and damage is limited to that layer (about three sheets of paper thick). “Active Denial System FAQs,” *Department of Defense*, accessed March 18, 2016,

<http://jnlwp.defense.gov/About/FrequentlyAskedQuestions/ActiveDenialSystemFAQs.aspx>. Tests conducted by an independent medical panel found no significant risk of cancer or other disease following exposure to the ADS. “A Narrative Summary and Independent Assessment of the Active Denial System,” Applied Research Laboratory (University Park, PA: Pennsylvania State University, February 2008),

http://jnlwp.defense.gov/Portals/50/Documents/Future_Non-Lethal_Weapons/HEAP.pdf.

¹⁴ Those two guys who got second-degree burns. “Active Denial System FAQs,” Department of Defense.

¹⁵ Katie Ainsworth, “Another “Non-Lethal” Weapon: The Active Denial System,” *The Firearm Blog*, February 18, 2015, accessed March 18, 2016, <http://www.thefirearmblog.com/blog/2015/02/18/another-non-lethal-weapon-active-denial-system/>.

¹⁶ Law, “Active Denial Technology (ADT).”

¹⁷ *Ibid.*

¹⁸ Millimeter waves exist in the 30GHz – 300GHz frequency. Microwaves exist in the 0.3GHz – 300GHz range. Millimeter waves are technically a subset of microwaves, but because the two waves have very different effects on living tissue and the human body, they are treated as separate entities in the academic literature and in this paper.

¹⁹ Airport body scanners use the same millimeter-wave technology as ADT, but at a lower intensity. While airport scanners do penetrate the skin and can cause mild temperature increases, their energy flow is too little to cause the severe heating effect of the weaponized millimeter technology. However, if a country took airport scanners, equipped them with the ability to handle high power loads, and directed the waves into a beam, that country would have constructed a working version of the ADS.

²⁰ “Silent Guardian Protection System: Less-than-Lethal Directed Energy Protection,” Raytheon, 2006, accessed March 18, 2016,

[http://www.atmarine.fi/ckfinder/userfiles/files/Silent%20Guardian%20Protection%20System\(1\).pdf](http://www.atmarine.fi/ckfinder/userfiles/files/Silent%20Guardian%20Protection%20System(1).pdf).

²¹ Fessler, *Directed-Energy Weapons*, 149.

²² Steve Wright and Charles Arthur, “Targeting the pain business,” *The Guardian*, 4 October 2006, accessed March 19, 2016, <http://www.theguardian.com/technology/2006/oct/05/guardianweeklytechnologysection>.

²³ The Bofors HPM Blackout can be used to destroy all electronic devices in a small area. Governments could use it to target and eliminate computer networks, communication devices, and all weapons which depend on electronic components. Civilian resistance organizations could be neutralized without a single death or arrest. Eliminating materiel which insurrectionists need would severely limit the threat they pose to the state, propping up dictators and tyrants.

²⁴ Ellis, “Directed Energy Weapons: Promise and Prospects.”

²⁵ Mark Gunzinger and Chris Dougherty, “Changing the Game: The Promise of Directed Energy Weapons,” Center for Strategic and Budgetary Assessments (Washington, D.C.: 2012), 1.

²⁶ Steve Wright and Charles Arthur, “Targeting the pain business.”

²⁷ “Preventing Torture: an Operational Guide for National Human Rights Institutions,” a report of the United Nations High Commissioner for Human Rights,

http://www.ohchr.org/Documents/Countries/NHRI/Torture_Prevention_Guide.pdf, page v.

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- ²⁸ Millimeter waves disperse in fine mists. Theoretically, demonstrators carrying large misting fans could be able to counteract the effect of ADT. It seems unlikely that such faculties are widely available to effected populations.
- ²⁹ “Silent Guardian Protection System: Less-than-Lethal Directed Energy Protection,” Raytheon.
- ³⁰ David Koplow, *Non-Lethal Weapons*, 136.
- ³¹ It should be noted that I do not include Tasers in my definition of N-DEWs, because I take the word “directed” to mean not only “directional,” but also “at a distance.” Including Tasers would not change any aspect of the paper, but would necessitate a distinction between one-on-one applications of DEWs (roughly one police officer to one offender) and one-on-many applications (a single ADS operator controlling a whole crowd).
- ³² Charlie Mesloh, Mark Henych, and Ross Wolf, “Less Lethal Weapon Effectiveness, Use of Force, and Suspect & Officer Injuries: A Five Year Analysis,” *Department of Justice*, September 2008, <https://www.ncjrs.gov/pdffiles1/nij/grants/224081.pdf>.
- ³³ *Ibid.*
- ³⁴ *Ibid.*
- ³⁵ “Police Use of Force, Tasers and Other Less-Lethal Weapons,” Eric H. Holder, Laurie O. Robinson, and John H. Laub, *Department of Justice*, (Washington, D.C., May 2011), <https://www.ncjrs.gov/pdffiles1/nij/232215.pdf>.
- ³⁶ *Ibid.*
- ³⁷ “Non-Lethal Human Effects Fact Sheet,” Joint Non-Lethal Weapons Program (October 2011), http://jnlwp.defense.gov/Portals/50/Documents/Press_Room/Fact_Sheets/NLHE_Fact_Sheet_Oct_2011.pdf; Protocol IV to the Convention on Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effects (New York, 13 October 1995). <http://jnlwp.defense.gov/>.
- ³⁸ Orde F. Kittrie, *Lawfare: Law as a Weapon of War* (Oxford: Oxford University Press, 2016), 38.
- ³⁹ Acting first takes advantage of the institutional structure of international bodies. Quasi-legislative organizations like the United Nations feature detailed committee processes and drafting procedures. Shepherding agreements from authorship to passage is complicated under any circumstances, but the United States can simplify the process significantly by authoring the relevant legislation. Authors of resolutions have the most control over the final product and the greatest leeway in including or excluding material.
- ⁴⁰ The same problems at issue in this paper will concern great powers like France and Great Britain. While the United States takes the lead in international “policing,” the UK and France also play this role in other realms (the Commonwealth of Nations and the former French African colonies, respectively). Human rights groups, academics, and even governmental organizations will take interest in N-DEWs and their effects, and the United States will lose its ability to take the lead on this issue.
- ⁴¹ Similar tactics plagued Soviet-American negotiations over the regulation of nuclear weapons. The USSR repeatedly stalled regulatory measures until nuclear weapon technology had progressed so much that the proposed regulation became outdated and ineffective. Moscow engaged in this behavior because it had a stake in weakening regulations and giving itself the greatest control over its own nuclear arsenal. Acting before other states obtain N-DEWs will sidestep this issue. If Moscow had not developed nuclear weapons, it would have had no incentive to obstruct international efforts at regulation.
- ⁴² As more countries obtain N-DEWs, each country obviously becomes another potential abuser. Additionally, as abuse occurs and goes unpunished (due to lack of political will or more pressing international crises), other nations will feel empowered to abuse N-DEWs themselves. The effect of proliferation on abuse is therefore multiplicative.
- ⁴³ The New York Times Editorial Board, “A Plague of Land Mines,” *The New York Times*, May 8, 1996, <http://www.nytimes.com/1996/05/08/opinion/a-plague-of-land-mines.html>.
- ⁴⁴ Convention on the Prohibition of the Use, Stockpiling, Production, and Transfer of Anti-Personnel Mines and on Their Destruction, September 18, 1997, 2056 U.N.T.S. 211.
- ⁴⁵ Kittrie, *Lawfare*, 1.
- ⁴⁶ The legal ability of companies like Raytheon to distribute this technology to foreign entities should worry the United States deeply. In the judgment of this white paper, Washington should act to prevent the spread of N-DEWs to any foreign country. Even if policymakers decide not to accept the conclusions of this paper, the decision will be taken away from them entirely if they permit U.S. corporations to sell the technology at will. Restricting the ability of businesses to market ADT systems, at least in the short term, will allow the United States to grapple with the issue of N-DEWs and contemplate its best policy options going forward.
- ⁴⁷ Robert Nichols, Jade C. Totman, and Christine Minarich, “Direct Commercial Sales,” (September 2014), http://www.dcsa.mil/sites/default/files/final-fms-dcs_30_sep.pdf.
- ⁴⁸ Threats of sanctions against both the great power and its client state should diminish their perceived benefit.

⁴⁹ Both sanctions and potential limited military intervention should be imposed on transgressor states.

⁵⁰ Thomas Jefferson, *The Works of Thomas Jefferson*, (New York and London, G.P. Putnam's Sons, 1904-5).