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The Basin of the Danaides: How 3-D Printing Will Push the Limits of International Gun Control and Digital Freedom of Speech in the Twenty-first Century

*Jean-Yves Meyer**

I. INTRODUCTION

The no longer inchoate technology of 3-D printing will revolutionize the current balance of regulation involved with international arms trafficking and digital freedom of speech by greatly democratizing and decentralizing the manufacturing of arms worldwide. Specifically, individuals worldwide will no longer need to purchase weapons from established and regulated manufacturers. Rather, in the near future, interested gun owners will simply need an internet connection, a 3-D printer, and the necessary raw materials, and with a click of the mouse, a layperson can have a workable unregistered weapon without a serial number or record of its manufacture. Future attempts by international legislators to regulate this technology will prove to be ineffective, similar to efforts to prevent the illegal downloading of music or film. Moreover, any attempt to disrupt the dissemination of the source code templates for these weapons will raise new questions regarding what are the boundaries of digital freedom of speech as recognized by international law.

A. *What is 3-D Printing*

3-D printing, also known as “additive manufacturing,” is the process of creating a digital model or blueprint of a desired object using Computer-Aided Design (“CAD”) software and “printing” off the desired object.¹ The CAD permits the construction of the object by taking a series of digital layers and transcribes each layer of the object to the 3-D printer.² The desired object is created by adding continuous layers of the raw material according to the design set forth until the finished product eventually emerges within the printer.³ To better understand this unique manufacturing process, it is important to appreciate the difference between additive manufacturing and traditional manufacturing techniques. Additive manufacturing works by directly layering successive materials, whereas traditional manufacturing is done much in the same way a sculptor approaches his unfinished

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1. *A Third Industrial Revolution*, THE ECONOMIST (Apr. 21, 2012), <http://www.economist.com/node/21552901>.

2. *Id.*

3. *Id.*

medium: by cutting away material from the template. Thus, additive manufacturing uses much less material.⁴

There are different engineering methods by which each of the layers may be joined. For example, some 3-D printers use powders as the print medium. By spreading thin layers of the raw materials, such as aluminum powder, a laser can melt the powder into the desired shape through a process called laser sintering.⁵ Alternatively, an extrusion nozzle can spray extremely thin layers of thermoplastic polymers that harden immediately after extrusion.⁶ As each layer of plastic hardens, it serves as a base upon which further material can be added. Companies around the world are developing their own methods of 3-D printing unique from the methods just described using over different materials from plastic to titanium as base media.⁷ Nevertheless, additive manufacturing is the one common method of production generally incorporated by all 3-D printer manufacturers.

Although 3-D printing technology has existed in its infancy for several decades now, it was only recently that the technology began to mature. In March of 2012, individuals at the University of Technology, Vienna, created a "nano racing car" through a process called two-photon lithography.⁸ Using this 3-D printing technology, scientists were able to manufacture a car in a mere four minutes that was four times the size of a human's hair.⁹ The applications of this technology are astonishing. In June 2011, an eighty-three-year-old woman underwent surgery for a jaw transplant that doctors manufactured through the process of 3-D printing.¹⁰ The doctors manufactured the jaw implant using titanium powder fused together by heating the powder one layer at a time using a laser.¹¹ As of 2013, 3-D printers have only been able to print primary structures (not, for example, computers or iPods), but Mr. Michael Idelchik of GE Global Research believes "one day we will print an engine."¹²

Much like emerging computer and printing technology from the 1980's and

4. Jane Bird, *Exploring the 3D Printing Opportunity*, FIN. TIMES (Aug. 8, 2012, 5:39 PM), <http://www.ft.com/cms/s/0/6dc11070-d763-11e1-a378-00144feabdc0.html#axzz2Q4nnOjND>.

5. *Id.*

6. See Céline Bellehumeur et al., *Modeling of Bond Formation Between Polymer Filaments in the Fused Deposition Modeling Process*, 6 J. Manufacturing Processes 170, 170 (2004).

7. Brad Hart, *Will 3D Printing Change the World?*, FORBES (Mar. 6, 2012, 2:09 PM), <http://www.forbes.com/sites/gcaptain/2012/03/06/will-3d-printing-change-the-world>.

8. Tibi Puiu, *Nanoscale Objects Created by 3D Printer in Record Speed*, ZME SCIENCE (Mar. 12, 2012), <http://www.zmescience.com/research/technology/nano-objects-3d-printer-faster-speed-0423954>.

9. Rituparna Chatterjee, *3D Printing: The Technology Can Revolutionize Manufacturing & Healthcare Industry*, THE ECON. TIMES (Mar. 15, 2012, 4:49 AM), http://articles.economictimes.indiatimes.com/2012-03-15/news/31197145_1_body-parts-3d-scooter.

10. *Transplant Jaw Made By 3D Printer Claimed as First*, BBC (Feb. 6, 2012, 9:07 PM), <http://www.bbc.co.uk/news/technology-16907104>.

11. *Id.*

12. *Solid Print: Making Things with a 3D Printer Changes the Rules of Manufacturing*, THE ECONOMIST (Apr. 21, 2012), <http://www.economist.com/node/21552892>.

1990's, 3-D printing machines have decreased in cost and improved in performance capacity. Basic non-industrial 3-D printers can now be purchased for as little as USD \$400.¹³ Additionally, new recycling technologies have paved the way for obtaining the raw materials for production from common domestic items such as plastic water bottles or Lego bricks.¹⁴

The evolution of 3-D printing is coupled with a certain culture of direct participation in the manufacturing phase by end users. Specifically, Wikipedia-styled websites such as RepRap.org are using the GNU General Public License that guarantees the public's right to use, study, share, and modify the software.¹⁵ Thingiverse.com, another open source 3-D printing website, states that the website's purpose is to "create a community of people who create and share designs freely, so that all can benefit from them."¹⁶ As a result of this unconventional understanding of proprietary information, the doors of manufacturing are democratized with the sharing of code.

B. 3-D Printing of Small Arms and Light Weapons

This paper will focus its attention exclusively on the illicit manufacturing and trafficking of small arms and light weapons ("SALW"). SALW are man portable lethal weapons that expel or launch a projectile using the action of an explosive.¹⁷ "Small arms" are designed for personal use and include, inter alia, revolvers, assault-rifles, and rifles.¹⁸ "Light Weapons such as heavy machine guns, grenade launchers, and mortars of a caliber less than 100 millimeters "are generally designed for use by multiple persons."¹⁹

The "Wiki Weapon Project," seemingly the most notorious and discussed 3-D printing small arms project, is an effort by Defense Distributed, a non-profit based in Austin Texas, to produce "a freely-distributed open source design for a 3-D printed firearm."²⁰ To date, 3-D printing has achieved the printing of thirty round magazines for an AR-15, muzzle suppressors, and an AR-15 reinforced lower receiver.²¹ Within the United States, the only regulated part of an AR-15 weapon

13. *Printbot Jr.*, PRINTBOT, <http://printbot.com/shop/printbot-jr> (last visited Jan. 1, 2013).

14. Oliver Wainwright, *The Filabot Will Revolutionise the Home 3D-Printing Market*, THE GUARDIAN (Jan. 15, 2013), <http://www.guardian.co.uk/artanddesign/architecture-design-blog/2013/jan/15/filabot-home-3d-printing-recycle>.

15. *GNU General Public License*, GNU OPERATING SYSTEM (June 29, 2007), <http://www.gnu.org/licenses/gpl.html> (version 3).

16. *About*, THINGIVERSE, <http://www.thingiverse.com/about> (last visited Jan. 5, 2013).

17. *Rep. of the Open-Ended Working Grp. to Negotiate an Int'l Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons*, Annex, ¶ 4, U.N. Doc. A/60/88 (June 27, 2005).

18. *Id.* ¶ 4(a).

19. *Id.* ¶ 4(b).

20. Clay Dillow, *Q+A: Cody Wilson of the Wiki Weapon Project on the 3-D Printed Future of Firearms*, POPULAR SCI. (Dec. 21, 2012, 5:50 PM), <http://www.popsci.com/technology/article/2012-12/qa-cody-wilson-wiki-weapons-project-3-d-printed-future-firearms>.

21. *AR-15 Magazine—30 Round Magazine*, DEFCAD, <http://defcad.org/ar-15-magazine-30->

is the lower receiver, because it satisfies the definition of a “firearm” set forth by the Gun Control Act of 1968.²² While it is currently impossible to print off a working version of an AR-15 in its totality, one likely outcome of this technology will be a separation of production between the legal manufacturing of the rest of weapon and the illicit manufacturing of the regulated lower receiver.

For many years, gun enthusiasts and underground market participants have illicitly manufactured small arms, both domestically and internationally, in countries where the manufacture of such arms is illegal. For example, a carryover law from the British Colonial regime continues to prohibit the manufacture of SALW in Ghana.²³ Today, Ghana has a thriving illegal gun manufacturing industry in which local gunsmiths use readily available materials to produce working copies of AK-47s at a collective annual production rate of one hundred thousand weapons per year.²⁴ Within the United States “Saturday Night Specials” or “Zip Guns” are sometimes manufactured, and used, even by children, despite the often lethal consequences to the user because of catastrophic failure of materials used when fired.²⁵

The 3-D printing of SALW will further promote the illicit manufacture of arms by facilitating and democratizing the process of manufacture. 3-D printing will achieve this by doing the following: 1) removing the knowledge barrier of illicit manufacturing so that inexperienced gunsmiths are able to produce workable guns with ease; 2) reducing the burden of transport by allowing the direct manufacture of SALW in the zone of conflict as opposed to requiring the transport of weapons across state borders; and 3) improving the quality of weapons by permitting the instantaneous modification of weapons as desired.

Despite the fact that technology to 3-D print a gun like an AR-15 is still in its infancy, it is likely that the capacity of technology to manufacture a functional weapon from the comfort of one’s home is quickly approaching. Nevertheless, the extreme prevalence of weapons already available within the United States for purchase will make the effects of 3-D printing technology less disruptive domestically than elsewhere in the world. Evidence for such a claim can be found in the Bureau of Alcohol, Tobacco, and Firearms and Explosives’ (“ATF”) records. The ATF estimates that in 2010 alone almost 5.5 million firearms were

round-mag (last visited Apr. 19, 2013) (an example of one of the gun parts that can be manufactured through this website).

22. Jon Kalish, *Weapons Made With 3-D Printers Could Complicate Gun Control Laws*, NPR (Feb. 25, 2013, 3:00 PM), <http://www.npr.org/2013/02/25/172905444/weapons-made-with-3-d-printers-could-complicate-gun-control-laws>. See also 18 U.S.C. § 921 (2006) (describes that the receiver is included in the definition of a firearm).

23. David B. Kopel et al., *The Arms Trade Treaty: Zimbabwe, the Democratic Republic of the Congo, and the Prospects for Arms Embargoes on Human Rights Violators*, 114 PENN ST. L. REV. 891, 902-03 (2010).

24. *Id.* at 903.

25. Gary J. Ordog et al., *Homemade Guns*, 27 J. OF TRAUMA 646, 646 (1987).

manufactured within the United States.²⁶ Additionally, individuals who would otherwise be prohibited from purchasing a weapon within the United States (e.g. convicted felons or addicts of illegal controlled substances)²⁷ can purchase a weapon through a “straw purchase.” This creates a relatively unfertile demand for the expanded use of this technology domestically. A “straw purchase” occurs when the actual buyer of a weapon uses a “straw purchaser” to execute the purchasing form (“Form 4473”) representing that the “straw purchaser” is the actual purchaser of the weapon when this is actually not the case.²⁸ Generally, a “straw purchaser” is hired when the actual purchaser is prohibited by law from acquiring the firearm, desires to acquire a firearm, and thus engages the “straw purchaser” to misrepresent himself to the vendor as the actual purchaser.²⁹ Nonetheless, it is likely that in countries where existing gun control legislation is stringent, the effects of 3-D printing will be considerable.

II. EXISTING INTERNATIONAL LAW REGULATING SALW

There currently exist six multilateral arms trafficking agreements apposite to the regulation of SALW.³⁰ The first three discussed are non-binding whereas the second three are binding to signatory states.³¹ These six agreements will be introduced here and will be discussed in greater detail later in the paper.

A. *Multilateral Arms Trafficking Agreements*

First, the United Nations Programme of Action on Small Arms and Light Weapons³² (“U.N. Programme”) was drafted in response to concerns regarding the illicit manufacture, transfer, and circulation of small arms and light weapons.³³ It serves as an aspirational document that puts in place adequate laws and regulations to control the illicit manufacture of SALW nationally.³⁴ The U.N. Programme attempts to accomplish this goal by providing a framework of national coordination agencies and creating the means for the tracing and record keeping of

26. BUREAU OF ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, FIREARMS COMMERCE IN THE UNITED STATES: ANNUAL STATISTICAL UPDATE 2012 1 (2012), *available at* <http://www.atf.gov/files/publications/firearms/050412-firearms-commerce-in-the-us-annual-statistical-update-2012.pdf>.

27. 18 U.S.C. § 922(g) (1968).

28. BUREAU OF ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, FEDERAL FIREARMS REGULATIONS REFERENCE GUIDE 165 (2005), *available at* <http://www.atf.gov/files/publications/download/p/atf-p-5300-4.pdf>.

29. *Id.*

30. OONA A. HATHAWAY ET AL., ARMS TRAFFICKING: THE INTERNATIONAL AND DOMESTIC LEGAL FRAMEWORK 7 (2011), *available at* http://www.law.yale.edu/documents/pdf/cglc/YLSreport_armsTrafficking.pdf.

31. *Id.* at 7, 21.

32. Rep. of the U.N. Conference on the Illicit Trade in Small Arms and Light Weapons in All its Aspects, July 9-20, 2001, 7-17, U.N. Doc. A/CONF.192/15 (2001) [hereinafter U.N. Conference].

33. *Id.* at 10.

34. *Id.* at 7-17.

SALW.³⁵

Second, the United Nations Register of Conventional Arms³⁶ (“U.N. Register”) was drafted in 1991 in an effort to further the transparency of interstate arms dealings.³⁷ It serves as an interstate “confidence building” document. Specifically, its purpose is to notify other states of excessive or destabilizing arms accumulations. It accomplishes this goal by having states voluntarily report annually on the import and export of conventional weapons.³⁸

Third, the Wassenaar Arrangement³⁹ was drafted in 1996 as a successor to the Cold War era legislation, COCOM, as a transparency agreement of national export controls.⁴⁰ Specifically, every six months, members of the Arrangement exchange information on the exchange of conventional arms to non-members.⁴¹

Forth, the Inter-American Convention Against Illicit Manufacturing of and Trafficking in Firearms, Ammunitions, Explosives, and other Related Materials⁴² (“CIFTA”) was finalized in 1997 by the Organization of American States as an enforceable treaty on the trafficking of SALW.⁴³ It is the first legally binding regional agreement to specifically address the matter of arms trafficking.⁴⁴ CIFTA specifically mandates that signatory states must criminalize the illicit manufacturing of SALW.⁴⁵

Fifth, the Protocol Against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and Ammunition⁴⁶ (“Firearms Protocol”) was drafted in 2001 as an additional binding agreement to the United Nations Convention Against Transnational Organized Crime.⁴⁷ The Protocol specifically creates a legal obligation for ratifying states to combat the illicit manufacturing of SALW.

Sixth, the United Nations Security Council may issue arms embargoes, or

35. *Id.* at 10-17.

36. G.A. Res. 46/36, U.N. Doc. A/RES/46/36 (Dec. 6, 1991).

37. *Id.* § L.

38. *Id.*

39. WASSENAAR ARRANGEMENT ON EXPORT CONTROLS FOR CONVENTIONAL ARMS AND DUAL-USE GOODS AND TECHNOLOGIES I (Wassenaar Arrangement Secretariat ed., 2003), available at <http://www.wassenaar.org/publicdocuments/2012/Basic%20Documents%202012.pdf>.

40. *Id.* at 1, 3.

41. *Id.* at 12.

42. Inter-American Convention Against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and Other Related Materials, Nov. 14, 1997, 2029 U.N.T.S. 55.

43. Kierstan Lee Carlson, *Fighting Firearms with Fire in the OAS: A Critical Evaluation of the Inter-American Convention Against the Manufacturing of and Trafficking in Firearms, Ammunition, and Other Related Materials*, 25 AM. U. INT'L. L. REV. 611, 614-15 (2010).

44. *Id.* at 618.

45. *Id.* at 619.

46. G.A. Res. 55/255, U.N. Doc. A/RES/55/255 (June 8, 2001) [hereinafter Firearms Protocol].

47. Jorene Soto, *Show Me the Money, Part II: The Application of the Asset Forfeiture Provisions of the U.S. Arms Export Control Act and the RICO Act and Suggestions for the Future*, 13 OR. REV. INT'L. L. 141, 154 (2011).

sanctions,⁴⁸ (“U.N. Embargoes”) that are legally binding pursuant to Chapter VII of the Charter of the United Nations.⁴⁹ U.N. Embargoes rely on member states of the U.N. to ensure that arms are not transported to prohibited states.⁵⁰ States may be required to provide information of possible embargo violations and “name and shame” violators.⁵¹ However, arms embargoes are consistently subject to criticism as outright failures in that they do not adequately prevent the flow of arms at all.⁵²

Together, these multilateral arms trafficking agreements are the most widely used and often applied international governing laws regarding the illicit manufacture and distribution of SALW.⁵³ The next section of this paper will analyze how these agreements may apply to 3-D printed weapons and possible enforcement mechanisms of these agreements.

B. Application of Existing International Law to 3-D Printed SALW

While arms agreements differ in application pursuant to the stage of development of the weapon, this paper will focus its attention on the application of arms agreements to the point of production. Marking weapons with serial numbers and recording the number of weapons produced annually within each country is generally the most common form of regulating the point of production of SALW.⁵⁴ While not legally binding, the U.N. Programme encourages signatory states to require reliable marking that indicates the country of origin as well as provide information for national authorities to identify the manufacturer.⁵⁵ The U.N. Programme encourages states to prevent the illicit manufacture or transfer of inadequately marked SALW.⁵⁶ Also, the U.N. Programme encourages states to publicly identify people or organizations involved in the illicit manufacture of arms and take appropriate legal action against those in violation of the law.⁵⁷ Thus, it appears that the U.N. Programme is in direct conflict with the proliferation of illicit 3-D printing manufacturers. As a result, signatory parties would be required to identify the people and organizations engaged in the illicit manufacture of arms and take action against them, but there is no legal enforcement mechanism to ensure that they do so.

CIFTA, unlike the U.N. Programme, is “hard law.” There is considerable

48. See *Security Council Sanctions Committees: An Overview*, UNITED NATIONS, <http://www.un.org/sc/committees> (last visited Apr. 2, 2013).

49. DAMIEN FRUCHART ET AL., UNITED NATIONS ARMS EMBARGOES: THEIR IMPACT ON ARMS FLOWS AND TARGET BEHAVIOUR 1 (2007), available at http://pcr.uu.se/digitalAssets/112/112147_un_embargoes_071126.pdf.

50. Claudette Torbey, *The Most Egregious Arms Broker: Prosecuting Arms Embargo Violators in the International Criminal Court*, 25 WIS. INT'L. L.J. 335, 336 (2007).

51. *Id.* at 339.

52. Kopel et al., *supra* note 23, at 893.

53. HATHAWAY ET AL., *supra* note 30, at 7-9.

54. *Id.* at 10.

55. U.N. Conference, *supra* note 32, at 10.

56. *Id.*

57. *Id.*

disagreement pertaining to the best definition of “hard law” as compared to “soft law.” For the purposes of this paper, “hard law” will refer “to legally binding obligations that are precise.”⁵⁸ The United States is not a party to CIFTA.⁵⁹ Under CIFTA, state parties are required to do the following: 1) criminalize the illicit manufacturing of SALW; 2) institute domestic requirements of arms manufacturers to mark manufactured firearms; 3) confiscate illicitly manufactured SALW; 4) create licensing systems for the import, export, and transit of SALW; 5) maintain records of SALW transactions for a reasonable period of time; 6) exchange information and cooperate with other state parties; and 7) resolve conflicts through appropriate diplomatic channels.⁶⁰ Thus, CIFTA would specifically criminalize the illicit manufacturing of 3-D printed firearms and signatory states would be required to take action against their proliferation.

The Firearms Protocol is also a legally enforceable treaty to which the United States is not a party.⁶¹ The Firearms Protocol specifically criminalizes the illicit manufacturing of SALW, their components, and the illicit trafficking in firearms.⁶² Additionally, it requires the recording of legally manufactured weapons.⁶³ Consequently, signatory states will again have to address and combat the illicit manufacture of arms that will increase as a result of 3-D printing or risk being found in subversion of a legally binding international treaty.

The Wassenaar Arrangement, the U.N. Register, and the U.N. Embargoes do not specifically attempt to prevent the illicit manufacture of arms. Rather, they serve to promote transparency and good faith efforts to combat the build-up of conventional arms. Interestingly, however, previous U.N. Embargoes have called for the prevention of dissemination of “technical training or assistance related to the provision, manufacture, maintenance of . . . [SALW].”⁶⁴ Whether the dissemination of open source code by hosting the information on the web constitutes a violation of a Security Council resolution will be discussed further as a component to digital freedom of speech.

III. EXISTING UNITED STATES LAWS REGULATING THE ILLICIT MANUFACTURE AND TRAFFICKING OF SALW

While this paper is not the place to give an exhaustive account of the complex legal fabric of gun regulation in the United States, this section will attempt to briefly outline relevant law within the United States crucial to understanding how 3-D printed SALW could possibly be regulated. Starting with the most relevant and direct statute on this issue, 18 U.S.C. § 231(a)(1) states that it is a criminal act

58. Gregory C. Shaffer & Mark A. Pollack, *Hard vs. Soft Law: Alternatives, Complements, and Antagonists in International Governance*, 94 MINN. L. REV. 706, 714 (2010).

59. Carlson, *supra* note 43, at 620 n.44.

60. *Id.* at 16.

61. Soto, *supra* note 47, at 154.

62. *Id.* at 154-55.

63. Firearms Protocol, *supra* note 46, at 5.

64. *See, e.g.*, S.C. Res. 1701, ¶ 15, U.N. Doc. S/RES/1701 (Aug. 11 2006).

to “[teach] or [demonstrate] to any other person the use, application, or making of any firearm or explosive or incendiary device . . . knowing or having reason to know or intending that the same will be unlawfully employed for use in, or in furtherance of, a civil disorder.”⁶⁵

Extensive litigation involving this statute revolves around two primary matters of concern: 1) the issue of “civil disorder,” which is vague as to the degree to which a defendant must foresee or reasonably foresee his contribution to the civil disorder; and 2) the inherent conflict between 18 U.S.C. § 2, which requires a specific mens rea of intent in contributing to a committed crime, and 18 U.S.C. § 231(a)(1), which would seemingly punish reckless or negligent teachings of firearms even where no crime has been committed.⁶⁶

Next, 18 U.S.C. § 842(p) also addresses the issue of “recipe dissemination” of illicit arms by criminalizing the teaching or demonstration of the making of or use of an explosive, destructive device, or a weapon of mass destruction.⁶⁷ Destructive devices include bombs, grenades, or mines.⁶⁸ Like 18 U.S.C. § 231, 18 U.S.C. § 842 has an intent requirement that is often difficult to prove.⁶⁹

More generally, the United States Gun Control Act of 1968 (“GCA”)⁷⁰ and the National Firearms Act of 1934 (“NFA”)⁷¹ (collectively the “Acts”) are the principal acts that govern the more generalized aspects of gun control.⁷² The Acts are premised on the nearly outmoded model of centralized production and distribution of guns.⁷³ The Acts use several mutual devices to regulate the production of arms such as licensing and marking requirements, registration, and record keeping laws.

The GCA governs a wide spectrum of weapons including “destructive devices,” which it defines generally as “firearms.”⁷⁴ It specifically defines “manufacturer” “as any person engaged in the business of manufacturing firearms or ammunition for purposes of sale or distribution.”⁷⁵ Moreover, the GCA requires that anyone engaged in the commercial manufacturing, dealing in, or importing of

65. 18 U.S.C.A. § 231(a)(1) (West 1994).

66. Leslie Kendrick, Note, *A Test for Criminally Instructional Speech*, 91 VA. L. REV. 1973, 2006 (2005).

67. 18 U.S.C.A. § 842 (West 2003).

68. 18 U.S.C.A. § 921 (West 2006).

69. Liezl Irene Pangilinan, “*When a Nation is at War*”: *A Context-Dependent Theory of Free Speech for the Regulation of Weapon Recipes*, 22 CARDOZO ARTS & ENT. L.J. 683, 715 (2004).

70. Gun Control Act of 1968, Pub. L. No. 90-618 (codified as amended at 18 U.S.C. §§ 921-31 (2006)).

71. National Firearms Act, 26 U.S.C. §§ 5801-5872 (2006).

72. Franklin E. Zimring, *Firearms and Federal Law: The Gun Control Act of 1968*, 4 J. LEGAL STUD. 133, 175 (1975).

73. KEVIN J. O’NEILL, IS TECHNOLOGY OUTMODING TRADITIONAL FIREARMS REGULATION? 3-D PRINTING, STATE SECURITY, AND THE NEED FOR REGULATORY FORESIGHT IN GUN POLICY 5-6 (2012), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2186936.

74. 18 U.S.C. § 921(a)(3) (2006).

75. 18 U.S.C. § 921(a)(10).

“firearms” be licensed.⁷⁶ The GCA also bans the interstate sale of firearms to non-licensed individuals.⁷⁷

For purposes of allowing the government to trace weapons, the GCA also requires the marking of firearms with a serial number on the receiver or frame of the weapon.⁷⁸ It is unlawful to be in possession of a weapon that does not have a serial number permitting tracing of the weapon.⁷⁹ By forcing manufacturers, distributors, and retailers to keep records of firearms sales, local law enforcement as well as the ATF can trace weapons used in crimes by providing a first lead for covert operations.⁸⁰

The NFA’s original purpose was to regulate dangerous “gangster weapons” such as machine guns, silencers, and short barreled shotguns.⁸¹ Today, the NFA regulates these weapons in a variety of ways. The most comprehensive means for regulation is the creation of a national registration database by which the firearm is identified, the date of registration is recorded, and the identification and the home address of the person entitled to the firearm are recorded.⁸² Ancillary to the creation of this database of registration is the NFA’s requirement that mandates the owner of the weapon to report to the government regarding any manufacture or transfer of a weapon that fits within the definitions set forth by the NFA.⁸³ It is incumbent upon the owner of the weapon to retain proof of registration.⁸⁴ The NFA criminalizes the illicit possession, transfer, or manufacture of listed weapons in infringement of the NFA.⁸⁵

Lastly, it is worth noting that in addition to the Acts, the Undetectable Firearms Act (“UFA”) of 1988 requires that gun components: 1) generate accurate depictions in x-ray machines; and 2) activate metal detectors.⁸⁶ That being said, it is only necessary to reference the UFA due to the frequency with which it is referenced in topical literature. At the moment, there are no plastic polymers strong enough to be used in combination with a 3-D printer to make a universally plastic or undetectable weapon that can withstand the heat and pressures inherent with the use of a firearm.⁸⁷

In summary, it is clear that there already exists a comprehensive domestic and international legal structure apposite to the illicit manufacture of arms. However,

76. 18 U.S.C. § 923(a).

77. 18 U.S.C. § 922(a)(2).

78. 18 U.S.C. § 923(i).

79. 18 U.S.C. § 922(k).

80. O’NEILL, *supra* note 73, at 6-7.

81. 26 U.S.C. § 5845(a) (2013).

82. *See* 26 U.S.C. § 5841(a).

83. 27 C.F.R. §§ 479.62 (2013).

84. 26 U.S.C. § 5841(e).

85. *See* 26 U.S.C. § 5861(b)-(f).

86. 18 U.S.C.A. § 922(p).

87. Rich Brown, *You Don’t Bring a 3D Printer to a Gun Fight—Yet*, CNET (Sept. 6, 2012, 4:00 AM), http://news.cnet.com/8301-11386_3-57499326-76/you-dont-bring-a-3d-printer-to-a-gun-fight-yet.

whether or not these laws will be substantially disrupted by the development of 3-D printing technology depends on how governments can effectively regulate this technology. Inherent in the regulation of 3-D printing lies the question of where are the boundaries of digital free speech as recognized by international law. The question of digital freedom of speech is inherent to the discussion of 3-D printed weapons because one of the most effective means of controlling the distribution of 3-D printed weapons would be by controlling the distribution of its source code. Source code, however, may constitute protected speech and governments would therefore not be able to regulate the distribution of the code. The next section of this paper will analyze how governments may best address the matter of 3-D printing while still respecting the inherent right of freedom of speech.

IV. IS SOURCE CODE SPEECH?

Source code is the highly structured human readable text used to write computer programs. There are numerous programming platforms on which programmers may write code, such as Java or HTML. One of the most effective means for combatting the proliferation of 3-D manufactured SALW would be to prevent the proliferation of its source code by criminalizing its possession and distribution by unlicensed manufacturers: effectively declaring source code not protected by existing legal structures regarding freedom of speech. If source code is deemed to not satisfy the standard of what may be defined as speech, it could be treated in much the same way as the digital possession or distribution of child pornography. Therefore, a coherent analysis must be undertaken to reasonably understand how digital source code for a SALW may or may not be protected by international law.

Historically, both domestic and international charters have consistently reaffirmed the right of a people to freedom of speech. In the United States, the First Amendment commands, "Congress shall make no law . . . abridging the freedom of speech."⁸⁸ Article 10 of the European Convention of Human Rights provides that "[e]veryone has the right to freedom of expression. This right shall include freedom to hold opinions and to receive and impart information and ideas without interference by public authority and regardless of frontiers."⁸⁹ Even Article 19 of the United Nations' Universal Declaration of Human Rights reaffirms that "[e]veryone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers."⁹⁰ After analyzing these documents it is clear that there exists a general international legal presumption for the protection of free speech. The question then becomes:

88. U.S. CONST. amend. I.

89. Convention for the Protection of Human Rights and Fundamental Freedoms art. 10, Nov. 4, 1950, 213 U.N.T.S 221.

90. Universal Declaration of Human Rights, G.A. Res. 217 (III) A, U.N. Doc. A/Res/217(III) (Dec. 10, 1948).

how is "speech" best defined as germane to whether source code is encapsulated and thus protected by these documents.

Fortunately, relevant United States Supreme Court jurisprudence exists that defines "speech." Specifically, the Court ruled that "symbolic" conduct, in which "speech" and "nonspeech" elements are combined in the same course of conduct, "must be evaluated according to a balancing test."⁹¹ This duality is relevant because of the inherent similarities to source code's own duality between "expression" and "function." For "symbolic" conduct to weigh in favor of protected "speech," it must be "sufficiently imbued with elements of communication" to merit constitutional protection.⁹² In plainer terms, if the source code simply instructs a machine to produce an outcome, then it is likely not sufficiently "expressive" so as to satisfy the standard for protection under the First Amendment.⁹³ However, if the source code ends up having some direct interaction with the programmer, in that it discretely conveys a programming concept, then it may satisfy the standard required for protection as freedom of speech. Applying this standard of review, however, produces a variety of legal conclusions as to how source code should actually be classified.

In the earliest case regarding this issue, *Bernstein v. United States Department of Justice*, the Ninth Circuit Court of Appeals rejected the government's argument that source code is uniquely functional and therefore protected by the First Amendment.⁹⁴ Additionally, in *Junger v. Daley*, the Sixth Circuit Court of Appeals overruled the lower court's decision and held that "[b]ecause computer source code is expressive means for exchange of information and ideas about computer programming, it is protected by the First Amendment."⁹⁵ Alternatively, in *Karn v. United States Department of State*, the District of Columbia District Court did not specifically address whether source code is protected under the First Amendment, but simply noted it is "merely a means of commanding a computer to perform a function."⁹⁶ In all three cases, the plaintiffs argued that the source code was protected free speech, and in all three cases the courts proffered different conclusions. Therefore, it is clear that the American jurisprudence on this matter is not settled.

Internationally, case law determining whether source code is protected free speech has similarly emerged. In 1999, a 15-year-old Norwegian boy, Jon Johansen, reverse engineered a licensed DVD player and released a software

91. *United States v. O'Brien*, 391 U.S. 367, 376 (1968).

92. *Spence v. Washington*, 418 U.S. 405, 409 (1974).

93. Recent Case, *Constitutional Law—Free Speech Clause—Sixth Circuit Classifies Computer Source Code as Protected Speech*.—*Junger v. Daley*, 209 F.3d 481 (6th Cir. 2000), 114 HARV. L. REV. 1813, 1817 (2001).

94. *Bernstein v. U.S. Dep't of Justice*, 176 F.3d 1132, 1141-42 (9th Cir. 1999) *reh'g granted, opinion withdrawn*, 192 F.3d 1308 (9th Cir. 1999).

95. *Junger v. Daley*, 209 F.3d 481, 485 (6th Cir. 2000).

96. *Karn v. U.S. Dep't of State*, 925 F. Supp. 1, 9 n.19 (D.D.C. 1996).

program titled “DeCSS.”⁹⁷ DeCSS unlocked the Digital Rights Management (“DRM”) on DVDs, thus allowing Linux computers previously incapable of playing DVDs (because they did not have either Apple or Microsoft Windows operating systems) to now play these DVDs.⁹⁸ When the motion picture industry became aware of the presence of DeCSS online, it sent cease and desist letters to the website operators publishing the software.⁹⁹ Eventually, the Norwegian Economic and Environmental Crime Unit (“ØKOKRIM”) brought suit against Jon Johansen at the behest of the Motion Picture Association of America (“MPAA”).¹⁰⁰ Ultimately, the Norwegian court dropped the suit, but it is a worthwhile case to note because of the precedent it set indicating that mere publication of undesirable open source code could merit criminal procedure. Moreover, while the MPAA and the Norwegian Crime Unit both brought suit against a handful of parties, the criminal proceedings did little or nothing to prevent future enlargement of the software’s publication, and it continued to spread like “wildfire.”¹⁰¹

Determining whether source code represents protected speech requires a complex analysis. Currently it is impossible to determine with certainty how future domestic and international courts will rule on this matter. It is likely, however, that the paradigm of governments arguing that source code is not protected speech versus private citizens continuing to expand the boundaries of what is protected in the digital realm will continue. In the words of Professor Jean L. Camp at Harvard’s Kennedy School of Government, there is a strong public policy argument that “[s]ource code is speech which empowers the individual against possible errors or abuses of governance at the state and Federal level.”¹⁰² In any event, even if future courts do determine that source code is protected speech, further analysis must be made as to how the publication of SALW schematic source code is likely to be regulated.

V. COULD SALW SOURCE CODE BE CLASSIFIED AS CRIME-INDUCING SPEECH?

The doctrine of “aiding and abetting” has long since been classified and criminalized both in the United States and in Europe as criminally instructional speech and thus protected by neither the First Amendment nor Article 10 of the European Convention of Human Rights.¹⁰³ In the United States, 18 U.S.C. § 2

97. Amy E. McCall, *The DMCA and Researchers’ First Amendment Rights*, 3 U. PITT. J. TECH. L. & POL’Y 1, 6 (2002).

98. *Id.*

99. *Id.* at 7.

100. Gabriella Coleman, *Code Is Speech: Legal Tinkering, Expertise, and Protest Among Free and Open Source Software Developers*, 24 CULTURAL ANTHROPOLOGY 420, 436 (2009), available at <http://steinhardt.nyu.edu/scmsAdmin/uploads/005/984/Coleman-Code-is-Speech.pdf>.

101. *Id.*

102. Jean Camp & K. Lewis, *Code as Speech: A Discussion of Bernstein v. USDOJ, Karn v. USDOJ, and Junger v. Daley in Light of the U.S. Supreme Court’s Shift to Federalism*, 3 ETHICS & INFO. TECH. 21, 27 (2001).

103. Kendrick, *supra* note 66, at 1974.

establishes that “[w]hoever willfully causes an act to be done which if directly performed by him or another would be an offense against the United States, is punishable as a principal.”¹⁰⁴

The generally understood basis for such criminalization is centered upon the principle that such speech should more accurately be considered action rather than speech.¹⁰⁵ Justice Hugo Black eloquently expressed this distinction in *Giboney v. Empire Storage & Ice Co.*, stating: “[i]t rarely has been suggested that the constitutional freedom for speech and press extends its immunity to speech or writing used as an integral part of conduct in violation of a valid criminal statute. We reject the contention now.”¹⁰⁶ Nevertheless, there are a variety of cases instructive in how to best classify and understand the likely category of 3-D printing, though the potential conclusions vary greatly between domestic and international courts. The following cases should be considered an overview of how courts have dealt with this matter in the past. This section is divided into a section on international case law pertaining to criminalized speech and a section on United States law pertaining to criminalized speech.

A. *International Case Law Pertaining to Criminalized Speech*

First, in the case decided by the European Court of Human Rights, *Jerslid v. Denmark*, the Court adjudicated the matter of a journalist who disseminated the racist remarks of a xenophobic group of young people who went by the name the “greenjackets.”¹⁰⁷ The Court ruled that national authorities were permitted to interfere with the enjoyment of an individual’s right of freedom of expression only when it is “necessary in a democratic society.”¹⁰⁸ The Court established that it would look at the interference complained of in light of the case as a whole and determine whether the reasons argued by the national authorities to justify the censorship were relevant and sufficient and whether the means employed were proportionate to the legitimate aim pursued.¹⁰⁹

In this case, the Court determined that the mere publication of racist remarks, not for the purposes of promoting racism, was protected speech in that it did not sufficiently interfere with a democratic society.¹¹⁰ Thus, the Court established a balancing test in determining whether certain speech is protected or not under Article 10. If the speech outweighs the interest of the state in promoting freedom of speech by its harm to a democratic society, then it appears the European Court is willing to censor that speech and punish the individual responsible.

The European Court of Human Rights further elaborated upon the meaning of

104. 18 U.S.C. § 2(a) (2000).

105. See *Giboney v. Empire Storage & Ice Co.*, 336 U.S. 490, 498 (1949).

106. *Id.*

107. *Jersild v. Denmark*, 298 Eur. Ct. H.R. (ser. A) at 10 (1995).

108. *Id.* at 20.

109. *Id.* at 23-24.

110. *Id.* at 24-26.

“necessary in democratic society” in the case of *Vejdeland and others v. Sweden*.¹¹¹ In this case the Court explained that the standard for evaluation requires the Court to determine whether there exists a “pressing social need” for the restriction of free speech.¹¹² Moreover, while the states have a “margin of appreciation” in determining whether such a need exists, there definitively exists “European supervision” to give a final ruling of whether a restriction of speech is permissible.¹¹³ When “European supervision” is invoked, the Court evaluates whether the interference at issue was “‘proportionate’ to the legitimate [social] aim pursued and whether the reasons adduced by them to justify the interference are ‘relevant and sufficient.’”¹¹⁴ The Court iterated that the freedom of expression or ideas is applicable not only to ideas that are favorably received by the public, but those expressions or ideas that “offend, shock, or disturb.”¹¹⁵

Lastly, in determining whether an individual’s claim of a violation of Article 10 constitutes an unnecessary restriction, the person must have exercised his right in a manner consistent with democratic principles.¹¹⁶ The person must act in good faith as to the legitimacy of his statements and have voiced them in a way that was compatible with democratic aims and be supported by the facts of the case.¹¹⁷

B. *American Cases Pertaining to Criminalized Speech*

In the landmark United States Supreme Court case, *Brandenburg v. Ohio*, the Court established the important disambiguation of “mere advocacy” from “incitement to imminent lawless action.”¹¹⁸ In this case, the Court ruled that the Ohio Criminal Syndicalism Act by its own words purported to criminalize mere advocacy and therefore was unconstitutional.¹¹⁹ This case is important in any analysis of crime-inducing speech in that it establishes the “Brandenburg Test” to examine whether law protects the speech. The Brandenburg test turns on three essential elements of analysis: intent, imminence, and likelihood.¹²⁰ In effect, the Brandenburg Test establishes the following principle:

[T]he constitutional guarantees of free speech and free press do not permit a State to forbid or proscribe advocacy of the use of force or of law violation except where such advocacy is directed to inciting or producing imminent lawless action and is likely to incite or produce

111. *Vejdeland and Others v. Sweden*, App. No. 1813/07, ¶ 15 (Eur. Ct. H.R., May 9, 2012), <http://hudoc.echr.coe.int/sites/eng/pages/search.aspx?i=001-109046>.

112. *Id.* ¶ 51.

113. *Id.*

114. *Id.* ¶ 52.

115. *Id.* ¶ 53.

116. *Thorgeir Thorgeirson v. Iceland*, 239 Eur. Ct. H.R. (ser. A) at 26 (1992).

117. *Id.*

118. *Brandenburg v. Ohio*, 395 U.S. 444, 448-49 (1969).

119. *Id.* at 449.

120. *Id.* at 447.

such action.¹²¹

Rice v. Paladin Enterprises is also a particularly instructive case in the analysis of whether the source code of SALW may constitute protected speech under the First Amendment.¹²² In this case, the plaintiff brought suit against a publishing company in a wrongful death action for two books, one titled *Hit Man: A Technical Manual for Independent Contractors* and the other titled *How To Make a Disposable Silencer, Vol. II*.¹²³ Using these books as instruction manuals, an individual named James Perry murdered three people under a contract by following the instructions of the book in great detail.¹²⁴ The plaintiffs thus alleged that by publishing the instruction manuals on how to murder, the defendant had "aided and abetted" in the murders.¹²⁵ In its analysis, the District Court identified five categories of constitutionally unprotected speech: obscenity, fighting words, libel, commercial speech, and incitement to imminent lawless activity under the Brandenburg Test.¹²⁶ The District Court disregarded the first four potential categories of unprotected speech as irrelevant to the case and analyzed whether the book satisfied the Brandenburg Test.

The District Court found that a book published in 1983 and purchased and read in 1992 could not satisfy the "imminence test" as established by Brandenburg for a murder that occurred in 1993.¹²⁷ As a result, the District Court granted summary judgment.¹²⁸ However, on appeal, Judge Michael Luttig of the Fourth Circuit refused to conduct his analysis as established by the previous jurisprudence under the Brandenburg Test and instead chose to evaluate whether the book was protected under the First Amendment by means of the traditional "speech-act paradigm" used to criminalize aiding and abetting.¹²⁹ In his conclusion, he explained that the book "constitute[d] the archetypal example of [unprotected] speech . . . because it methodically and comprehensively prepare[d] and st[ole] its audience to specific criminal conduct . . . [thus the speech] finds no preserve in the First Amendment."¹³⁰

Lastly, in *United States v. Featherston*, the Fifth Circuit upheld an appeal challenging the conviction of the defendants for teaching the making of explosives in violation of 18 U.S.C.A. § 231(a)(1).¹³¹ This statute criminalizes the actions of "[w]hoever teaches or demonstrates to any other person the use, application, or

121. *Id.*

122. *Rice v. Paladin Enters., Inc.*, 940 F. Supp. 836, 840-41 (D. Md. 1996), *rev'd*, 128 F.3d 233 (4th Cir. 1997).

123. *Id.* at 838.

124. *Id.* at 839.

125. *Id.* at 838.

126. *Id.* at 841.

127. *Id.* at 847.

128. *Id.* at 849.

129. *Rice v. Paladin Enters., Inc.*, 128 F.3d 233, 263 (4th Cir. 1997); Kendrick, *supra* note 66, at 2001.

130. *Rice*, 128 F.3d at 256.

131. *U.S. v. Featherston*, 461 F.2d 1119, 1121-22 (5th Cir. 1972).

making of any firearm or explosive . . . knowing or having reason to know or intending that the same will be unlawfully employed for use in, or in furtherance of, a civil disorder.”¹³² The appellants argued that the statute was excessively broad with its language, “knowing or having reason to know,” and thus unconstitutional.¹³³ The Court ruled that the statute does not cover mere inadvertent conduct; rather, the statute requires that the accused party have acted with the necessary intent or knowledge that the information would be used in furtherance of civil disorder.¹³⁴ Consequently, the statute on its face is not unconstitutional.¹³⁵ The Court simply established that the jury must be instructed that in order to convict the defendant, they must find that at the time and place in question, the defendants knew and intended the incendiary devices to be unlawfully employed for use in, or in furtherance of, a civil disorder.¹³⁶

VI. CONCLUSIONS

It appears that the technology of 3-D printing is likely to lead the twenty-first century into another highly transformative century in which the role of governments, the right of the people to bear arms, and the boundaries of free speech will all be called deeply into further question. How exactly this will all turn out is impossible to say, nevertheless, certain conclusions do seem particularly likely.

First, SALW are bound to become more accessible and widespread in countries where strict gun control is in place. For example, in countries like Mexico, which has a population of 105 million and only 4,300 people who carry licenses to possess a weapon, it is likely 3-D printed weapons will become more accessible to the common citizen not involved with the cartels or army, but, who nevertheless desire to have a weapon.¹³⁷ Ancillary to the direct manufacture of arms in a person’s home, it is also probable that this will place negative pressure on the illicit trafficking of SALW from the United States, the place of origin of eighty-seven percent of the firearms seized by Mexican officials, to Mexico.¹³⁸ It appears unlikely that the technology of 3-D printing weapons will have much of a destabilizing domestic effect within the United States due to the existing mature market for firearms and the ease with which those who would otherwise be prohibited from obtaining a firearm may acquire one cheaply and illicitly via

132. 18 U.S.C.A. § 231(a)(1) (West 1994).

133. *Featherston*, 461 F.2d at 1121.

134. *Id.* at 1122.

135. *Id.* at 1121.

136. *Id.* at 1122.

137. David B. Kopel, *Mexico’s Federal Law of Firearms and Explosives* 6 (Univ. of Denver Sturm Coll. of Law Legal Research Paper Series, Working Paper No. 10-12, 2010), available at http://papers.ssm.com/sol3/papers.cfm?abstract_id=1588296.

138. U.S. GOV’T ACCOUNTABILITY OFFICE, FIREARMS TRAFFICKING: U.S. EFFORTS TO COMBAT ARMS TRAFFICKING TO MEXICO FACE PLANNING AND COORDINATION CHALLENGES 3 (2009), available at <http://www.gao.gov/assets/300/291223.pdf>.

“straw purchases.”

Second, because the prospects of directly manufacturing a weapon in a person's home is likely to destabilize and decentralize the established channels of production, it is unclear how those who currently benefit from the status quo of gun manufacturing, the established gun industry, will react. To date there have been no official statements made by the National Rifle Association (“NRA”) regarding 3-D printing weapons. However, it is not difficult to foresee a strong conflict of interest between the fiduciary obligation of the gun manufacturing industry to share-holders and the promotion of the NRA's own mission statement to “foster the Second Amendment rights of all law-abiding Americans.”¹³⁹ Because of the strong financial ties between the NRA and the gun industry, and because of the strong financial stress that could result from the widespread distribution of 3-D printed weapons, one can reasonably conclude that the existing gun lobbying organizations will not come to the legislative aid of those working to expand the technology of 3-D printed weapons.

Third, there will be continued and extensive litigation in the matter of whether source code is constitutionally protected free speech under the First Amendment and Article 10 of the European Convention of Human Rights until the highest courts establish a coherent rule on the matter. If source code is protected speech, then there is seemingly not much that governments could do to combat the illicit manufacture of SALW other than punish manufacturers, owners, and distributors of SALW. Regulation would thus be forced to combat the manufacture of these weapons in much the same way as regulation is pursued by governments with the manufacturers, owners, and distributors of child pornography and illicit drugs. Unfortunately for those who desire increased gun control, it is likely such efforts would similarly fail.

Fourth, in the event that source code is determined by international courts not to constitute protected speech, then the question is raised whether the example discussed in this paper of DeCSS's “wildfire-like” dissemination would be prophetic of future attempts to prohibit the distribution of software. While it is impossible to answer definitively, it is certainly reasonable to presume that prophylactic attempts to regulate the distribution of source code will also be equally ineffective in reducing the illicit manufacture of SALW.

Together, these conclusions suggest that irrespective of future government regulation, the development of 3-D printing is going to have considerable consequences in redefining how individuals worldwide are able to obtain weapons, how governments will be able to remain relevant in regulating of the actions of their citizens, and how reactionary governmental controls will further come in conflict with technological development. Harmonization of international firearms law with the evolving technology of 3-D printing manufacturing is necessary to provide continued effective gun control measures in the twenty-first century.

139. *Mission Statement*, NAT'L RIFLE ASS'N FOUND., <http://www.nrafoundation.org/mission-statement.aspx> (last visited July 15, 2013).

However, there is likely no single law or regulatory mechanism that can be introduced to solve the issue. Any genuine attempts to effectively regulate this technology are likely to be particularly complex and difficult. Therefore, work in developing and researching appropriate responses should begin immediately if governments genuinely desire continued gun control in the future.



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