

Greetings Senators, my name is Blake Bryant. I am a scholarly college student and an advocate for Second Amendment rights. I am contacting you all regarding SB978, for I view the amendments to the bill as a wholesale attack on law abiding concealed carry holders, hunters, hobbyist gun builders, citizens in rural communities, and Oregonians more broadly. For starters, increasing the fees for concealed carry permits creates a large financial burden for lower income individuals who wish to carry a handgun for self-defense, effectively limiting their RIGHT to defense because of their economic positions. This concern, alone, runs contrary to the mainstream Democratic talking point: we are the party that fights for the poor and less fortunate. Moreover, the main point of having a firearm in the home is for the lawful purpose of defense. So why would the state penalize a single mother, father, or other person wishing to have quick access to their firearm, a practical means of self-preservation when an intruder busts through the door. Do any of you honestly think that a criminal who would, for example, break into a young woman's college dorm allow her to unlock her gun and ammo, load, and discharge her weapon? Of course not. However, it seems that, with all due respect, a significant amount of Democrats know very little about firearms and self-defense, valuing a false perception, or feeling, of safety somehow guaranteed by the government's growing monopoly on personal defense. Should the government force the people to outsource their own personal safety to the government? No way! Why? Well, the government is clunky, ineffective, and has done very little in the way of preventing major mass shootings, gang killings, or smaller lethal skirmishes. Just remember, when seconds matter the most, the police are only minutes away. Respectfully, I am truly ashamed to be in a state with so many who choose to ignore the basic notion of individual freedom with regard to defense, a deeply ingrained part of the American identity, while conveniently ignoring FBI criminal statistics clearly showing that lethal engagement distances average 10 yards or less. There are solutions to our problems, but passing an unpopular bill that could make EVERY firearm owner a felon and endanger the lives of thousands is not the answer. Democrats have a super majority and very few, especially behind closed doors, like the Second Amendment. Therefore, I beg you, on behalf of nearly all gun owners in the state, to vote no on SB978 in its entirety. For additional information supporting my position, I have included a thesis paper I just recently wrote arguing the validity of 3D-printed weapons regulations. My writing professor, who is anti-gun, admitted that it was one of the best works he has seen in all his years of teaching, balancing opposing arguments with critical analysis. I hope that you all have an opportunity to read it and reconsider if SB978 will have any meaningful real-world impact. Remember, I am a proud, law abiding, American gun owner... I am not the enemy, so let us work together in stopping the real ones.

Sincerely,

Blake Bryant

Blake Bryant

Professor Owen

WR121

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3D Printed Weapons: The Overblown Novelty

Albert Einstein, arguably the most important figure in physics during the 20th century, once said “I know not what weapons World War III will be fought, but World War IV will be fought with sticks and stones”. This famous line was Einstein’s response to the effects of nuclear weapons. Enriched Uranium, in Einstein’s view, was a key ingredient in the creation of weapons with the power to *decimate* entire cities. Ironically, the same key ingredient used to make nuclear warheads, thanks to advances in nuclear physics and technology, can also be utilized as a zero-emission fuel source to *power* a city. With the increasing pace of 3D printer development over the last five years, a line of rational similar to the use of Uranium is applied by many to the private operation and development of rapid fabrication technologies. In this line of thought, one could leverage 3D printing to construct a functional prosthetic for a disabled child or, potentially, print an untraceable weapon with the intention of engaging in criminal activities. This binary form of thinking, pitting a technology’s capacity for good and evil against one another, has been central to sparking fear-based responses among proponents of sweeping gun control with regards to 3D printed weapons. In this community, the reality of 3D printed weapons, a reflection of advancements in manufacturing moving the means of production from large corporations to individuals, is now an intense topic of debate over the future of America’s rich 270 year history of private firearm manufacturing and ownership. The conversation surrounding printed firearms

has only amplified amidst increasing media coverage on the subject, with scholars, lawyers, parents, bloggers, and average citizens weighing in on the debate. With the future of America's gun culture and rapid prototyping industries at stake, the outcome of the debate on the regulation of 3D printed weapons will, arguably, set some of the most significant legal precedence for decades to come. Regardless of which political faction the outcome benefits, there will be an enormous impact on the manner in which the individual, and their liberties, are oriented in relation to the government. However, the enactment of legislation regulating 3D printed firearms would be ill-founded and irresponsible because the regulations being proposed are predicated on the false belief that 3D-printed weapons pose a serious threat to society, instead serving as a superfluous addition to existing laws already dealing with the legality of firearm assembly/ownership that would violate multiple constitutional amendments.

First, before diving into the subject matter, it is important to provide background information on the debate itself, how it started, and define several key terms that are crucial to fully appreciating the criticism of 3D printed weapons regulations. To begin, 3D printing, part of a large family of rapid fabrication technologies, is referred to as an "additive manufacturing" process (Jacobs and Haberman 6), meaning that a material like a thermoplastic is pushed through a heated metal extruder and laid down by the fabrication device in extremely small layers, usually less than several hundred micrometers in height, until the desired part is completed. The fabrication process is made possible through a stereolithography or computer-aided design file, or STL/CAD. The file serves as the digital blueprint for a real object, providing the information necessary for a conventional 3D printer to replicate or build parts with a relatively high degree of accuracy. This is important to clarify, because in the context of 3D printed weapons, STL/CAD files enable an individual to print a complete firearm, or firearm component. However, the idea

of blending firearms with 3D models did not gain significant traction until 2013 when Cody Wilson, a libertarian activist, fired the world's first fully 3D printed gun, coined "the Liberator" (Jacobs and Haberman 1). Posting his initial testfire to youtube the next day, Wilson proceeded to upload the blueprints for the gun online, along with schematics for rifle receivers and handgun frames, which were blocked by the U.S. State Department (Lopez 6). Wilson's online video showcasing the Liberator, and the possibilities of 3D printing tech by extension, truly marked the ignition period for the modern controversy surrounding printed weapons, what some refer to as a "ghost gun". The term "ghost gun" is often used to describe these printed DIY guns since they are constructed by private citizens and therefore "have no serial number", rendering the gun untraceable to law enforcement (Willis 2). Moreover, Wilson touts his gun files as "open-source", meaning, in his ideal situation, anyone can have access to firearm blueprints free of charge with no copyright or proprietary licensing fees required for use, courtesy of the internet (Wilson 16). It would also be worthwhile briefly mentioning proposed, and actual, regulations that deal with some aspect of 3D printed weapons, all of which will be covered in more detail later. The first regulation is a bill passed by the state of California, which went into effect in 2018, that addresses "ghost guns" by mandating that a state-issued serial number be placed on any self-made firearms (Jacobs and Haberman 5). Another piece of legislation, originating from the state of New Jersey that passed in 2018 as well, makes it illegal to 3D print a firearm or possess the STL files that would enable the printing process (Delorenzo 1). The most common proposal for future regulation includes the legal requirement of addition software that ships with consumer printers to detect STL files modeled after firearm components and prevent them being printed (Curtis 11). Please note that the previous explanation of 3D printing is referencing fused deposition modeling, or FDM, because it is currently the most popular printing method among

consumers, and will therefore be the focus of our breakdown. Understanding the aforementioned terms will help in comprehending the logical fallacies of experts, academics, and journalists arguing that 3D printed weapons will have deadly consequences for society.

Upon closer analysis of 3D printing's capabilities, it is clear that the weapons it could potentially yield are of no significant threat to the welfare of the general public. A major problem with current printing tech has to do with physical inconsistencies, such as peeling and separation between the layers of material, that would render a potential firearm component woefully unable of withstanding any of the typical stresses associated with the discharging of a gun. Jacobs and Haberman, lawyers who specialize in contemporary law, state that polymer guns "cannot withstand the explosion produced when the primer is ignited by the firing pin striking the cartridge" (4) leading to the logical conclusion that 3D printed guns will likely suffer from extensive quality control issues, making them vastly inferior to conventionally manufactured metal guns. This inconsistency in printing is exemplified by Wilson's Liberator, capable of surviving only a single shot, unlike modern semi-automatic handguns, before shattering. Moreover, John Willis, the author of "Are 3D Guns A Credible Threat", highlights additional issues with current printing tech such as cost, production time, and level of expertise required for use: "USA Today [...] noted that printers that produce guns can cost [anywhere] from \$5000-\$6000" and "the process of printing the gun can take up to 35 hours", requiring "a variety of software and technical knowledge" (4). By pointing out the hassle of utilizing 3D printing as a means of production, Willis shows that the technology is still somewhat trivial and inherently self-limiting in its use cases, which leads to another problem with printing: dimensional accuracy. According to Ben Redwood, a writer for 3D Hubs, "variations in temperature across the build platform" can lead to "different areas of the part cool[ing] at different rates" and cause

the print to deform, warp, and shrink (3). The risk of losing dimensional accuracy, a constant concern in the 3D printing community at large, can result in complex multi-part devices, such as guns, from functioning whatsoever. To finally dispel of any lingering fear regarding 3D printed weapons, consider that 3D printing itself is still very much a niche, as suggested by Business News Daily writer Andreas Rivera. Rivera states that “the industry is in a lull on the consumer side” and “home 3D printers have primarily been purchased by enthusiasts” (1), contradicting the ridiculous mental image that media outlets often create: large sums of people printing AR15s in dimly lit garages for the zombie apocalypse. Despite disagreement in other areas, notice that those debating on the threat credibility of 3D printed weapons have converged on a noteworthy conclusion. With printing technology in its youth, and so long as flimsy thermoplastics are the main manufacturing material, it is still more economical and convenient for criminals to buy conventionally manufactured guns through black market channels rather than construct a plastic weapon themselves (Koslow 3). After all, conventional guns are built to a higher quality standard than their 3D printed cousins and argo less susceptible to failure. However, it is understandable that some may raise objections to the easy access that 3D printing could potentially provide to a skilled individual with criminal intent.

Those who raise objections to the intellection that 3D printed weapons are not a credible threat cite that, even if it is difficult to print, completely untraceable firearms akin the aforementioned “ghost gun” could be constructed by tech savvy individuals for use in a criminal act. To fully address the point being raised, it is only fair to start off by conceding that, in a situation where a criminal had access to the best 3D printer and materials available, he or she could in fact make a *firearm* that is untraceable to law enforcement. However, notice the specific use of the term “firearm” in the above concession; it is a legal term that is defined, under the

National Firearms Act of 1934, as “the frame or receiver of any such weapon” that is “designed to or may readily be converted to expel a projectile by the action of an explosive” (Cornell Law School 3). The definition of a “firearm” is crucial to the objection because the “receiver”, the core component of the gun that stores the firing mechanisms, is the part that individuals are 3D printing a majority of the time, think the polymer pistol frame of the popular Glock 19 handgun. Since the receiver is the portion of the gun serialized by the government, anyone who can print or make their own receiver will, therefore, have a “ghost gun” of their own. However, assuming that a prospective ghost gun builder is reasonably intelligent, he or she will understand the fatal repercussions of 3D printing components such as the barrel, slide, recoil spring, and firing pin, all of which are stressed by the explosive forces of a bullet exiting a gun. Instead, a criminal would, logically, elect to buy these key components separately. Nonetheless, there is a caveat: the key components listed above are quite expensive and, according to the article “How to Build a Glock at Home - No Serial Number, No Registration”, will cost around 830 dollars, minus the frame, to complete a typical Glock 19 (Cleckner 11). Clearly, the cost in combination with the time, mentioned previously, to 3D print a sturdy and dimensionally accurate firearm receiver would serve as a serious economic and logistical deterrent, forcing a criminal to contemplate black market alternatives to avoid this tedious process. In the Forbes article “Inside the Black Market for Guns”, Agent Mulham of the Bureau of Alcohol, Tobacco, and Firearms, states that, due to the proliferation of small arms, “the black-market price [for a handgun] is typically just a few hundred dollars more than retail” (Minitier 6). Considering that a brand new Glock 19 is priced, at the time of writing this essay, around 500 dollars on the Glockstore’s retail site, a black market gun would likely hover in the 700 dollar range, making them significantly cheaper than their DIY counterparts. To put the objection to rest, the creation of firearms by private citizens

has existed in the United States for decades through several laws that permit the assembly of guns via the use of “80% frame[s]” (Jacobs and Haberman 74), which are unfinished and, therefore unregulated, firearm lower receivers that are milled out to completion by an individual, resulting in a function firearm. 3D printing, therefore, is not a new phenomenon that is now enabling people to build ghost guns. Furthermore, the objection is self-nullifying because it ignores the likelihood that individuals capable of successfully printing and assembling a weapon are relatively intelligent, so it would make sense that an intelligent individual would seek to obtain a cheaper, yet more reliable, conventional weapon through, for example, the dark web, rather than wasting time, money, and labor to construct a potentially faulty device. The author of the article “Yes, Anyone Can Print a Gun at Home. But Not a Very Good One”, Elaine Ou, rightly points out that “there’s a reason we haven’t seen an uptick in the number of crimes committed using 3D-printed firearms since the Liberator plans became public five years ago: It’s not actually that convenient” (5). It would be much more reasonable for the masses to panic over conventional black market guns with defaced serial numbers instead of a techie engaging in the niche hobby of printing a gun for a Youtube video. In spite of their passionate responses, critics of 3D printed weapons fail to note the shortcomings of their legislative proposals.

Printing firearms, albeit controversial, is a legal activity in nearly all 50 states; legislation that attempts to limit the creation of DIY weapons either neglects existing legal controls on the practice or further convolutes firearm related regulations. As of 2019, current legislative efforts seeking to control particular aspects of 3D printed weapons have produced bills with language that would enact a total ban on the private printing of guns, make it illegal for felons to possess/create 3D printed guns, and/or impose lengthy prison sentences for felons caught with a 3D printed gun while committing a crime (Moss 4). However, these bills are an unnecessary

expenditure of government resources, for vast swaths of the perceived problems proponents of gun control attribute to 3D printing, such as who should be allowed to print them, have already been addressed, in some fashion, with laws already on the books. Under existing federal law governing gunsmithing, the assembly or manufacturing of a firearm is completely legal, thanks to a decades-old piece of legislation that set the foundation for modern Gun Control in America: the Gun Control Act of 1968. The act, a response to a string of high-profile assassinations, namely Dr. Martin Luther King Jr. and President John F. Kennedy, allows for firearms to “be lawfully made by persons” for personal use *if* the “maker is not prohibited from receiving or possessing firearms” (ATF 9). The GCA unequivocally supports my claim that 3D printing is a perfectly legal activity, now for over four decades, and invalidates the postulation that 3D printing is a rogue technological loophole in existing law granting people the ability to “easily” craft a firearm. Furthermore, let us draw our attention to the use of the word “prohibited” in the GCA’s legal language. The term is used to describe an individual that, according to Federal law, has “a felony [conviction] in violation of any law of the United States involving the use of threats, force, or violence” (Cornell 1). Therefore, any individual who is considered a “prohibited” person is ineligible to own, build, or otherwise possess a firearm; politicians and lobbying groups crafting laws under the assumption that felons can own a 3D printed gun shows the extent to which the modern gun control movement has disconnected itself from understanding the nuances of existing legal controls on weapons. Unsurprisingly, there are more limitations on the private manufacturing, i.e. printing, of guns. Typically, the Bureau of Alcohol, Tobacco, and Firearms, or ATF, requires that “gunsmiths” who “make firearms with intent to sell [...] imprint an ATF-issued serial number on each gun” (Jacobs and Haberman 5). Furthermore, weapons specially regulated under the National Firearms Act, like short barreled

rifles, short barreled shotguns, suppressors, and machine guns, are highly illegal to manufacture without “a tax payment and advance approval by ATF” (ATF 9), along with special Federal Licenses permitting NFA item manufacturing. Additionally, the thought of using a polymer handgun for criminal activities was taken into consideration long before the 3D printing craze. In 1988, the U.S. Congress passed the Undetectable Firearms Act, signed into law by then President Ronald Reagan, which made any “firearm not detectable by walk-through metal detectors or x-ray machines used at airports”, i.e. a *fully* 3D printed gun, illegal to produce or own (Jacobs and Haberman 4). To comply with the law, individuals often employ the use of a metal firing pin and an additional piece of metal in the frame, leading to creative solutions such as Cody Wilson’s use of a standard hardware nail as the firing pin for his fully 3D printed Liberator handgun, making it detectable by an X-ray machine (Wilson 294). Recall that people who chose to print firearm components often fabricate the receiver, as elaborated on earlier, and then buy the crucial components as metal parts from a factory for the sake of safety, effectively resulting in a firearm that is easily spotted by a metal-detector. In summary, based off the laws discussed above, a citizen wishing to 3D print a gun must not have been convicted of a felony, domestic/drug abuse, or involuntarily committed to a psychiatric facility, all of which nullifies gun ownership rights. If the prospective printer is an eligible person, though, he or she can legally manufacture non-NFA items but are required to include some piece of metal in the weapon to ensure that X-ray detectability. Therefore, it is logical to reassert the notion additional laws controlling 3D printed weapons are unnecessary and add to an already confusing line up of gun laws. Despite the fact that felons are not *supposed* to print guns, critical readers might very well express opposition to the private building of weapons more generally, for, in their mind, the practice naturally appeals

to individuals who are unable pass a mandatory background check when purchasing a new firearm.

Critics of my argument against expanded regulation of 3D printed weapons point out that the technology would allow for a new kind of unchecked access to a wide variety of arms that could be created without passing a background check, threatening the safety of the public, and warranting, at the very least, a legally mandated software control on the printing process. The requirement that software be built into consumer printers that can detect and refuse to print objects modeled after firearm components is a suggestion made by legal analyst **Katie Curtis** in her work “A Wiki Weapon Solution: Firearm Regulation for the Management of 3D Printing in the American Household”: “it should also be the responsibility of federal lawmakers to regulate product safety by requiring manufacturers to continue developing software programs that limit the ability of users to inadvertently print a weapon”. While Curtis’ approach is much more custom tailored to the act of printing a gun itself, minimizing government overhead relating to enforcement of this law, those in the tech industry like **Jon Stokes** know that “it will be hard for these machines to reliably tell what’s a gun-related file and what isn’t” and hackers, with a few lines of code added or subtracted from the machine’s operating system, could intentionally remove this fail-safe (**Lopez 4**). Obviously, targeting tech companies and their products would be a clunky and easily evaded solution. Although ignoring the reality that, under the Gun Control Act of 1968, the building, possession, or purchase of firearms by felons or otherwise “prohibited” individuals is already a punishable crime, the overall criticism at hand is heavily reliant on the idea that background checks are an effect means of crime prevention. According to the article “What We Know About the Effectiveness of Universal Gun Background Checks”, the author details major flaws in the United States’ background check system, blatantly stating that it

“is only as good as the records available” later mentioning several high-profile mass shootings in which “the gunmen were able to pass background checks” as a result of database errors on behalf of the government “despite convictions for domestic violence, a history of drug abuse, or involuntary psychiatric hospitalization” (Yablon 18). The article continues deeper into data on background checks, citing a study which found that “one in four [California] gun owners said they had purchased a gun without going through a check” even though the state passed a universal background check law in 1991 (Yablon 19), bringing up the logistical problem of a population’s refusal to comply with local, state, and federal laws, counteracting the intended outcome of the law in the first place. It would be safe to assume, then, that background checks as a tool are relatively ineffective, serving as more of a thoughtful comfort than a practical solution; to tie this into my rebuttal to the objection raised, there is, arguably, not enough evidence supporting background checks to use it as the singular justification for implementing restrictions on law-abiding citizens leveraging 3D printing as a vehicle for firearms manufacturing. In essence, I believe the objection raised ultimately fails to frame printed weapons in the totality of the context in which the practice exists. By this, I mean that the objection fails to account for the cost, difficulty, and quality control concerns of printed weapons that could lead to a catastrophic failure of the device. However, shoving aside the logistical nightmare of regulating printers, it is worthwhile to assess the impact of these controls on the civil liberties of the average American citizen.

Sweeping legislative measures designed to target the various technical dimensions in which 3D printing exists requires the highest levels of scrutiny to avoid any level of infringement on the natural rights declared in the United States Constitution, specifically the first and second. Since the advent of the digital computer for the Army during the Second World War and the

birth of the modern World Wide Web in the 1990s, the United States legal system has been forced to apply a 270 year old document, the constitution, to a seemingly obscure concept: software. Unlike the pen and paper before it, computer code is not a physical object, nor an idea, but a collection of zeros and ones to represent electrical impulses. These impulses then translate to real and quantifiable work for tasks, like completing a complex math calculation and printing the output to a piece of paper. Due to the unique nature of code, whose syntax and logical process of breaking down a problem is specific to the individual programmer, an increasing number of people in the contemporary legal field and software industry are, rightfully, arguing for software products to be classified as “a form of expression used to communicate ideas” (Eck 5), granting all software protection under the first amendment. The modern code as free speech movement is crucial to the conversation of 3D printed weapons regulations because it calls into question existing measures, like the aforementioned New Jersey bill, that criminalizes, among other things, the software aspect of 3D printed guns. The law forbids the “selling [of] manufactured parts or designs for assembling firearms by non-licensed individuals” and “effectively makes it illegal for individuals to assemble or possess a 3D printed firearm in New Jersey” (Delorenzo 1). New Jersey’s approach to regulating printing is highly controversial, since it *criminalizes* CAD/STL files, which are not physically firearms, while setting the legal precedent for future government censorship of information arbitrarily deemed not permissible as free speech on the open-web. Since the passage of the bill in late 2018, Wilson and his company, Defense Distributed, have filed a lawsuit against the state of NJ, asserting that the bill is a severe violation the first amendment. Ironically, Wilson’s company was in a years long legal battle with the Obama administration, starting in 2013, after the State Department claimed his company had violated the Arms Export Control Act by posting gun STL files online. This violation provided

sufficient justification, according to the Obama administration, to “force Wilson to take Defcad offline” with the possibility “of fines and jail time” (Lopez 14). However, a legal settlement reached between Wilson and the Trump administration’s State Department in August of 2018 that ended the years long legal battle. The court, who ruled in favor of Wilson, stated that “the ban on these CAD files was in violation of the First Amendment and that the government has been unlawfully censoring Defense Distributed’s right to expression” (Koslow 1). The statement and ruling by the court reaffirmed that, in fact, code is a form of free expression that can be violated if a governing body chooses to censor said software on the internet *or* in the privacy of one’s home. Now, let us shift streams of consciousness to focus our attention on the Second Amendment. Under the language of this controversial amendment, the clause reading “right of the people to keep and bear Arms, shall not be infringed” (Cornell 1) resulted in a decades old debate in the legal community as to whether or not it granted an individual or collective right. The debate was settled after the Supreme Court’s released its landmark 2008 decision in the District of Columbia V. Heller case, asserting that the right to bear arms is an *individual*, not collectivist, civil liberty conferred to all Americans (Cornell 1). The ruling, in combination with the blatantly stated right to bear arms *and* the previously elaborated GCA of 1968, it makes perfect logical sense that, since the Second Amendment recognizes the individual, an individual has a legitimate right, protected by law, to build his or her own guns to for the expressed purpose of “bearing” them. Therefore, banning the means through which production of a gun can occur, under the false pretense of public safety, is an illicit act on behalf of the government that imposes a direct restriction on the ability to bear arms, as is the case of the New Jersey law. A similar argument can be utilized to oppose the 2018 California law, mentioned earlier, “requiring makers of 3D printed guns and other homemade firearms to apply for an official serial number from the

Department of Justice, a process which requires a background check” (Armstrong 2) because it violates the spirit of the Second Amendment by requiring a de facto-registration, a system the founders would have no doubt condemned, and an unofficial tax, in the form of an expensive background check and registration fee, on the right of the individual to build or print a firearm for lawful purposes. In response, though, critics would surely cite that the advanced nature of cutting edge 3D fabrication coupled with modern firearms technology is a future the founders could have never envisioned protecting for the common citizen.

A common and thought-provoking argument on behalf of gun control advocates with regards to the modern application of 3D printed guns develops something like this: the founders could have never envision a world so advanced that an individual could buy all of the materials and tech required to build a gun off the internet, and this extremely easy access to deadly weapons should not be covered under the Second Amendment. To a degree this criticism is absolutely correct, the founders could not have possibly conceived of 3D printers fabricating an AR15 lower receiver. The same is true for knights of the 13th century who, similarly, would have failed to conceptualize the musket technology that “evolved in 16th-century Spain” (Encyclopedia Britannica 1) and emerged into common use by European militaries sometime later. However, the framers of the United States Constitution, political geniuses for their time, were intelligent enough to understand that technological evolution naturally compounds over time with intensifying scientific discovery. The founders took this realization into consideration when recognizing the right of the individual to own weapons for the preservation of themselves and their way of life. It makes sense then that they, the framers, could not conceive of the AR15 in civilian hands, like the knights in relationship to muskets of the centuries before, but wrote the Second Amendment with the conscious intent of protecting the possibility of said future.

Moreover, The Bill of Rights, in which the Second Amendment was declared, deals with everything from states rights, to freedom of speech, to the right to bear arms; all of which, in the minds of the founders, were inalienable rights conferred to us by dint of our humanity. As a result of the inalienable nature of these rights, I believe it more than fair to say, in a conversation on the constitutional devices guaranteeing protection from government expansion, that rights should not be deferred or denied based off a fundamentally flawed understanding of software, firearms, and modern technology that culminates in a population fearful of the unavoidable evolution in our means of production. Throughout American history, there are key moments that mark massive shifts in the way people build commodities and other goods, like guns, which can be used as points of reference to examine the pivots in dominant public and political opinions. For a large portion of America's history, firearms "were made by blacksmiths or specialized gunsmiths" so it was not at all uncommon for individuals to make their own weapons, until "the founding of Remington Arms in 1816" (Jacobs and Haberman 3). By the end of the industrial revolution, around the middle of the 19th century, guns moved from small shops to factories enabling the mass-production of high-quality, yet cheap, weapons in numbers never before seen in human history (Jacobs and Haberman 3). However, there was a lack of significant gun control measures passed in America until the Nation Firearms Act of 1934, over a century after Remington Arms opened its doors, suggesting that the prevailing attitudes toward the quick industrialization of the gun industry were, without a doubt, never a problem. Politicians and the general population of the time understood the rapid change in manufacturing to a be a result of natural technological progression, viewing the shift in the means of production as a net-benefit to society rather than a detriment. If gun control proponents in the modern age take no problem with the current industrialized state of the gun industry, it would, therefore, be logically

incoherent and disingenuous for them to voice objections to the printing of guns. 3D printing, is, after all, a metamorphosis in the long history of human production technologies. Even so, legal analysts Jacobs and Haberman are insistent on a different interpretation of 3D printing technology: “Considering how common gunsmithing has been, and is, the advent of 3D-printed firearms is arguably a modest technological development rather than a game changer” (Jacobs and Haberman 3). By thinking of the technology in its totality, Jacobs and Haberman arrive at the accurate conclusion that, despite being new and cutting edge, 3D printing’s application in firearm development is more akin to a novelty than an advantageous change to existing production methods. The conclusion defeats the misinformed comments from politicians, such as Frank Pallone, a sponsor of a bill to ban 3D printed guns and gun parts, stating that “AR15s [are] available at the stroke of a fingertip” (Moss 8). To best deconstruct the objection, let us use the Socratic method to frame the criticism in terms of the first amendment: should the government require a permit for people to post on social media while selectively limiting what content people can post due to the technologically advanced nature of social media? Of course not! There is nearly unanimous agreement among the general population and those in government that social media provides an extended and enhanced way for individuals to communicate, argo deserving of first amendment protections under the assumption that online posts are a form of free speech and/or expression. After thorough expansion on the topic, the second amendment does, to clarify, protect modern forms of gunsmithing, like 3D printing, as well as modern weapons. Therefore, there is no situation in which technological innovation, a deeply valued part of the American identity, is sound justification for unconstitutional infringement upon an inalienable right.

The 3D printing of firearms is, as showcased from the above analysis, a vast topic to say the least. After reviewing an extensive amount of information pertinent to the deconstruction of

3D printed firearms regulations, I have conveyed three main messages. The first is that, despite the vocal critics arguing otherwise, 3D printed firearms are more of a concept inspiring fear than an actual objective threat to society, evident in the blackmarket use of guns long before 3D printing. Secondly, the sweeping legislative efforts pushed by congressional officials attempting to address 3D printed weapons waste government resources by unnecessarily adding to the large body of existing law controlling gunsmithing, potential gun owners, and the guns themselves. Note that the legal controls in place do in fact address the main concerns of 3D printing, ranging from the criminal use of small arms to the unlawful creation of NFA items. Finally, the proposed and currently implemented laws attempting to regulate 3D printed weapons are, by all accounts, overreaching. This regulatory overreach jeopardizes the civil liberties of law-abiding citizens, ignoring America's longstanding culture and history of firearm manufacturing, and leave the nation's people vulnerable to future infringements by governing entities. Furthermore, as evidenced throughout this analysis, there is a large disconnect between coverage of 3D printed arms and how they are implemented in real life. The disconnect leads to a gross misrepresentation of the printing process and the technical capabilities of the arms that follow. Printing a gun, let alone a functioning one, is by all accounts relatively difficult, requiring extensive knowledge on material science, the functionality of CAD software, and effective firearm design. Due to these reasons, criminals or prohibited individuals will, generally, be dissuaded from employing 3D printing as a go to means of obtaining weapons thanks to the overhead associated with the practice. A final important consideration is the impact of printing regulations in shaping future the generation's philosophy regarding the government's place in American life. Shall America maintain its core value of limited government, reinforcing the idea of the individual as a sovereign entity not to be perturbed by excessive government coercion, or

will we welcome the state into the homes of law-abiding citizens to further regulate away our freedoms under the guise of collective security? Overall, the conversation surrounding 3D printing's legality, application, and advancement in modern American society is central to our increasingly technological world in which the free flow of information frightens some but empowers others. The issue of 3D printed guns is beyond a matter of policy disagreement or securing a win for an ideological faction, but determining if the knee-jerk response of the human amygdala will guide our republic away from the core tenant of Western Civilization: valuing the individual, and the exercise of his or her freedom, over a government monopoly on the feeling of safety achieved through tyrannical collectivism.

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