The next arms race? A military ethical reflection on the effects of artificial *super*intelligence on drone warfare and American counterterrorism

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Abstract

The trend towards the automation and robotization of warfare, enabling the exercise of violence from a distance, has been long-present, dating back to such inventions as the bow and arrow that allowed an archer to kill *from afar*. Today's military drones now permit an extreme separation between rivals. James Der Derian's concept of virtuous war encapsulates a certain normative view of current and future wars. A rationale of the actors waging virtuous war is that violence is used in a cleaner way, resulting in ever fewer battle deaths. In this thesis, I argue that the next step in the progression of military weaponry is the inclusion of artificial *super*intelligence (hereinafter ASI) in the American drone and counterterrorism program. While including this technology into the American war machine may represent a moral objective, I conclude that the use of ASI for military purposes is immoral because accountability becomes indeterminable.

Introduction

I'm becoming much more than what they programmed.

—Samantha to Theodore (*Her* 2013)

Prelude and general topic of research

It would be hard for me to forget the Christmas of 2000 since my parents gifted me with my first video game console, a Nintendo 64. Then, there was only one computer in our household, which had to be shared among four of us. Thus, my N64 doubled the number of electronic devices on which I could entertain myself. Fourteen years later, I count thirteen computers divided among the same four members of my family. These include desktops, laptops, smartphones, and tablets. This number represents the total of computers *currently* possessed, therefore excluding the several replacements each of these devices has had in the past decade and a half. That figure would probably more than triple if I were to consider Peter W. Singer and Allan Friedman's (2014) understanding of a computer. Whether they are hidden inside of our alarm clocks, coffeemakers, microwave ovens, or cars, the two academics maintain that computers are found everywhere in our daily lives (Singer and Friedman 2014, 8-9). Moreover, the numerous updates our electronic companions ask us to conduct on them are indicative of the frenetic pace at which they are evolving so as to more effectively perform the tasks they were engineered to execute. To paraphrase sextuple Grammy-winning French disc jockeys Daft Punk (2001), computers are becoming "harder, better, faster, [and] stronger," traveling on the seemingly endless road of progress.

But is this not a normal path to development and technological advances? After all, *Homo sapiens* is believed to be the apex predator. Are computers not simply one more assertion of our species' domination over the others? In other words, are these computers anything more than tools we, human beings, have built to make our life easier? Or are they something more than just that? Post-humanists would say so, for they believe that computers and machines are the enablers of the next stage of human evolution (Coker 2013, 29). Christopher Coker (ibid., 29-30) explains that this evolutionary phase is initiated in one of three ways: firstly an artificial intelligence (hereinafter AI) surpasses *Homo sapiens* as the apex, secondly the very notion of *Homo sapiens* becomes subject to changes, and thirdly machines are blended with humans to beget cyborgs. Ray Kurzweil describes cyborgs as "the continuation of a long-standing trend in which we grow more intimate with our technology" (2005, 309). Taking a loose definition of the term, Chris Hables Gray (2002, 2) argues that the present world is filled with cyborgs, humans whose metabolic functions or abilities have been altered by technologies such as pacemakers or vaccines.

When International Business Machines' artificially intelligent computer Watson won *Jeopardy!*, the corporation had given us a confirmation that it had taken computers to a new level of intelligence. In light of Watson's achievement on *Jeopardy!*, are the answers to the questions I posed above any different? If computers are tools that not only help us, but also enhance us as we enhance them in return (Kurzweil 2005, 309; Transcendent Man[1] 2009) and if machines enable humans to access another form of life, one that is virtual, allowing the post-human mind to roam across the worldwide internet like Johnny Depp did in *Transcendence*[2] (2014) and liberating an almost infinite amount of information and

[1] Transcendent Man is a documentary based on Kurzweil's life and bestselling book *The Singularity Is Near* (2005), in which he discusses his expectations regarding intelligence greater than that of humans, namely an ASI—although he does not refer to it as ASI. Kurzweil's main hope is that ASI will be invented before his death so that he will be able to enhance himself with it and live for eternity.

[2] After being severely injured by a radioactive bullet, Dr. Will Caster, portrayed by Depp, decides that the only way he can survive is by uploading his consciousness to the Internet. Once he does so, he finds himself able to travel through the global web; able to access through his mind banks accounts, search engines, and security cameras to name but a few. Caster thereby enters a post-human form of existence.

knowledge analogous to the pills Bradley Cooper ingested in *Limitless*[3] (2011), why was Watson *competing* with humans? In an interview concerning the future of weapons, Singer (2012) admits to wondering whether the technology present in Watson will be integrated in military robots. His interrogation raises many more important questions regarding military ethics; to highlight but one, we only need to think about the *Terminator* slippery slope argument cursorily alluded to by certain authors (Barrat 2013, 17-18; Singer 2009d, 414-415). More importantly, Singer's question serves as the starting point of my thesis, which I will expatiate on in the next section.

Research questions

Singer's question is interesting because the mere fact that he asked suggests a possibility, namely that AI be used in robots to achieve military tasks. Thus, my thesis will be a continuation of Singer's interrogation, gravitating around the central task of fathoming the effects of an advanced form of AI, ASI, on drone warfare and the American counterterrorism strategy. I argue that while AI has already been incorporated in military robots, ASI has not since it has not been invented.[4] What is even more thought provoking is to ask: if it does, what happens then? The list of possible scenarios goes on. Critics could easily argue that this question is pointless, as ASI does not exist so there is no use in talking about its impact on the military. Using this ground to dismiss an analysis of ASI's potential effects on military

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[3] The character of Eddie Mora, personated by Cooper, is given a drug, which once absorbed by his system, allows him to access a hundred percent of his brain instead of the mere twenty percent when he is not under the substance's influence. While Mora's intelligence is heightened *temporarily* after taking the pill, the insertion of a microchip or a nanotechnological device in his brain, rendering him a post-human, could affect him in a similar fashion, yet *permanently*—or until the contrivance is removed from his body. Gray (2002, 2) would argue that Mora is a cyborg, whether his intelligence is amplified by the medicinal stimulant or the microcomputer.

[4] Drawing on the work of James Barrat's (2013, 22), the definition I will use for AI is one of a technology that already exists. Artificial general intelligence (hereinafter AGI) and ASI, however, have yet to be created. I will discuss these different types of intelligence in more details in the first chapter.

robots is analogous to arguing that it is not necessary to prepare for a forecasted tornado because it has not yet happened.[5] Granted, meteorology is not the most exact science and the prediction of a deleterious meteorological phenomenon may sometimes turn out to be innocuous or vice versa. It is nonetheless wise and prudent to be braced in anticipation of a disaster[6], whether it ultimately takes place or not. While the damages that can be engendered by a tornado are limited to the vicinity of the tornado's passage, those of ASI could be rife; they could arguably lead to the annihilation of human beings, a point James Barrat (2013, 16) would make.

At present, I only wish to argue that studying, even if it is at the level of imagination, the effects of ASI on military robots is a worthwhile academic endeavor—one I undertake in this thesis. To do so, I will look at the possibility of drones equipped with ASI because drones are now America's weapons of predilection when it comes to vanquishing terrorism (Byman 2013). Also, former US General Billy Mitchell, a pioneer among air power proponents, was adamant that military power could be best secured through the domination of the sky. In fact, Mitchell claimed: "Should a nation […] attain complete control of the air, it could more nearly master the earth […] because there is no place on the earth's surface that air power cannot reach" (quoted in Franklin 1988, 79). Since ASI could arguably enable an unqualified military hegemony, it is essential to research the effects it could have on the technology that is most likely to capacitate such domination, namely unmanned aerial vehicles or simply drones.

[5] Admittedly, ASI does not exist—unlike tornadoes. Its potential invention nonetheless represents one position in an ongoing debate about this technology. Dismissing the study of ASI—even if it does not exist—would therefore be rash.

[6] My use of the word "disaster" refers *exclusively* to tornadoes. It should therefore not be interpreted as to suggest that the advent of ASI would be disastrous.

The research I intend to conduct will gravitate around the task of answering the following three related research questions: From a military ethics perspective, what would be the effects of ASI on drone warfare in general? More specifically and using the same analytical lens, how would artificially *super*intelligent drones influence the American counterterrorism strategy? Finally, how could this military program be conceptualized and therefore elucidated?

In addition to time and space management concerns, I choose to focus my attention on drones rather than *all* military robots for two reasons. First, it is because of personal interest. Personal life experiences are the first reservoir of ideas for research topics (Janet Buttolph Johnson and H. T. Reynols 2012, 77), and topics chosen from this source must then be polished using academic literature (ibid., 79). I also follow Stephen Van Evera's advice who writes one should "choose a topic that fires [oneself] up" (1997, 112). Moreover, Anne-Marie D'Aoust notes that it is important to acknowledge "that emotional considerations [...] come into play when it comes to research" (2013, 36). Second, drones are a category of robots that differ from other types in that they have been at the center of the American counterterrorism strategy (Byman 2013) as well as its more recent and exhaustive military strategy, its "new ways of war" (Grondin 2013, 193).

Why bother?

Following the terrorist attacks of September 11, 2001, then President George W. Bush (2001) announced that the United States (hereinafter US) was initiating its War on Terror. Despite his successor's discursive efforts to put an end to this war (Grondin 2012, 1-2; Obama 2009; 2013), the US is still employing military force, namely through its use of drones, to defeat terrorism, making its counterterrorism strategy germane to the field of security studies. Moreover, as a whole this War on Terror, which David Grondin (2012, 3) argues has been studied in interdisciplinary venues, has been a highly popular research object in critical security studies. Drones, one of the technologies this peculiar war calls for, have also been studied through this branch of security studies (Der Derian 2009; Grondin 2012; 2013). Critical security studies has moved away from a state-centric level of analysis and a focus on military threats, predominant in traditional approaches, to study a larger spectrum of threats and risk management strategies, as well as security technologies through discourses and practices (Hobden and Wyn Jones 2011, 142). This therefore makes it a more productive research field to host my research as I concentrate on the technology of ASI itself. As the US drone campaign has also been at the center of recent research in critical security studies (Grondin 2013, 191), studying ASI through drones makes it all the more worthwhile because drones are technologies that are used in military and policing contexts while still being the object of intensive research and development. In effect, the future of ASI is contingent on technological progress in fields such as engineering and computer science, and drones feature prominently in the robotic revolution in military affairs that is highly dependent on such developments.

Furthermore, the research questions enunciated above go hand in hand with questions of military ethics nature. In fact, Patrick Lin (2010, 313) argues that new military technologies are often accompanied with significant ethical questions. Lin exemplifies his position by pointing out that while military robots diminish the physical risk usually posed to soldiers during conventional warfare, this benefit of lowered casualties is exactly what may also make the decision to go to war easier, thus raising the question of whether they should be deployed in the first place (Campaign to Stop Killer Robots 2015; Kaag and Kreps 2014, 54; Lin 2010, 13). Another crucial ethical question that arises when contemplating the idea of artificially (*super*)intelligent drones is whether the decision to kill should be delegated to robots (Johnson and Axinn 2013; Krishnan 2009).

Therefore, the pertinence of the above research questions to the fields of (critical) security studies and, in parallel, military ethics among others lies on two postulates. First, there is a consensus that military robots and drones are now deep-seated technologies of the US arsenal (Byman 2013; Cole 2013; Grondin 2013, 194; Luban 2014; Neve 2013; Singer 2009d, 430; 2012; Turse and Engelhardt 2012, 44). Second, *if* ASI is invented it will only be a matter of time until it is incorporated into drones (Barrat 2013, 21, 235, 266-267; Singer 2012). Singer (2009d, 273) believes that if and when ASI is added to drones, ASI will most certainly have a noticeable impact on the US ways of countering terrorism. In the second chapter, I argue that the introduction of ASI into military drones represents one logical extrapolation of the current trend in the US ways of war.

Is it absurd then to think that ASI drones could resemble the three enormous anti-terrorist drones used by the organization S.H.I.E.L.D. from the movie *Captain America: The Winter Soldier* (2014)? Drawing on Singer, I think not. The three gigantic A(S)I-equipped drones portrayed in the movie—similar to a heavily armed ARGUS (Hambling 2009)—likely represent the quintessence of the future of the US counterterrorism strategy, as their purpose was to obliterate every single enemy of the US. In fact, S.H.I.E.L.D.'s rationale for putting these weapons in the sky was that once they would be in function no one could take them down since they would be too powerful and could eliminate anyone attempting to destroy them. Put simply, these massive drones would have enabled S.H.I.E.L.D. to keep a permanent edge on their enemies—an eventuality I address in the second chapter.

Singer explains that science fiction has been a driving force for technological research, especially in the military (Singer 2009d, 164). He adds that "[m]any of our expectations and ethical assumptions around real-world robots come from science fiction" (ibid., 165). Predating Singer, Bruce Franklin (1988, 4) argues that weapons such as the nuclear bomb or the intercontinental ballistic missile first had to be conceived in the minds of scientists before they could be engineered. Franklin adds that "Americans have been actually trying to build their imagined superweapons, with more and more success" (ibid., 5). It therefore seems that the current obstacle for ASI, a technology already imagined by several scholars (Barrat 2013; Kurzweil 2005; Transcendent Man 2009; Turse and Engelhardt 2012), to actually have an impact on drone warfare and the US counterterrorism strategy is a matter of having scientists come up with ASI. Naturally, another hurdle to the advent of ASI drones is the vigilance of those who outright oppose the creation of such technology for any military purposes (Johnson and Axinn 2013; Sharkey 2010; 2012) or killer drones themselves (Altmann et al. 2013; Benjamin 2013; Suarez 2013), not to mention the Campaign to Stop Killer Robots (2014), which encompasses a group of non-governmental organizations and activists determined to permanently interdict killer robots. According to some experts' estimates, I should live to see the day where AGI[7] will be reality, provided I do not have a premature death (Barrat 2013, 196-197). However, it is too early to predict the advent of ASI. One of the arguments I defend in this thesis is that if the decision of political elites to contrive ASI and incorporate it in military drones is left unchecked their development will be inevitable, provided ASI is scientifically achievable—an eventuality that while currently plausible is also impossible to determine with any certainty. To be sure, military drones *will* be upgraded to the level of ASI. However, this course of action could be avoided through an

[7] Barrat uses the term AGI in reference to the "intelligence level of a human" (2013, 8), but which of course is unlikely to be exactly that of a human.

incisive military ethical reflection on the potential effects of this technology on drone warfare and US counterterrorism, the task to which this thesis is dedicated.

Also, researchers and other organizations working on ASI could fall short of inventing it. That is, ASI may never exist. That the subject I investigate in this thesis is based on a hypothetical scenario, a *what if* if you will, does not impede a critical study of its potential rise and impact in warfare technology and the conduct of military operations. *What if* ASI is created and is then combined with military drones? Barrat's (2013) main argument that ASI could be "our final invention" is compelling whether one agrees with it or not because he anticipates that ASI—should it be invented—will have effects of a great magnitude. He is not so much concerned about the risks of ASI drones, but those represented by ASI in itself, maintaining that even if they are not unfriendly towards human beings they could still do us great harm by wanting to use us for their own purposes that may be incompatible with ours. While some like Kurzweil are optimistic about post-humanity (Kurzweil 2005; Transcendent Man 2009), others are mindful of the not so rosy ramifications possible in a post-human life that may irreversibly modify humans or subject them to the will of cyborgs or ASI (Coker 2013, 292; Gray 2002, 193; Transcendence 2014). Noel E. Sharkey (2010; 2012) and Daniel Suarez (2013) are among those who look upon killer robots with a pessimist eye, arguing that the decision to kill should not be assigned to a robot, thus demanding that killer robots be banned *before* they are created.

Barrat ends his book mentioning that during the course of his research he "encountered a minority of people, even some scientists, who were so convinced that dangerous AI is implausible that they didn't even want to discuss the idea" (2013, 267). If the potentially dangerous side effects of ASI appear to be far-fetched unrealistic scenarios that still pertain to the realm of science fiction cinema (from Stanley Kubrick's *2001: A*

Space Odyssey (1968) to James Cameron's *The Terminator* (1984)), it might not have necessarily been a child's play for them to explain why they believed so and subsequently debunk Barrat's position, given the complexity of the technology being at the center of the debate. However, elaborating a somewhat stronger and logical explanation of why they believed ASI was not worth discussing would have given more weight to their claim than simply dismissing the subject prior to having any intellectual discussion. The fact that they have not done so casts doubts on the validity of their position.

While my aim here is neither to support nor undermine Barrat's argument, I still think it is worth reflecting on it for a moment, if only because *what if* his prediction turns out to be right? The significant amount of money that has been and is still being used to fund research programs aimed at developing AI systems is an indicator that ASI may eventually come about, potentially corroborating Barrat's predictions. At the very least, it demonstrates a clear and strong desire to make that technology a reality. About thirty years ago, the Defense Advanced Research Projects Agency (hereinafter DARPA) requested $600 million to finance its program to develop AI, a technology it intended to use to fulfill several purposes including enhancing weapons (Sun 1983, 1213). In 2013, the European Commission granted $1.3 billion to fund a project, which aim is to emulate the human brain in its totality (Keats 2013). While large sums of money are spent on AI as a technology, research programs developing unmanned systems and drones are awarded considerable funding too. In fact, Medea Benjamin asserts: "when it comes to drones, the [military industrial] complex is booming" (2013, 32). She claims that the Pentagon's active budget for drones is $5 billion and that $94 billion will have been spent worldwide between 2011 and 2020 according to experts' estimates (ibid.). With 77 percent of the latter number coming from the American budget, the superpower's military finances are far from parsimonious, putting the US easily ahead in this technological race (ibid., 49). Pointing to the $5.5 billion allocated in 2010 to the US military to acquire more drones, Sharkey (2010, 371) substantiates these facts.

If the potential cost of neglecting Barrat's (2013) argument is "the end of the human era," which I argue is an audacious gamble, it is crucial to at least ponder it before dismissing it. So *what if* ASI, even an amicable ASI, becomes a reality? Former Bloc Québécois member of Parliament in the Canadian House of Commons and National Defence opposition critic Jean-François Fortin (2014) says that "[l]e drone en soit n'est pas bon ou mauvais, il est ce qu'on en fait."[8] The same applies to ASI and the US is unlikely to upgrade its drones to the level of ASI to then use them in a strictly harmless manner. Thus, even a friendly[9] ASI involves risks. And because it has not convincingly been demonstrated that ASI will never come about, I argue it is paramount to discuss the repercussions it could have on US counterterrorism because of the important place this campaign has occupied within the US foreign policy throughout the last decade. To be sure, the creation of the US Department of Homeland Security following 9/11 in combination with the fact that the military, supervised by the Joint Special Operations Command, and the Central Intelligence Agency (hereinafter CIA), two separate governmental bodies, are both in charge of conducting drone strikes (Ohlin 2013, 39-40) indicates just how many resources the US devotes to counterterrorism. Put simply, counterterrorism constitutes a sizeable machinery in the US and is therefore worthy of academic scrutiny.

The 1948 Universal Declaration of Human Rights and the South African Truth and Reconciliation Commission sought to address some of the atrocities committed during World

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[8] Albert Einstein expressed a similar thought when he stated that "[t]echnological progress is like an axe in the hands of a pathological criminal" (quoted in Singer 2009d, 279). Moreover, Barrat argues that "AI is a dual-technology like nuclear fission[, which] can illuminate cities or incinerate them" (2013, 21). Indeed, this is even close to Alexander Wendt's (1992) argument about anarchy and the state in international politics.

[9] The adjective "friendly" denotes an A(S)I that would be able to recognize empathy and interact with humans in a non-confrontational way (Barrat 2013, 18).

War II and the apartheid regime, respectively. While they are valuable, both were created after the events took place. The problem with ASI is that we might not be able to live to create an *ex post facto* compensation for the effects of ASI. Although Singer argues that "[i]n technology there is no long-term first-mover advantage" (quoted in Brown 2010, 27), I argue that ASI might prove him wrong. Once the sky will be filled with ASI drones that can learn on their own and continuously find better ways to defeat their enemies, it will become virtually impossible to take them down because the strategic advantage that they could enable would be so great that the first actor to possess this technology would be unlikely to give it away. A similar tactical advantage was behind S.H.I.E.L.D.'s three enormous drones: the organization created a weapon so powerful that it would be the last weapon it would ever have to invent. Captain America and his superhero companions were able to defeat the drones only because they had not yet been activated. Hence, it is pivotal to commence this ethical reflection *before* the sky becomes infested with ASI drones, which is the objective of this thesis.

Main argument

In the conclusion of his seminal book on robotics and warfare, *Wired for War,* Singer asks a very important question. He wonders, "how […] we really know whether any new technology does matter, that it really is changing things" (Singer 2009d, 429). So how do *I* know ASI will have an impact on drone warfare and the US counterterrorism? Well, I do not, at least not with certainty. But is it not assumed in my research question that these technologies will have ramifications? Yes, it is; by asking, "what would be the effects," I take as a given that there are actually going to be effects. ASI could revolutionize counterterrorism and even make a cleaner[10], more effective, fight against terrorism[11], at least in theory. However, the main argument I defend throughout my thesis is the following: while the introduction of ASI into drones could enable, in theory, a cleaner fight against terrorism or other enemies, which can be regarded as a moral aspiration in itself, the utilization of ASI for military purposes would render the military campaign that employs such technology unethical because determining accountability becomes unfeasible. I support this argument through the use of a heuristic conceptual tool derived from the movie *The Matrix* (1999).

This technology could enable a more effective way of countering terrorism, which would occur with always less human intervention from the part of the US and the lowest risk for its soldiers; drones and computers would take care of the killing, hence making it a *clean* military operation and potentially even creating a terrorist-free world[12], a goal few would label as immoral. Yet, the utilization of ASI in the military raises various questions pertaining to military ethics, some of which I mentioned above. My argument is centered on one specific ethical question, namely that of accountability. Where does liability lie when the weapon takes over the responsibilities that previously belonged to the soldier, if it does not become the soldier? I address this question in the third chapter.

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[10] The adjective "cleaner" refers to military campaign that simultaneously reduces the number of soldier and civilian casualties on all sides of the combat.

[11] Hence, the US drone campaign that is part of its counterterrorism strategy, partly characterized by the deployment of robots on behalf of human soldiers, aims to make a cleaner fight against terrorism.

[12] John Kaag and Sarah Kreps (2014, 137) question the strategic effectiveness of drones in addressing the issue of root causes of terrorism, wondering whether US drone strikes have produced a greater number of terrorists than that they have killed. This is a fair criticism of the current US counterterrorism strategy. Nonetheless, the US seems to praise the "killed terrorists" part of its campaign, the President even arguing: "We relentlessly targeted al Qaeda's leadership" (Obama 2013).

Theoretical framework and relevance

Patrick Lin et al. (2011, 943) offer a threefold definition of robots, maintaining that these actants must possess the ability to sense, think, and act.[13] To effectively perform these actions, robots therefore need to be equipped with "sensors, [a] processing ability that emulates some aspects of cognition, and actuators" (ibid.). The Predator is a robot; its cameras and chemical detectors are its sensors, its autopilot system gives it some leeway that allows it to operate somewhat autonomously, and its two Hellfire missiles are its main actuators. Given the ethical scope of this thesis and the topic related to robots, Isaac Asimov's (1942) *Three Laws of Robotics* could therefore constitute a good theoretical point of departure to investigate the ethical ramifications of ASI military drones. However, I will show that they fail to give any substantive help to this research. He presented his laws as follow: "[first,] a robot may not injure a human being, or, through inaction, allow a human being to come to harm[; second,] a robot must obey the orders given it by human beings except where such orders would conflict with the First Law[; third,] a robot must protect its own existence as long as such protection does Dot [sic] conflict with the First or Second Laws" (Asimov 1942).

Barrat (2013, 21) identifies a flaw inherent to the application of these laws to drone, pointing out that drones—to which Asimov's laws should apply, as they are robots—have already been used to bring harm to humans. In fact, US Attorney General Eric Holder officially acknowledged that the US killed four American citizens, including three that were mishaps (Ackerman and Shachtman 2013). While, these three accidental deaths—caused by drones—clearly contravene Asimov's first law, the case of the individual who was

[13] Of course, these actions are all done in the metaphorical sense for robots, as they are inherently human behaviors.

intentionally killed is indicative of a breach of the first two laws. In a speech in which he laid out his country's counterterrorism strategy, the President clearly stated that "the United States has taken lethal, targeted action against al Qaeda and its associated forces, including with remotely piloted aircraft commonly referred to as drones" (Obama 2013). This suggests that the four deaths discussed above are four instances among countless others; Obama's comment leaves no doubt that robots have indeed contravened Asimov's first two laws. While unofficial *and* official reports do not necessarily agree on the exact number of casualties, it is clear that drones are responsible for a few hundreds human deaths (Shachtman 2012).

Since Asimov's laws fail to offer a good military ethics foundation for the analysis of the current use of drones, it is unlikely that they will have more to contribute to ASI drones within the US counterterrorism strategy. Ergo, I turn to an alternative theoretical framework that should prove more suitable for the purpose of this thesis, namely *jus in bello*. This concept also referred to as 'laws of war,' can be understood as meaning the laws that (ought to) apply when at war and involves a mutual understanding among the parties partaking in war that there is "an overriding common interest in preserving the rules of the game" (Howard 1992, 28). *Jus in bello* is built on two assumptions: discrimination and proportionality (Ceulemans 2005, 10). While discrimination involves the distinction between combatants and non-combatants, proportionality entails that the drawbacks of a military action must be less than its benefits. Carl Ceulemans (ibid., 26-29) maintains that both principles should be respected in a war against terrorism. It should thus apply to the War on Terror.

Jus in bello offers a useful theoretical framework when considered in conjunction with James Der Derian's (2009) concept of virtuous war. It is important to note that Der

Derian's use of this concept is flavored by a critical and mildly sarcastic undertone. In fact, Der Derian is not convinced that this virtuous war is really virtuous. Yet, he posits that this is a characteristic that the US does indeed attribute to its ways of war—whether it simply pretends that its martial campaign possesses this "virtuous" quality or because it genuinely believes it. I therefore use virtuous war not as a prescriptive moral framework that the US ought to follow, but rather as a way of understanding how the US regards (and even lauds) its military campaign. Understanding how the US contemplates its strategy allows me to imagine its extrapolation and inquire into the ethical implications of ASI on it—in a scenario where this military strategy would actually do what the US say it is capable of doing.

As Der Derian explains, "[a]t the heart of virtuous was is the *technical capability* [emphasis added] and ethical imperative to threaten and, if necessary, actualize violence from a distance—*with no or minimal casualties* [original emphasis]" (2009, xxxi). Virtuous war blends the 'virtual' with 'virtue.' Although he (ibid., xxxiv) does not state it explicitly, it is understood that the virtual is present in drone warfare because drone pilots are sitting in front of screens, thousands of kilometers away from their target, where they see the strike take place, making it not so different from a strike executed in a video game. The virtual is what enables the virtue aspect of virtuous war, for it prevents soldiers from having to go on the ground and risk their lives during conventional combat. There is also virtue because of the "technical capability" to strike surgically, which reduces the number of deaths on the opponent's side—"collateral damage" à la Carol Cohn (1987, 709). Taken jointly, *jus in bello* and virtuous war make a valuable analytical lens to examine the effects of ASI on counterterrorism. The US drone program that is part of its counterterrorism strategy is embedded in virtuous war and its highly surgical nature enables it to be implemented within the boundaries of *jus in bello*.[14] It is worth noting, however, that simply because it can does not mean it necessarily is. I am interested in finding out how this will change with ASI drones.

I will not use post-human theories of ethics, which question the essence of humanity or humanhood (MacCormack and Ruskin 2012). As I mentioned above, Coker lists three paths to post-humanity. ASI is the epitome of the first of these paths and since my thesis analyzes the effect of ASI on drone warfare and US counterterrorism, I will set aside the second and third routes to post-humanity. Virtuous war is about reducing battlefield risks not through human enhancements, bionic (wo)men, or exoskeletons; rather, it is about keeping Americans out of harm's way through the automation and robotization of weaponry. Although human-enhanced cyborgs allure military scholars (Coker 2013, 213), being a stronger soldier or able to restore an injured limb, while certainly beneficial during combat, simply does not reduce battlefield risks the same way sending a robot on a soldier's behalf does. Der Derian (2009) argues that virtuous war characterizes current and future wars. Hence, I do not make use of ethics pertaining to cyborgs; instead, I focus on ASI drones as autonomous robots operating within the confines of virtuous war and *jus in bello*.

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[14] David J. Luban (2014) argues that drones are a highly discriminatory type of weapon as they allow select individuals to be targeted. Concomitantly, they enable proportionality. However, one technical problem with drones is that while strikes are usually able to hit their target, the payload is often too powerful and the blast that follows a strike ends up killing individuals who were not initially targeted. Yet, drones do enable more discriminatory and proportional strikes—so long as their payload are not exaggerated and their controllers are not using them in ways that would go against these principles.

Another problem of these weapons is that when they are used to perform strikes, their operators do not know with exact certainty whether they are targeting the individual they think they are. In fact, former drone operator Brandon Bryant (2015) states that he did not know who the individuals he was targeting were. Moreover and as Brian Glyn Williams points out, drones are "only as good as their intelligence" (2013, 37). ASI could help overcome this problem and allow the US counterterrorism strategy to be carried out within the confines of virtuous war and *jus in bello*—at least in theory.

Methodology

Given the (present) nonexistence of the object I propose to study here, namely ASI, it should already be obvious to the reader that this thesis will not follow the methodological guidelines offered by the scientific method widely employed in the hard sciences. Indeed, the very uncertain nature of ASI prevents me from testing hypotheses that would be based on its potential ethical implications. I must therefore turn to an alternative methodology—one that provides a more appropriate frame of research to study ASI.

As I explained above, critical security studies represent a suitable field for this purpose. Mark B. Salter (2013, 15) asserts that when they develop a research design researchers must have in mind three key elements: clarity, fit, and reflexivity. He adds that in critical security studies "there is a consensus that the empirical field should drive the methodological choices" (ibid.). I therefore employ a materialist analysis, using various technological objects (e.g. the Gorgon Stare, the ARGUS, and neural networks) as my data. Doing so, "[my] analyses face the empirical directly" (ibid., 17). The main limitation of this approach, however, is that it does not allow me to do an empirical analysis of ASI (and other immaterial objects of study), for ASI does not have a materiality and only exists in my (and, by now, your) imagination. Hence, important segments of my analysis are conceptual. These sections have been influenced by my acquaintance with certain science fiction narratives, which I have been exposed to throughout my life. In such instances where a materialist analysis might not enable me to adequately explore my objects of study, I develop intuitive heuristic models to help me ponder these immaterialities. While Salter (ibid.) warns us of the unproductiveness of creating myriad methods, the newness of the tools I conceive is a direct result of the fact that they are tailored to objects that have not yet been studied in critical security studies—at least not thoroughly. In short, I develop new tools precisely because ASI is a new object of study, which underlines the novelty of my research—an element Salter (ibid., 15) argues ought to be present in research designs.

I intend to tackle the scholarly task introduced in the previous sections in three acts. I begin this research by focusing on the central element of my research question, namely the concept that ASI represents, explaining what it is and how it sets itself apart from AI and AGI. I thus look at the materiality of quadcopter drones tested in the confines of a University of Pennsylvania laboratory.[15] By observing their physical movements I attempt to assess their (metaphorical) behavior with the aim of informing our understanding of components that might be contained in ASI. In fact, I look at notions of self-awareness and consciousness, subsequently attempting to understand where autonomy locates itself in the concept of intelligence.[16] I am then able to investigate AI itself, which could eventually lead to AGI and ASI. I briefly look at the automobile industry, positioned at the frontline of this technological race and therefore representing higher prospects for ASI discoveries—or at least inventions that could constitute parts of ASI.[17] I touch upon the work of Alan M. Turing (1950) on computing intelligent machinery, considered among the architects of the early conceptions of AI (Singer 2009d, 79). I also discuss that point of no return called Singularity and explain how ASI is intimately related to it. Last, I lay out the ethical foundations of my

[15] Grondin, whose work looks at military drones and the US ways of war, argues that, "drones can be studied as *objects* in themselves [original emphasis]" (2013, 191). I therefore begin my analysis of ASI by looking at these quadcopters precisely because they are physical objects.

[16] Salter explains that "[o]ften, the end of our research period is determined by external or institutional factors, such as […] the length of degree programs" (2013, 16). Since this thesis is part of a two-year master's degree program (where only a little over a year is to be devoted to the thesis itself) another limitation arises. This limitation lies in the fact that each of these concepts can take on various meanings and/or definitions, notions that are at the center of debates in various fields including, but not limited to philosophy (of mind), engineering, and computer sciences. Thus, I cannot conduct a comprehensive survey of all of these literatures, inevitably leaving open to criticism (some of) the definitions of concepts, which I only partially address.

[17] In 2005, a group of engineering students at Stanford University modified a Volkswagen Touareg named Stanley, getting it to win DARPA's Grand Challenge (Singer 2009d, 135-137). Singer explains that Stanley contained a "learning algorithm" that rendered it driverless (ibid., 137). Talking about progress in AI research, Patrick Lin et al. argue that "[d]riverless trains today and DARPA's Grand Challenges are proof-of-concepts that robotic transportation is possible" (2011, 945).

argument, explaining why Asimov's laws fail to offer a good theoretical base, but *jus in bello* and virtuous war succeed. This is the aim of my first chapter.

In the second chapter, I do an overview of the US counterterrorism strategy, mainly post-9/11 as this period is characterized by a drastic increase in counterterrorism measures. Although detention centers such as those in Guantanamo Bay and Abu Ghraib have been an important element of the US counterterrorism strategy, I do not examine them; rather, I revolve around the use of weapons, including but not limited to drones. The main task of this chapter is the sketching of the trend towards the automation and robotization of warfare, a tendency that started long before 9/11 and which espouses the US desire to implement virtuous war. Finally, I argue that ASI drones would represent a logical continuation of the US strive to wage war virtuously, explaining how this technology fits in the current defense culture of transformation and the robotic revolution as well.

In the third chapter, I look at issues of ethics pertaining to advanced robotics in counterterrorism, combining the discussions of the previous two chapters in an attempt at answering my research questions and supporting my main argument. I first lay out the conceptual, heuristic tool that allows me to answer my third research question. This conception is drawn from the movie *The Matrix* (1999) and builds on the idea of the software that the Matrix itself represents. According to Salter, the selection of a method, which is at the center of a research design's fit, "is also an assertion of what role the research plays in the narrative, and what literature we intend as our audience" (2013, 17). I derive my conceptual tool from *The Matrix* for the purpose of clarity, as it is a cult movie in popular culture, which not only appeals to a broad audience, but also offers a clear and easy way to imagine the deployment of ASI for military purposes—a contribution to a yet-to-be-written literature on the ethical implications of this potential technology.

I use this conceptual tool to tackle the first two research questions regarding the military ethical implications of ASI on counterterrorism and drone warfare. While the use of ASI certainly matters when discussing the ethical issues, I focus on the technology itself, rather than simply its utilization. In fact, I concentrate on the question of accountability and build my main argument as a response to that specific ethical concern. What happens when an ASI drone obtains James Bond's 00 status and is granted its license to kill? How does this authorization to (asymmetrically) minimize battlefield risks change the game of drone warfare and counterterrorism? Potentially creating a terrorist-free space, what I call the US counterterrorism matrix is a logical continuation of the desire to carry out counterterrorism in a risk-free and cleaner fashion. In principle, this matrix could respect *jus in bello* and therefore be regarded as moral. Yet, I argue that its use is immoral.

A brief survey of A(S)I

Janet Buttolph Johnson and H. T. Reynols (2012, 81-82) show that reviewing the literature has several benefits, one of which is quite relevant to my research, namely looking at how academics have defined particular concepts. Given the central stage that the term "artificial intelligence" occupies in my research, it is apropos to begin by perusing the literature specific to it and explain what AI actually is.

Stuart Russell and Peter Norvig tell us that AI is a discipline that "attempts not just to understand but also to *build* [original emphasis] intelligent entities" (2010, 1). Apart from being a field of study, AI is also defined in many ways (ibid., 2). These various definitions include the capacity to perform certain metaphorical actions such as reasoning, thinking, and making decisions. While they may vary, most of these definitions center on the notion of human intelligence. That is, AI is defined in relation to the intelligence of human beings. In fact, Singer points out that there is no consensus around a single definition of AI "not only because of all the technical baggage that comes with determining what is an "appropriate choice" or not, but also because the definition of AI links to broader debates about what it means to be human or not" (2009d, 75-76). A pioneer of the conception of a non-human intelligence, Turing (1950) was one of the firsts to discuss the idea of AI and he too compared it to humans. He imagined a machine that could learn in a similar fashion as a human child does (Turing 1950, 460). According to Turing, a learning machine would have the virgin mind of a human child that could be molded by both education and experiences that are not formal education (ibid.). In short, a computer programmer would create a learning machine by programming comprehensive codes into its initially empty inner software.

While he did not provide a definition of an artificial intelligence or intelligence itself, Turing believed that an intelligent behavior would be one that contained an element of randomness, allowing a "departure from the completely discipline behaviour involved in computation, but a rather slight one, which does not give rise to random behaviour, or to pointless repetitive loops" (ibid., 463). The randomness within intelligent behavior allows moving away from the adage, which claims "insanity is doing the same thing over and over again and expecting different results." The different understandings of AI discussed so far can be encapsulated by what Barrat (2013, 8) calls artificial general intelligence, or AGI. AGI is essentially the level of intelligence equal to the human intelligence, but it is not that of a human. AI, then, is the level of intelligence right below AGI and, as I mentioned above, AI already exists.[18] In fact, Barrat states that “regular old artificial intelligence [AI] surrounds us, performing hundreds of tasks humans delight in having it perform” (ibid., 22). Singer (2009d, 77-78) also acknowledges the ubiquity of AI. This type of AI is also known as “weak AI” or “narrow AI” (Barrat 2013, 22). As I write these lines in my word processor, AI is that thing, which draws a dotted red line under the word “Barrat” because the word is not in the English dictionary and therefore the AI hidden in my word processor does not recognize it. AI is not more intelligent than me, but when mixed with my intelligence it enhances my abilities. For example, while I may not know what the capital of country X is, when I search it on Google—which contains AI—I can get the correct answer almost instantly on a quiz. AGI is reached when Google no longer needs me to type “what is the capital of country X?” in its search engine in order to come up with the answer.

ASI is the next stage of intelligence, likely to be a game changer not only in drone warfare and counterterrorism, but also in every domain in which it will be employed. Samantha, quoted in the epigraph of this introductory chapter, is an ASI. Singer (2009d, 79) would refer to Her as a “strong AI.” Once Her level of intelligence is attained, Singularity is reached (ibid., 104). It is that moment when “humankind is in the presence of an intelligence greater than its own” (Barrat 2013, 8). This is precisely where my research questions take their significance. I explore this technology in greater depth in the following chapter.

[18] Throughout this thesis, I build on Barrat’s definitions of AI, AGI and ASI. It is important to note that when scholars discuss a type of AI that is *above* human intelligence, they are talking about what I refer to as ASI.

Chapter 1

When artificial intelligence surpasses human intelligence: A theoretical framework tailored to the US (new) ways of war

Any sufficiently advanced technology is indistinguishable from magic.
—Arthur C. Clarke, Science fiction writer

Self-awareness and consciousness

At the beginning of February 2012, *Wired* posted a short article that got a lot of people talking within the drone community[19] (Paur 2012). It was not so much the article itself that proved particularly interesting; rather, what dazzled everyone was the video it featured. The less than two minutes long video showcased twenty quadcopter drones engineered by roboticists at the University of Pennsylvania. The impressive element of this footage was that the remotely piloted drones were flown in intricate arrangements with a matchless degree of synchronization without entering in collision with one another (ibid.). Of course, this achievement does not constitute a manifestation of ASI, although the software programming involved in the conception of these drones points to the presence of some degree of human genius among these Ivy Leaguers. So why does this matter for the present discussion on AI?

It is significant because while this accomplishment may not be a sign of ASI, it demonstrates a capacity to simulate "intelligent" behavior with a high level of verisimilitude. This is because, just like birds flying together in swarm or fish swimming in a shoal, each quadcopter was to some degree "sensitive" to the presence of the other quadcopters next to it, which prevented impacts between two or more of them and/or the obstacles in their environment. Whether these drones were *aware* or *conscious*—that is, in the human sense of the word where I am aware that I am writing these lines as I write these lines—of their

[19] Here, I use the term drone community primarily to denote the academics conducting research on military drones. However, this community also encompasses individuals who may or may not be scholars and who consider drones as recreational objects. Such individuals, which I label as hobbyists, would have an interest in the *Wired* article, for, like the famous launches made by former Apple chief executive officer Steve Jobs, it introduced a new technology that would eventually be made available to the general public.

surrounding is a totally different question to which the answer is likely a "no." But let us consider the following extract from *Transcendence* (2014).

In one of the scenes of *Transcendence*, the character of Joseph Tagger, portrayed by Morgan Freeman, asks a quantum computer whether it can prove that it is self-aware. The computer surprised Tagger by returning the question: "Can you prove that you are?"[20] Evincing self-awareness is indeed a difficult task, perhaps even unattainable. René Descartes' catchphrase "Cogito ergo sum"—Latin for "I am thinking, therefore I exist"—is probably the simplest way to substantiate our self-awareness (1996, 68). At the same time, it is revealing of how few tools we have at our disposal to prove self-awareness. A logical objection to this mantra, which Descartes acknowledges, is that "you cannot know whether you exist or even whether you are thinking" (ibid., 69) as this requires a prior grasp of what it means to exist or to think. Yet, the French philosopher argues that there exists an instinctive sense in individuals, which is sufficient for them to become self-aware of their existence through thinking. He maintains that this "internal awareness […] always precedes reflective knowledge" (ibid.) therefore (or somehow) allowing us to bypass the circular problem of not possessing anterior knowledge about the meaning of existence or thinking. This circumvention nonetheless involves the use of a reflective thought process as it merely substitutes for the lack of prior knowledge. Thus, the reasoning behind "Cogito ergo sum" is inherently reflective. That is, the thought processes that take place here are done consciously by the individual who is thinking. The people who become self-aware through this logic must actively think about it before they can get any sense of self-cognizance. This necessity renders the process a conscious one.

[20] For a short clip of this scene see: https://www.youtube.com/watch?v=Dtndxiz66p4 (Accessed August 31, 2014).

George Lakoff (2009, 271) disagrees with how Enlightenment thinkers such as Descartes describe the way the human mind functions. Dismissing the all too rational approach of the intellectuals of this period, Lakoff contends that the human mind operates in a much more unconscious fashion. In fact, he argues that since around 98 percent of the mind's activities take place subconsciously, the majority of our thinking is "*reflexive*—automatic, uncontrolled [original emphasis]" (ibid., 9). This analysis is in direct contrast with that of Descartes who intimated that thinking was done mindfully. If Lakoff is right, we may, for all we know, still be deep inside Plato's (2008) cave, facing a world we self-deceptively believe in when it may in fact be nothing more than a reflection of our shadows on a wall—a crude, yet powerful illusion that is exhibited without our knowledge of it. Hence, for Lakoff thinking is done primarily reflexively, but also lightly reflectively while Descartes would argue that it is a purely reflective operation. It is important to note that Descartes' view of thought—that allows reaching self-awareness—entails an impossibility of determining whether someone else is self-aware. This is because self-awareness is made possible through an "internal awareness" (Descartes 1996, 69) and therefore while I may possess this internal capacity to be aware, I cannot use it to find out if you are aware or vice versa. Russell and Norvig corroborate this argument, specifying, "in ordinary life we never have *any* [original emphasis] direct evidence about the internal mental states of other humans" (2010, 1026). Turing (1953, 569) also acknowledges the impossibility to determine someone else's feelings with any exactitude.

Ok, but why all that fuss about self-awareness then? Because the many definitions of AI that Russell and Norvig (2010, 2) discuss encompass notions such as reasoning, thinking, decision-making, and behaving[21], which are processes that while not requiring self-awareness to take place can be sophisticated with it, hence opening the door to an evolving form of AI, namely AGI and perhaps ultimately ASI. Singer (2009d, 77) notes that the acquisition of (metaphorical) knowledge by an AI allows for its progress. Furthermore, Harvard University psychologist Daniel Goleman highlights that "[s]elf-awareness is fundamental to psychological insight" (1995, 54). That is, I can more easily exercise my thinking and reasoning if I am aware that I am a thinking being than if I am unaware of it. Goleman argues that the same applies to emotions, which can be better controlled once we are aware of them (ibid., 55). Put differently, self-awareness and thinking/reasoning/behaving are processes that are interlaced. How so? According to Geoffrey Jefferson, strong AI or ASI is reached once the computer regarded as such is *conscious* of its abilities (Russell and Norvig 2010, 1026). Jefferson gives the example of a computer who would be able not only to orchestrate music, but also be *aware* that it did (Russell and Norvig 2010, 1026; Turing 1950, 451) Thus, consciousness (and self-awareness) is a key element to the understanding of ASI. It is also at the center of contentions on the issue of ASI (Russell and Norvig 2010, 1033).

For instance, John R. Searle (1980, 424) argues that because ASI is a program—similar to a computer's software—rather than a machine it will not be able to occasion thinking nor will it be able to give rise to consciousness. He believes that only machines akin to brains could generate thinking. Searle (2000, 557) further argues that consciousness is an inherently biological event, which arises from neurobiological operations in the brain and

[21] Actions such as reasoning, thinking, making decisions, and behaving are usually done by human beings. Thus, when they are used to describe the actions of AIs, AGIs, and ASIs they are used in a metaphorical sense. In other words, an AI does not literally reason or think; rather, it does something that is comparable to these human actions.

therefore ought to be studied within the field of neurobiology. Barrat (2013, 45) explains Searle's skepticism regarding the possibility of a thinking or conscious ASI by adding that AGI or ASI would only be able to duplicate the mechanical functions of the brain such as raw processing or computing power, but not the biological activities such as thinking, reasoning, or being conscious. Searle defines the concept of consciousness as an amalgam of "inner, qualitative, subjective states and processes of sentience or awareness" (2000, 559). The subjective component is very important because it entails that being conscious may (and most probably does) vary from one individual to another. Hence, while you and I can both be conscious your consciousness may be different than mine as this subjectivity also involves different degrees or intensities of consciousness. The inner element in Searle's definition ties back to Descartes' "internal awareness," which leads to the impossibility of determining whether someone else possesses consciousness or is self-aware. But as Barrat (2013, 46) points out, when it comes to communicating with one other through language, we can hardly tell for certain whether we have been understood by our interlocutors aside from making a guess based on their reaction to what we articulated. Yet, this uncertainty does not prevent us from using language successfully. I argue that the same can apply to consciousness. That is, I do not need an empirical confirmation that you are self-aware to continue interacting with you.

So far in this chapter, I discussed the ideas of self-awareness and consciousness, only moderately and not systematically addressing the core concept of ASI. I did so because it is essential to first look at the elements that are tied to the notion of intelligence, a notion that is itself present within AI, AGI, and ASI and therefore necessary to be dissected before dealing with them. Thus, this discussion merely served as a springboard to the task I now turn to, namely the exploration of intelligence.

(*Natural*) intelligence and autonomy

Animals such as birds and fish, while not humans, are in a category apart from computers or robots and it would therefore be inappropriate to use the term AI when talking about their intelligence. Thus, if I may borrow the antonym of the word "artificial," I would characterize animals as possessing *natural*[22] intelligence. Of course, this intelligence is lesser than that of humans, but still involves the notions of self-awareness and consciousness. So are the birds that fly in swarm aware of the presence of other birds around them? They certainly enjoy a minimum of self-awareness, which allows them to dodge the other birds in their surroundings. And what about the fish that swim in shoal? Searle (2000, 564) mentions that although some intentions are unconscious, intentionality is part of consciousness as a whole. It is a component of consciousness that facilitates species survival so that when a predator such as a shark approaches a shoal, the fish know that it is time for them to leave. In other words, they are conscious of the danger posed by the shark and this consciousness has a direct impact on their behavior since they escape.

But what is it exactly that enables birds to avoid colliding with one another when they are in flight and that gets fish to run away when they see a predator? Intelligence. Put plainly, intelligence is a mechanism that gets them to make a decision on how to (re)act when faced with a given situation, which they first had to assess (Singer 2009d, 75). Singer includes the notion of uncertainty to this definition. This uncertainty, however, is different than that discussed above in relation to the feelings or state of consciousness of someone else; rather, it pertains to the situation or environment faced by a subject. For intelligence to kick in or an intelligent behavior to be generated, the situation faced by the subject needs to be

[22] This is not a technical term used in the literature on AI. I simply use the word "natural" to characterize a type of intelligence that is not man-made or artificial.

uncertain—at least *partially* unknown to the subject and therefore forcing it to think, reason, make a decision, and then (re)act/behave based on that decision. Let us recall that Turing (1950, 463) argued that an element of randomness was necessary for an intelligent behavior to occur. Let us take the example of a fish facing a shark. When trapping its prey, the predator will try to anticipate the former's reaction so as to conduct a successful attack. It is exactly where this randomness can prove useful as the fish—not knowing the precise intentions of its aggressor—faces an uncertain or unknown situation and the randomness within intelligence allows it to opt for a less (if not un)predictable behavior, which in this scenario may save its life.

Does intelligence require autonomy? What does autonomous decision-making mean? When I defended the proposal of this thesis, Kevin McMillan, one of my committee examiners, was quick to tell me about the importance of defining autonomy, which seems central to the idea of AI and its more advanced stages—AGI and ASI. When analyzing discourse, Paul Saurette and Kelly Gordon (2013, 172) tell us that the more words are used to talk about a specific concept or argument, the more importance the author of the text accords to this concept or argument. I was therefore quite surprised when I searched the word "autonomy" in the many books I borrowed on the topic of AI, for very few of them had the word listed in their indexes and those that did only featured the word on a page or two. This begs the question of whether autonomy is as crucial as one would think when talking about intelligence and decision-making. Given the place ASI occupies in my thesis, it is most certainly appropriate to tackle the issue, as ASI drones would inescapably encompass a high level of autonomy.

Russell and Norvig (2010, 39) describe an autonomous being as one whose dependence on knowledge given it by its creators is absent. They add that the entity possesses autonomy when it depends solely on its percepts to ensure its survival. Referring exclusively to *artificially* autonomous beings, Johnson and Axinn (2013, 130) give us a more narrow definition of autonomy, maintaining that autonomous robots place reliance uniquely on their inner software. For their part Lin et al. (2011, 943) define the autonomy of robots as the trait peculiar to robots that enables them to carry out activities within an environment without outside assistance after they have been actuated by an external force. This last definition blends elements of Russell and Norvig *and* Johnson and Axinn's respective definitions since it explicitly allows the possibility of a reliance on former knowledge—which would fall under Johnson and Axinn's definition—yet does not prohibit the option of a being that would run on its percepts alone, hence falling under the definition of the other two scholars. Finally, Singer's understanding of autonomy relates to the "relative independence" (2009d, 74) a being has towards other beings, therefore manifested in various degrees. He gives the example of a plane's autonomy, which can range from non-autonomous to adaptive. The former level of autonomy refers to a plane that is entirely piloted and controlled by a human while the latter would require no human assistance and could even learn metaphorically from the situations it is faced with (ibid.). ASI would be characterized by adaptive autonomy.

The birds and fish from the scenarios discussed above would be considered autonomous regardless of which of the above four definitions is used. Of course, Johnson and Axinn *and* Lin et al.'s definitions refer to artificial and robotic beings, respectively and thus, animals would not fall under the scope of these definitions. Putting that technicality aside, however, we can see how animals would enjoy autonomy according to these definitions too. Singer would characterize their autonomy as adaptive, for animals have the ability to learn although that capacity is not as developed as humans. Think about mammals such as monkeys and dolphins that have been able to learn from interactions with humans or birds such as parrots that can learn up to a few hundred words. Scientists at Duke University have even found learning capacities in reptiles, which can alter their behavior after having been repetitively exposed to certain external stimuli in their environment (Anonymous 2011). These animals possess adaptive autonomy, but it is tied to their *natural* intelligence. In the following section, I look at the first stage of a non-natural intelligence, namely AI.

Artificial intelligence

The quadcopter drones designed by the University of Pennsylvania scholars are equipped with AI (Paur 2012). While they may not possess adaptive autonomy as their learning ability is fixed—that is, they cannot learn—Singer would maintain that they benefit from some level of autonomy and are therefore not fully human-dependent. When the drones are flown in figure eights or other elaborate arrangements, it is clear that they are partially if not completely relying on their internal software and at least somewhat independently of their human controllers to perform these labyrinthine maneuvers. This is because it would be impossible for a single human to control twenty drones at the same time. To be sure, Singer (2009b) indicates that humans can hardly pilot or control two or more drones simultaneously as this would considerably diminish their piloting accuracy and performance. For this reason, when several drones or robots are being operated concurrently the human's role "in the loop" becomes supervisory, consequently granting drones higher degrees of autonomy as they increasingly rely on their internal software and exploit the abilities that are made possible by AI.

And were these quadcopters conscious of their existence or the presence of other drones in their immediate vicinity? This is a question we cannot answer definitely. In fact and as mentioned above, it is not possible to determine someone else's emotions or whether they are conscious. All we can be relatively sure of is that we are each individually conscious of our respective selves. And so it would be impossible to discern consciousness in robots. At best, we may be able to surmise that they possess *some* level of consciousness, which may be completely different than human consciousness[23], based on the fact that they are able to perform tasks such as building block structures without running into one another for example (Paur 2012). So the quadcopters probably do not reach their equivalent of self-awareness the same way Descartes does with his thinking. Nevertheless, they have in themselves something comparable to consciousness, allowing them to successfully accomplish difficult assignments analogous to birds when they fly in swarm with unequaled agility.

Artificial general intelligence and artificial *super*intelligence

As I set forth in the introductory chapter, (narrow) AI already exists and is found in (nearly) all electronic and computerized devices we use in our daily lives. What do not yet exist, however, are AGI and ASI. As I also mentioned in the introduction, (financial) efforts to devise these technologies are far from parsimonious. The desire to build or engineer an entity (mainly a computer program) that would emulate the human intelligence has been present for decades in the scientific community. Turing's (1950) early work on learning machines is an expression of this. The idea to contrive a form of intelligence in a body that would not be

[23] Barrat (2013, 46) points out that if and when AGI comes about, it will likely possess a quality that may be similar to consciousness, but will not be exactly it. That is, AGI will have something that produces the same effects consciousness would while being slightly distinct from consciousness. If we extrapolate this claim to AI (and ASI), we can hypothesize that any form of consciousness that would be found in AI (and ASI) could be recognized as such through *its effects* rather than *itself*.

quite human predates Turing and can be found in the famous novel *Frankenstein, or, The modern Prometheus* (Shelley 1998), which was first published in 1818.[24]

Serious attempts at designing an AGI (with the hope of ultimately coming up with an ASI) have taken off around the end of the 1980s and beginning of the 1990s when scientists tried to devise neural networks, an artificial, computerized system that would work in a fashion analogous to the human brain (Asakawa and Takagi 1994, 106; Rumelhart et al. 1994, 87). David E. Rumelhart et al. explain that scientists from the AI community sought to create an AI that would possess "the intelligence of biological organisms" (1994, 87). The ultimate purpose of neural networks is to understand how neurons are connected with one another to transmit information in their multitudinous interactions within a biological brain (ibid., 88). Toshinori Munakata describes neural networks as "modeled on the human brain and [able to] learn by *themselves* from patterns" (1994, 25). It is that capacity to metaphorically learn—that is, acquire knowledge and skills—*independently* that makes neural networks so important. Let us recall the highest level of autonomy described by Singer (2009d, 74), namely adaptive autonomy. This type of autonomy involves a capacity to learn, which itself entails the possibility of an evolving AI, at some point possibly reaching the level of AGI or ASI. Hence, neural networks can self-improve.

So can genetic algorithms. Genetic algorithms are another form of advanced AI, which has not yet reached the stage of AGI. Munakata explains that this technology is based on the idea of natural evolution, which would explain why it is also referred to as "evolutionary computing" (1994, 25). While neural networks seek to improve themselves by

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[24] Since Shelley describes Frankenstein as being made of lifeless human body parts it is not clear whether the monster would fall under the post-human label. Nonetheless, her novel is indicative of an existing conception of a form of life—possessing some degree of intelligence—that would not be entirely human even though it is made of human components. Let us recall that Franklin (1988, 4) argued that before a technology or weapon could be invented it first needed to have been envisioned. Frankenstein was a visualization of a non-natural (or artificial) intelligence that approached the idea of AGI without clearly pinning it down.

building on existing knowledge that they acquired throughout their existence, genetic algorithms endeavor to alter their internal genetic sequences—which in essence are the numerous lines of codes within their software—so as to readjust themselves to their surroundings, which present them with continuous changes (ibid.).

Although both neural networks and genetic algorithms may show signs of self-improvement, they do it in distinct ways. Genetic algorithms do not learn *per se*. While they adapt to their environment, which itself is changing erratically due to a multitude of factors, they do not adapt because of their knowledge of this environment. A simple example should prove useful in elucidating how this is the case. Let us take the example of a species whose members have suffered repetitive sunburns due to several prolonged periods of unprotected exposure to sunlight. After a while (probably tens of thousands if not millions of years to be realistic), members of this species will pass on genetic information to their offspring that will result in an increased production of melanin, the substance responsible for darker skin pigmentation and that offers a natural protection to sunlight. The result for the species would be a higher tolerance to ultraviolet rays, rendering the members of that species less likely to get sunburns. Genetic algorithms function in a similar fashion—at a much faster pace. This is why it is also called "machine evolution" (Russell and Norvig 2010, 21). The improvements generated by genetic algorithms are therefore reflexive instead of reflective. They are done without necessitating a conscious behavioral change from the subject in question.

Let us now take the same sunburn example and see how it applies to improvements engendered by neural networks. The fact that Russell and Norvig introduce neural networks in a chapter of their book entitled "Learning from Examples" (ibid., 693) is revealing of the logic behind that technology. According to them, a being that possesses the ability to learn can "[improve] its performance on future tasks after making observations about the world" (ibid.). This is precisely what neural networks do. They identify patterns in their environment, estimate how they could better deal with these patterns, and change their internal framework accordingly (Widrow et al. 1994, 104). Bernard Widrow et al. (ibid.) explain that the "adaptivity" contained in neural networks enables them to overcome the emerging changes of their environment, although the possibilities of neural networks are currently finite rather than infinite as they would likely be in the case of an ASI. And so going back to the sunburn example, a neural networks-like approach to adapting to the protracted exposure to sunlight would be quite straightforward: members of the species would *learn* that unprotected exposure to ultraviolet rays leads to a higher risk of sunburns and would therefore seek protection, searching for shaded areas where sunrays are not as strong and sunburn risks are lower. Unlike that of genetic algorithms, this adaptation would be done reflectively.

Misha Tsodyks and Charles Gilbert (2004, 775) explain that perceptual learning is an aspect of learning that is done reflexively by living organisms. This learning process, which they assert is crucial to any attempts at faithfully emulating biological learning, consists of perfecting the art of perception via repetitive contacts with various stimuli (ibid.). Put simply, it is about becoming accustomed to sensory stimuli and therefore better able to metaphorically recognize them. Tsodyks and Gilbert add that current models of neural networks could profit from a more advanced stage of perceptual learning (ibid., 780). They argue that while certain models possess some perceptual learning abilities, these are nowhere near those of living organisms (ibid., 775).

Kazuo Asakawa and Hideyuki Takagi (1994, 106) state that neural networks utilizations started to spread in the early 1990s in the Japanese commercial and industrial sectors. Widrow et al. (1994, 96) add that neural networks have also been used in the military sector, specifying that such uses are probably much more extensive and diversified than those of any other categories, but are kept secret. As early as 1994, one known military use of neural networks was in missile guidance mechanisms, which not only enabled missiles to be launched and led into their target more accurately, but also faster than if they had been fully human-controlled (Widrow et al. 1994, 96).

Grondin (2013, 192) notes that information pertaining to national security is less easily accessible due to elements that—according to security experts—need to be kept (top-)secret to ensure the success of security measures. Antonio A. Cantu (1991, 128) argues that some technologies such as those utilized in counterterrorism should remain secret, for disclosing information about them could weaken them or even defeat their purpose. While they do so on much shorter periods of time, policemen work on a similar rationale when they turn off their sirens as they approach a crime scene to avoid advertising their arrival to the suspect who may still be in the whereabouts. Moreover and as I have briefly adverted to in the introduction, there is currently a movement—in the US (new) ways of war—in the direction of automating and robotizing weaponry and warfare as a whole—a trend that will be discussed at length in the second chapter. Cantu (1991, 128) states that counterterrorism technologies have made use of AI and neural networks. And as Asakawa and Takagi contend, "neural networks will be the heart of autonomous systems" (1994, 111). A last point is unequivocally worth mentioning: referring to the commercial aspect of counterterrorism technologies, Cantu (1991, 129) argued that the market's demand for such tools was strong. This was *before* 9/11. Thus, it is very likely if not definite that neural networks are already and will continue to be employed in a variety of other military technologies and applications.

A brief note on the automobile industry

The automobile industry is likely to be among the firsts to devise an ASI capable of learning and therefore self-improving. As early as 1994, researchers at Carnegie Mellon University were testing an Autonomous Land Vehicle In a Neural Network called ALVINN (Widrow et al. 1994, 99). With the help of neural networks, ALVINN was able to park a truck—within a computer simulator program—with a decreased margin of error after every attempt it made, even when placed in a starting position it had never found itself in before (ibid., 100). In 2010, researchers were still using more sophisticated models of neural networks to control land robots. This time, however, the autonomous robots were not in a computer simulator. They were made of hardware, in a miniature robot called Khepera (Trhan 2010, 824).

In the September 2014 edition of *Motor Trend*, Alex Nishimoto gives us a taste of the future of the automobile industry, as Google announces its nearly fully autonomous car prototype to be tested on the roads in the imminent future.[25] The Google driverless car only requires a human to press its start button. The article does not go into details as to how exactly the car's autonomous system will function, but what is certainly most striking is the fact that it has "no steering wheel, accelerator, or brake pedal" (Nishimoto 2014). The former generation of driverless cars engineered by Google ran on "sensors, software, and Google's mapping database" (Brown 2011).[26] More research and experiments have yet to be conducted with neural networks and autonomous systems and it is too early to determine how effective Google's new cars will be, but should they prove successful these prototypes

[25] According to Tesla Motors (2015), seven automotive corporations, including Google, have been granted permits from the California Department of Motor Vehicles to test autonomous vehicles on public roads in California. While these "autonomous" vehicles are not proof of ASI, they are nonetheless indicative of an increasing interest in the automobile industry to design ever more autonomous technologies, which could help advance technological progress in other connected fields that work on (components that will make up) ASI.

[26] For more on the abilities and potential benefits of Google's previous generation of driverless cars, see Sebastian Thrun's (2011) presentation on TED Talks. Also, to find out about Google's objectives regarding driverless cars see Alex Wright's (2011) article on automotive autonomy.

will represent a major step in the direction of self-learning autonomous systems. Peter Trhan (2010, 825) explains that research is now oriented towards autonomous *flying* robots.

The Singularity (and artificial *super*intelligence)

What is the Singularity? It is that distinct point in history after which nobody can quite say what will happen exactly aside from saying that (almost) everything will certainly change. It is also a moment we cannot predict with great exactitude. In their thousand page long book, Russell and Norvig (2010, 12) only mention this concept in passing, indicating that the Singularity is reached once computers' level of intelligence equals that of humans, which they acknowledge is a description that does not tell us much. The Singularity consists of more than just that. In fact, Singer (2009d, 102-103) explains that in the field of astrophysics, this concept refers to a moment where new knowledge is made available that is so groundbreaking that it subsequently forces us to question all anterior knowledge. For instance, when Albert Einstein discovered the theory of relativity it revolutionized the field of physics as a whole (ibid., 103). Kurzweil defines the Singularity as "a future period during which the pace of technological change will be so rapid its impact so deep, that human life will be irreversibly transformed" (2005, 7). To give us an idea of how important the Singularity is and how serious it is considered by political leaders, Singer (2009d, 105) even points out that it was the topic of discussion of a US Congress study in 2007, which was called "The Future Is Coming Sooner Than You Think."

ASI is intimately linked with the Singularity because of the latter's exponential growth component. As per Barrat's (2013, 8) definition, ASI is a type of intelligence that is beyond that of humans. Once ASI is created then, the possibilities for breakthroughs in every scientific and non-scientific field become not necessarily unlimited as we cannot tell for sure, but certainly disproportionately greater than they currently are. ASI will not simply build on existing knowledge in a linear fashion like King (1995, 445) probably had in mind; rather, it will do so in an evermore-accelerating way. The Singularity is about technological changes that will be "expanding at an exponential pace" (Kurzweil 2005, 8). This exponential rhythm also explains why it is impossible to ascertain how ASI will change the future (of drone warfare and counterterrorism) in all its intricacies. This does not mean that every prediction about the implications of the Singularity and ASI are necessarily flawed. It means that we simply have no way of knowing because while we may be making estimates that seem logical and not overstated nor understated, we build these extrapolations on *present* knowledge, not post-Singularity knowledge. For that reason, we may be including factors or variables that will no longer exist and/or leaving out others that simply do not exist yet.

Neil Gershenfeld puts it in a simple way, claiming "what Ray [Kurweil] does consistently is take a whole bunch of steps everybody agrees on and take principles for extrapolating that everybody agrees on and show they lead to things that nobody agrees on" (quoted in Transcendent Man 2009). Experts have already made their bets regarding the consequences of the advent of ASI. They range from very optimistic (Kurzweil 2005; Moravec 1999, 13; Transcendent Man 2009) to quite pessimistic (Barrat 2013), passing by more cautious, yet enthusiastic ones (Singer 2009d).

Patently, there are currently a number of hurdles that will need to be circumvented before ASI and even AGI can be created. If there were not, AGI and ASI would likely already exist given the strong desires to bring them about. So what are existing forms of AI missing to become AGI or ASI then? More autonomy than they already possess? Neural networks that would be more powerful? Self-awareness? Consciousness? Intentionality? A passing mark on the Turing test? A mix (or perhaps *all*) of the above? Anything else? The answers to these questions may be decades away. And even if we knew which ingredients were missing to make the recipe for AGI and ASI, it might not be as simple as putting them in the mixing bowl. Can you think of a way to incorporate consciousness in AI?

The above obstacles are complex and their solutions are not self-evident, which would explain why experts' estimates regarding a timeline for the attainment of AGI and ASI do not all agree with one another (Barrat 2013, 196-197). As a student of the social sciences, my work concentrates on the political, ethical, and philosophical implications of ASI. Consequently, I deliberately leave these academic conundrums to those who they belong, namely computer scientists, cognitive scientists, engineers, neuroscientists, etc. To be clear, I am not arguing that social and political scientists should not pay attention to AGI and ASI or that the latter pair is not relevant to the former's respective disciplines; on the contrary, I insist that these technologies matter to all of us regardless of our fields of study. However, given the complexities of these technologies it is apropos to leave the task of figuring out how to overcome the (mechanical) difficulties they present to those who are best equipped to do so. Thus, I will not propose ways of fulfilling AGI or ASI. And so while I employ Barrat's definition of ASI throughout this thesis, I cannot provide my reader with the exact components of this type of intelligence. Yet, I expect that the elements that have been discussed so far in this chapter will give my reader a comprehensive idea, however indefinite, of what ASI would involve. In the following section, I lay out the theoretical foundation of my thesis, explaining how *jus in bello* together with virtuous war offer a tailored model of investigation for ASI drones.

A theoretical framework to suit ASI drones

The idea behind Asimov's three laws of robotic was that they would be ingrained within robots so that the robots would have no choice but to follow them at all time. In fact, the laws were to be "the three rules that are built most deeply into a robot's positronic brain" (Asimov 1942). The only problem: how do we (permanently) wire them into robots? Lee McCauley notes that while Asimov's laws are well known within the AI and robotics communities there is a near consensus that the laws simply have no real life use, for they "are not implementable in any meaningful sense" (2007, 153). Others (Moran 2008, 1557; Murphy and Woods 2009, 14) highlight just how difficultly the laws were followed even in the tales of their author, which also contributed to the stories' intrigue.

Until we figure out a way to input Asimov's laws into the core of every robot, it will be up to the humans who control these robots to apply the moral principles behind these laws or revised versions thereof (McCauley 2007, 162). McCauley (ibid.) even goes as far as comparing the allegiance that robot's human controllers should have towards the higher moral principles embedded in Asimov's laws to the Hippocratic oath doctors take. Those who, like Francis Hutcheson and Mencius (Mancilla 2013, 57), believe that human beings are capable of genuine benevolence will find that McCauley's suggestion is tenable. Others, including myself, who think that Thomas Hobbes's view of the state of nature as being "solitary, poor, nasty, brutish, and short" (2002, 96) or Bernard de Mandeville's (1988, 20) argument that vice is ubiquitous are better diagnoses of the world will find that McCauley's normative position is simply idealistic.

In theory, Asimov's laws could apply to drones since they are robots. When it comes to drones like Predators and Reapers, which are equipped with Hellfire missiles that deliberately target, hit, and kill select human beings, however, any attempt at using the laws on their merits becomes futile—especially since the laws were not intended to apply to robots specifically designed to kill. As I have explained in the introduction, drones have been used by the US in ways that contravene Asimov's first two laws. This is not the case simply because these laws cannot be entrenched in robots. While Asimov's laws cannot be inputted in robots, it would not be impossible for the US to ask its drone pilots to be committed to using drones in a fashion that would still embrace the moral ideals behind the laws. Thus, Asimov's laws *could* be used as a normative ethical parameter that would circumscribe the use of drones, should this be the design of the US drone war and counterterrorism campaign.[27] Again, this is *in theory*. In practice, there is plenty of evidence clearly indicating that this is *not* how the US employs its drones, nor aspires to.

When addressing the issue of drone strikes, the incumbent US President declared that "America does not take strikes to punish individuals; we act against terrorists who pose a continuing and imminent threat to the American people" (Obama 2013). This short passage encompasses the concept of self-defense, an idea at the heart of the 2001 joint resolution on the Authorization for Use of Military Force (hereinafter AUMF). Defending the use of US strikes, the Attorney General made clear references to the AUMF, stating that the US employed lethal force to *defend* itself (US Department of Justice 2014). Daniel Klaidman (2012, 140) notes that, legally speaking, the AUMF has been the central pillar of the fight against al Qaeda since George W. Bush. Military drones are and have been used for military operations and such tactical campaigns result in the death of individuals. Obama (2013) explains that the preference of the US is to capture rather than kill suspected terrorists, but

[27] An updated version of Asimov's laws—such as one substituting the words "human being(s)" that are currently in the first two laws with the words "non-combatants" or "civilians"—could act as a normative framework for the use of ASI drones deployed in counterterrorism (or other military) missions. Yet, hardwiring these modified laws into drones would still pose a problem.

that the former option is not always available. Hence, the use of drones in line with Asimov's laws becomes out of the question when the latter alternative is chosen. Once ASI drones will be requested to carry out counterterrorism missions for the US government, the superpower is unlikely to ask them to be careful not to hurt anyone while they are on duty. It more likely will ask them to get the job done, meaning that it will sometimes inevitably result in some people getting killed. I therefore turn to theoretical models that are customized to military endeavors, namely *jus in bello* and virtuous war.

As I mentioned in the introduction, Der Derian argues that virtuous war depicts current and future wars. Virtuous war comprehends the US (Global) War on Terror, the US (new) ways of war, and the US counterterrorism strategy, as each has used technologies that can reduce battlefield risks for US soldiers and *in theory* can reduce collateral damage (Turse and Engelhardt 2012, 55). Virtuous war is a type of war that is likely to keep on being waged, for its potential, theoretical benefits are very appealing to the leaders higher up the military chain of command. Turse and Engelhardt argue that the current state of US foreign policy is characterized by a global war, producing what they call "a drone-eat-drone world" (2012, 97), which is not close to be over. Benjamin (2013, 45) also uses the idea of a drone-eat-drone world, which she argues will be funded by US taxpayers.

In an interview he gave to Singer, Der Derian, who discussed drones and autonomous robotic systems more broadly, explained that "[i]f one can argue that such new technologies will offer less harm to us and them, then it is more likely that we'll reach for them early, rather than spending weeks and months slogging at diplomacy" (quoted in Singer 2009d, 321). Now, there has been quite some criticism from various sources (Benjamin 2013, 104-105; Neve 2013; Williams 2013, 115-118) arguing that drone strikes are nowhere near as precise and as "civilian casualty minimizing" as the US claims them to be. Taking this argument of impreciseness of drone strikes in consideration, the US virtuous war does not seem so virtuous after all, hence the diagnostic/sarcastic undertone behind Der Derian's concept of an allegedly "virtuous" war. Whether drones genuinely result in more "surgical" strikes with fewer casualties is beside the point, however.

What matters is the fact that the US does commend its counterterrorism strategy on these merits. That is, the US, whether because it sincerely believes in the virtuousness of its military campaign or simply pretends it does, uses virtuous war rhetoric to talk about its military objectives and achievements.[28] For instance, the President declares "[c]onventional airpower or missiles are far less precise than drones, and are likely to cause more civilian casualties" (Obama 2013). Advocating his superior's position, Eric Holder adds that "the use of advanced weapons may help to ensure that the best intelligence is available for planning and carrying out operations, and that the risk of civilian casualties can be minimized or avoided altogether" (US Department of Justice 2014). Military manufacturers also champion this argument, maintaining that the products they engineer minimize the risks usually present on the battlefield for the soldiers who employ them (Boeing 2014; iRobot 2013; Lockheed Martin 2014; Northrop Grumman 2013; QinetiQ 2013).

Leaving the veracity of virtuous war aside for a moment, let us take as a given that drones indeed not only enable, but also cause fewer civilian casualties by bringing about more precise strikes. In the definition of virtuous war is the idea of a "technical capability" (Der Derian 2009, xxxi) that renders a cleaner use of violence possible. For this capability to actually produce the desired outcomes of virtuous war—more "surgicality" and less collateral damage—the technology supporting virtuous war needs to have the principles of

[28] Saurette and Gordon (2013, 179) remind us that simply analyzing a discourse cannot help us pinpoint the reason(s) why an individual articulated that discourse. Hence, attempting to determine the rationale behind the US drone war and counterterrorism simply based on their discursive rhetoric is futile.

jus in bello, namely proportionality and discrimination embedded in it. Without these, virtuous war simply becomes war.

Ok, but why use *jus in bello* and virtuous war as a theoretical foundation to investigate the military ethical implications of ASI drones? Because the US is currently expressing a very clear desire to conduct warfare and counterterrorism in a clean fashion, an idea present in virtuous war and made possible through *jus in bello*'s tenets. When aspirations are blended with the possibilities offered by new technologies, unforeseen consequences (can) ensue. While the US' eagerness to play the drone game in an always cleaner and more virtuous way shapes the research agenda of AI scientists and military manufacturers, the technologies they produce also have an effect on these objectives as they unlock courses of action to wage war and counter terrorism that were not previously available. These technological prospects come with an ethical price tag. The title of Lin's (2010) article—"Ethical Blowback from Emerging Technologies"—best encapsulates this idea. In the next chapter, I canvass this desire to conduct war in a cleaner and more virtuous manner, which has been manifest in the US in the last few decades. I pay closer attention to the post-9/11 era and the Obama administration as the trend towards the automation and robotization of warfare has been more accentuated then.

Chapter 2

Towards drone ubiquity for an ever-cleaner counterterrorism strategy: The automation and robotization of warfare

Knowledge is seen as the key to "battlefield dominance," and speed is seen as the key to exploiting that knowledge.
—Thomas K. Adams, US military strategist

To a drone world[29] and beyond

This is the second of three chapters. My objective here is threefold. First, I show that there is an existing US counterterrorism strategy that is not near its demise and is therefore relevant to study. Second, I trace the development of automated weaponry and the conduct of war (from afar), which characterizes the US (new) ways of war and is understood through Der Derian's concept of virtuous war. By using the word "trace" I do not mean to suggest that I will be looking at every single model or generation of weapons. There is just too many of them and it would therefore not be possible in the limited space I have. Furthermore, getting caught up in the almost interminable list of different weapons would not be productive. Rather, I am more interested in sketching the general trend towards the automation and robotization of warfare and counterterrorism, a tendency that was discussed in the introduction and briefly at the end of the first chapter. Third, I take that trend a few years if not decades beyond the present, to a point where the US virtuous war will reach what could be seen as its "logical culmination", namely when ASI is blended into its ways of war.

Singer (2009a; 2010, 57-58) notes that while the US only used a few drones at the beginning of the 2003 war in Iraq, it now employs thousands in its multiple military campaigns. At the time of writing his article, he estimated that around 7,000 drones and an

[29] The term "Droneworld" refers to a not so distant future in which Ian Shaw (2012) believes there will be thousands of (non)military drones, which will be the aerial expansion of a long established network of US military bases across the globe. Droneworld is distinct from drone world in that Shaw's concept is inclusive of military and to some extent recreational drones too, while I refer exclusively to military drones, which can be used for surveillance, data collection, and/or targeted strikes. The drone world I write about most closely resembles the geographer's Predator Empire, which "bring[s] together the strategies, practices and technologies arranged around the deployment of drones for targeted killings" (Shaw 2013, 540).

additional 12,000 unmanned robots—such as those tasked to disarm improvised explosive devices also known as IEDs—were used by the US (Singer 2009a). Singer published the latest of these two articles in July 2010, which is more than five years ago. Hence and given the rapid pace at which the US is reinforcing (and even replacing) its manned arsenal with unmanned equipment, it is very likely that the US is currently using a fleet of drones that is by many times greater than the one it had in 2010. In fact, Singer (2009c, 35-36) explains that the US relies on drones each time it carries out a tactical campaign, quoting an Air Force lieutenant who predicts that prospective military undertakings may be characterized by the deployment of squadrons comprising several thousand drones. The above numbers and predictions only represent a brief survey of how much more the US is likely to depend on robots and drones in its future wars. The current breed of military robots employed by the US is nothing more than the tip of the iceberg (Singer 2010, 59).

I will devote the largest portion of this chapter attempting to map out this course towards a drone world and beyond. In the last section, I will extrapolate this tendency beyond the present use of unmanned systems in warfare and counterterrorism by the US, in what I argue is simply a logical continuation of the way war is being virtuously waged by the US. In other words, I am arguing in which direction the car would be headed if the US kept its right foot on the gas pedal with the same pressure it currently uses, but took its hands off the steering wheel. Doing so, I stretch the trend towards automation and robotization until it reaches a point where ASI becomes part of the equation, which of course only happens at a later indeterminate moment in (the US) military history.[30] But first, I will demonstrate that

[30] While I argue *where* the US ways of war are going, I do not take a position regarding *when* they will do so. I remain silent on that issue, given that the predictions concerning the advent of ASI represent an unsettled debate, an element I discussed in the first chapter.

there is indeed an existing military campaign that relies on (semi-)automated robotic systems.

Terrorism is well alive, and so are the measures seeking to counter it

As I write these lines, videos of two US journalists being beheaded by a masked individual are circulating on the Internet and across various social medias.[31] The names of these journalists were James Foley and Steven Sotloff and the individual who allegedly executed them claims to be from the organization named Islamic State of Iraq and the Levant (hereinafter ISIL) (Obama 2014). Shortly after the release of these videos and on the eve of the thirteenth anniversary of the 9/11 attacks, the US President addressed his nation regarding ISIL. His opening sentence made the purpose of his speech very clear: "tonight I want to speak to you about what the United States will do […] to degrade and ultimately destroy the terrorist group known as ISIL" (Obama 2014). Brookings Institution's Tamara Cofman Wittes (2014) was quick to note that the President did not actually express a theory of what he would do to vanquish ISIL. However, what matters is that throughout his short 15 minutes speech Obama laid out the principal military aspect of his country's counterterrorism strategy to defeat ISIL. As he articulated it, "ISIL is a terrorist organization, pure and simple [… and] I ordered our military to take targeted action against ISIL to stop its advances" (Obama 2014). I do not wish to initiate a definitional tirade here and will therefore not define "terrorism" nor will I try to determine whether ISIL fits any particular definition

[31] I do not provide a reference here as these videos contain macabre scenes, which violate the terms and conditions of several websites on which they are posted and therefore subsequently removed from. Hyperlinks to one of these sources may be broken days or even hours after their creation, thus rendering futile any attempt at referencing one of these sources.

of the term.[32] According to the US, ISIL *is* terroristic and because the former regards the latter as such, the US' efforts to thwart ISIL fall under the category of counterterrorism.

At several occasions during his address, Obama made explicit mentions to his previous counterterrorism campaign and implicit references to his administration's use of military drones, sometimes even employing the language that accompanies the concept of virtuous war. He reminded the American nation that his government had killed Osama Bin Laden as well as highly ranked members of al Qaeda and other related nefarious associations in places such as Afghanistan, Pakistan, Yemen, and Somalia (ibid.). These are four countries where US drone strikes have been recorded and which represent the center of the battlefield when it comes to US counterterrorism (Byman 2013; Cole 2013; Grondin 2013, 191; Shaw 2012; Vogel 2010, 132). Considering that these states are merely places were US drone strikes have occurred and therefore do not include the spaces where the (Global) War on Terror apparatus has been deployed—in places such as Guantánamo Bay (Cuba), Abu Ghraib (Iraq), and countless black sites in various locations around the world—it is no wonder Derek Gregory coined the term "the everywhere war" (2011, 239).

The 44th President declared that over 150 airstrikes had been fired by the US on ISIL, thus "sav[ing] the lives of thousands of innocent men, women and children" (Obama 2014). These strikes do not represent the end of the US counterterrorism strategy against ISIL. In fact, the first component of Obama's fourfold strategy is to maintain a military pressure on ISIL via strikes—*from the air*—like those it conducted in Somalia and Yemen (ibid.). He subsequently specified that this strategy would not entail the need for soldiers to be on the ground (ibid.). This particularity is indicative of the desire to keep soldiers out of harm's way and while it is not crystal clear whether the US will hit ISIL using planes containing human

[32] For more on criteria and definitions of terrorism, see David J. Whittaker (2004).

pilots, unmanned drones, or a mixed fleet, this statement strongly suggests that drones will play a significant role in this ongoing counterterrorism strategy.

Moreover, at the time of his National Defense University speech, Obama (2013) was seeing the threat on America as coming from a weakening al Qaeda, yet he now perceives the main danger of terroristic nature as originating in ISIL (Obama 2014). It was during this speech in Washington, D.C. that Obama (2013) exhaustively acknowledged the lethal use of drones by his administration. He then explained that the superpower's drone strikes were performed in the context of a war against al Qaeda (and its allies) and were part of a broader counterterrorism strategy. In his most recent speech on the issue of terrorism, Obama (2014) pointed out that ISIL used to be an ally of al Qaeda. Thus, efforts at defeating ISIL are nothing more than the continuation of a long endeavor to eradicate (major) terrorist organizations and the names these organizations give themselves or the individuals that comprise their membership then become absolutely irrelevant. These elements are trivial because a strategy that seeks to counter al Qaeda or ISIL is a *counterterrorism* strategy so long as the members of these groups are regarded as terrorists by the US, which they are in these two cases.

Ellen Meiksins Wood (2002, 9) argues that a war against terrorism simply cannot be won, for the goal of defeating evil is unrealizable. She adds that by setting an objective such as that of countering terrorism creates a "war without end" (ibid., 8). Notwithstanding Obama's essay to draw the idea of the Global War on Terror to and end (Grondin 2012, 1-2; Obama 2009; 2013), the US is still employing the same methods it did under the umbrella of the Global War on Terror. Cohn (1987, 709) explains that when you talk about the damages an incendiary or nuclear bomb inflicts on a populated city in terms of "mass murder" instead of "collateral damage" you are suddenly talking about a totally different thing, metaphorically speaking. In reality, a raw reality, however, you are talking about the same bomb and the same thousands of dead people. Ergo, putting aside the label of the Global War on Terror is simply a matter of framing, which may change the perception of the phenomenon we conceive in our heads, but it certainly does not change the crude reality on the battlefield especially if the same strategy and the same weapons are used. Grondin (2012, 1-2) draws attention to the fact that the Obama government attempted to swap the tag "Global War on Terror" for that of "Overseas Contingency Operations," not trying to determine whether this conceptual change is synonym with the (possible) end of the Global War on Terror.

Given that the US plans on using airstrikes against ISIL like it did with al Qaeda, one can confidently hypothesize that the US finds efficacy in that approach and will therefore likely embrace it when it comes to defeating whichever terrorist organization takes the place of a vanquished ISIL. And so my point here is that drone strikes will keep on being used in counterterrorism, an argument that has already been articulated by others (Byman 2013; Shaw 2012). Obama's (2014) address to the nation reinforces that position, hence increasing the timeliness of my research's relevance to the field of security studies. But what is it exactly that the US values in this modus operandi? It admires and strives for (a metaphorical) military cleanliness, which can then, in theory, nurture virtuousness. And as I mentioned in the introduction, virtuous war is more effectively achieved through the delegation of military assignments from human to non-human actants of war, namely robots. In the following section, I look at this transfer of martial task in more details, locating it in the US ways of war.

Are the US new ways of war really new?

Emily O. Goldman explains that, “[w]hile change in the ways of making war is an evolutionary process, periodically a state will succeed in exploiting an integrated set of military inventions and demonstrating clear superiority over older techniques of battle” (2001, 48). Vice Admiral Arthur Cebrowski argues that the advent of information technologies, particularly advanced in the US, holds the potential to significantly upgrade the US ways of war (Singer 2009d, 180-181). When information technologies are mingled with weapons, the latter’s enhancement is similar to that explained by Goldman. All of a sudden, soldiers who find themselves on Iraqi or Afghan soil no longer seem to be thousands of kilometers away from the US homeland; instead, they are in the earphones and on the computer screens of their commanders at a base somewhere on US ground (or elsewhere in the world). All of a sudden, distance does not seem to matter as much anymore. Goldman adds that, “[i]mprovements in core technologies like precision guided munitions, surveillance satellites, and remote sensing, combined with advances in the speed, memory capacity, and networking capabilities of computers, form the foundation for a fundamentally new way of war” (2001, 52). While the capabilities currently contained in drones that are linked with one another via digital networks such as those engineered by the University of Pennsylvania roboticists do not necessarily enable a flawlessly precise exercise of violence, they nonetheless capacitate a drastic enhancement of warfare techniques. Singer (2010, 60) argues that robots are a game changer. Cebrowski goes as far as averring that, “the advent of interconnectivity is comparable to the advent of fire” (quoted in Der Derian 2009, 131). Military manufacturers like Boeing, Lockheed Martin, and Northrop Grumman to name a few are most certainly already working on new prototypes of always more intelligent drones that will outcompete their predecessors.

And so in that sense, the denomination "new ways of war" utilized by Grondin (2013, 193) among others does indeed make sense. The emergence of *new* technologies makes possible their combination with existing military contrivances, leading to the creation of an upgraded breed of weapons, which subsequently gives the means to conduct warfare in a *new* fashion, hence the idea of "new ways of war." However, this concept may also be somewhat misleading because of the fact that it entails the notion of novelty. While new technologies have indeed been employed by the US, hence shaping its ways of war, it is important to note that there is an element of continuity in the US (new) ways of war. This continuousness can be found in a long established desire to make a certain aspect of virtuous war a reality, namely the aspiration to "actualize violence from a distance" (Der Derian 2009, xxxi).

Ian Shaw emphasizes that "unmanned aerial vehicles are definitely *not* [original emphasis] new technologies—their modern incarnation dates back to [the] Vietnam [War]" (2012).[33] In fact and as Singer (2009d, 46) explains, the desire to wage war from afar goes as far back as the days of Thomas Edison and Nikola Tesla when the two scientists were involved in a race for the creation of remotely controlled machines that would be commanded through radio signals. Of course, a mere desire to design a certain gadget is not in and of itself sufficient to result in that tool's creation. Technological progress is (often) not linear and it can sometimes take years if not decades for a scientific project to yield the results that its initiators had in mind. AGI and ASI are one perfect example of that. Moreover, progress in one field is sometimes dependent on a breakthrough in another domain, as is also the case of AGI and ASI, which are contingent on the advances in several areas of science. However and as Singer plainly phrases it, "what was technically possible

[33] For the purpose of this chapter, it is not necessary to trace or locate the inception of unmanned aerial vehicles. Simply pointing out the non-newness of drones suffices to support my broader argument, namely that there is a long existing trend towards the implementation of direct force from afar.

mattered less than whether it was bureaucratically imaginable" (ibid.).[34] The opposite of Singer's statement comes down to saying: "when there is a (governmental) will, there is a way."

The peaks of Edison and Tesla's respective scientific careers took place in the years leading to World War I, which was "more deadly, [and so] unmanned weapons began to gain some appeal" (ibid., 47). Hence, there was the foundation of a governmental will. The first discussions among security experts in the US regarding the possibility of robotizing the battlefield by sending autonomous robots instead of soldiers took place at the beginning of the 1970s, however (Singer 2010, 57). The bloodshed that took place during the Vietnam War activated the governmental will to develop unmanned robots. Such weapons enabled those who employed them to strike their opponents while remaining in a protected zone. Distance is key. Let us take the example of a boxing match where one fighter measures 5'11", the other 6'4", and the rest of their physical characteristics are relatively similar. Which boxer is most likely to win? The tallest because his arms will be longer and so will the reach of his punches. Again, distance is key, which is why the advent of military technologies like machine guns and tanks that increased the distance between combatants changed the way wars were conducted (Singer 2009d, 100). Prior to these inventions, soldiers fought in close combats that posed great risks to them as killing an opponent meant putting oneself in the enemy's range. Rudimentary inventions such as bows and arrows changed the game, for an archer could kill from afar. Machine guns, tanks, and bombers only magnified this technical advantage. Today's Predators and Reapers represent the archetypical separation between military rivals, simultaneously embodying the logic behind virtuous war.

[34] Singer made that statement in the context of a situation where Tesla explained to a Washington official that he had made some technical progress in his laboratory, but that it seemed far-fetched that it would be implementable by the bureaucracy. Hence, Tesla's idea was dismissed despite its scientific feasibility.

Ok, but can this distancing be stretched even further? Theoretically, yes. How? By removing the human from the kill loop through a total delegation of a license to kill to a machine. In other words, by granting robots complete lethal autonomy. As I will explain at length in the next chapter, I argue that doing so would be most effectively achieved through ASI drones, and the creation and deployment of these futuristic weapons is nothing more than the logical continuation of a resoluteness to conduct war and counterterrorism virtuously. While this may not actually increase the physical distance between those effectuating the killing and those being killed—for planet Earth is spherical and there is therefore an actual maximum distance between two points on its surface—it will ensure that the population of the side on whose behalf the robots are doing the killing is made as unaware as possible of the slaying. Not only will the use of these weapons help save the lives of those employing them, it will also censor killing as a whole for them. That is, as those living on Elysium[35] became oblivious to the poverty and suffering still rampant on Earth, war and counterterrorism will carry on without those employing ASI drones even knowing that they are. This is the apogee of cleanliness, enabled through an absolute reliance on killer robots to effectuate the killing. Current research on drones concentrates on the post-traumatic stress disorder from which drone pilots suffer due to the nature of their work (Eckert 2014). As nightmarish as the above scenario may sound, this complete delegation of lethal decision-making to robots would be a way of keeping soldiers out of *psychological* harm's way—a

[35] According to the poems of Hesiod and Homer, Elysium refers to a place of abundance where select heroes—after having been chosen by the Gods—were sent to live for eternity, away from the miseries of Hades' underworld (Marinatos and Wyatt 2011, 385). Also, in the movie *Elysium* (2013) poverty and diseases have spread across Earth, rendering the planet unviable. To remedy the situation, Elysium, an artificial land in the form of a giant rotor, is built and placed above Earth. Elysium admits only those who can afford to pay an exorbitantly expensive spacecraft trip to it. Equipped with technology that can heal (almost) any disease, it is populated exclusively by the rich and the doctors ensuring their survival, hence leaving the poor and suffering population behind. The happiness generated on Elysium renders its inhabitants impervious to the suffering they once experienced.

step closer to the clean exercise of violence. But as Der Derian points out, "in the final analysis that it seeks to evade, virtuous war is still about killing others" (2009, xxxiii). And of course, such military strategy has profound ethical implications, which I will address in the last chapter.

Towards harder, faster, and stronger drones

Shaw's (2012) main argument is that the US' exercise of military power is shifting from a previous reliance on military bases *on the ground* to drones *in the sky*, hence the title of his article "From Baseworld to Droneworld." Because the US had military bases spread out across the globe, the superpower could quickly intervene or apply its power virtually anywhere. However, these interventions still necessitated human soldiers to be mobilized. In Droneworld, this necessity is fading, as military technologies grow more intelligent. This represents a continuum that leaves space for an incremental, and sometimes abrupt, decrease on the reliance of human beings. In fact, Droneworld is a flying, mobile, and unmanned version of Baseworld, allowing for a much faster and risk-free exercise of military might. For instance, Lockheed Martin's High-Altitude Airship, which is designed to fly at high altitudes as its name reveals, can remain in flight for up to months at the time without having to land to refuel (Singer 2010, 60). The VULTURE, an acronym that stands for "Very-high-altitude, Ultra-endurance, Loitering Theater Unmanned Reconnaissance Element," is a project initiated by DARPA and which is expected to be able to stay in flight (or perhaps it would be more appropriate to say *in orbit*) for periods of five years (Benjamin 2013, 48; Singer 2009d, 117). Benjamin even alludes to drones that "will be able to remain airborne indefinitely" (2013, 19). Given the high level of secrecy around such technologies, it is not clear whether they have already been put in the sky and, if so, whether they have met the expectations of their creators.[36] These projects certainly open the door to another level of drone warfare. Once the US decides that it should equip its High-Altitude Airships and VULTUREs with lethal power, such as with the Hellfire missiles found on Predators and Reapers, the science fiction flavor of S.H.I.E.L.D.'s drones will start waning pretty fast.[37] And I am not even talking about ASI drones, which will be the systematic continuance of a desire to fight *à la* Der Derian.

Counterterrorism is the driving force behind the virtuous war rationale. While the objective of sending robots on the battlefield to spare human lives has been present in the mind of US politicians, engineers, and military manufactures for a relatively long period of time, the attacks on US soil that took place on September 11, 2001 acted as a catalyst on this governmental will to devise cleaner, robotic weapons (Benjamin 2013, 16). Ty McCormick (2014, 18) locates the beginning of killer drones in 2001, when the now (in)famous Hellfire missiles were added to drones. McCormick adds that in November 2002, the US performed a strike outside of the formal context of war, an unexampled action that marked the beginning of drones being used at the heart of counterterrorism (ibid., 19). Furthermore, Singer (2010, 59) specifies that the primary issue in the military following 9/11 was to acquire as many robots as possible and deploy them so that US soldiers would be out of harm's way. This is the essence of virtuous war, aptly captured by Benjamin who argues that,

> [t]he main advantage of using drones is precisely that they are unmanned. With the operators safely tucked in air-conditioned rooms far away, there's no pilot at risk of being killed or maimed in a crash. No pilot to be taken captive by enemy forces. No pilot to cause a diplomatic crisis if shot down in a "friendly country" while bombing or spying without official permission (2013, 18).

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[36] The X-37B, a joint project between Lockheed Martin and Boeing, is a space drone, which recently completed a top-secret mission for the US government that lasted 22 months (Yuhas 2014).

[37] For more details on S.H.I.E.L.D.'s drones, see the introduction.

However, sending a drone instead of a human flying a F-15 for instance is not sufficient. The drone has to be precise. The higher the lethal precision, the cleaner the strike becomes, and the more virtuous the war comes to be. But higher precision requires more reliable intelligence on which decisions can be taken. In fact, to be effective killers, drones need to know where, when, and who to target, thus relying on the intelligence humans provide them and "for all their advanced optics and loitering capacity, [... drones are] only as good as their intelligence" (Williams 2013, 37). The US is already working to solve that practical hiccup, engineering the Gorgon Stare, a surveillance system employing twelve high-resolution cameras enhancing Reapers' vision, originally using a single camera (Shachtman 2009). And because war can never be too clean, DARPA is on its way to devising ARGUS, which is somewhat similar to a second generation of Gorgon Stare, its main upgrade being its ninety-two high-resolution cameras (Turse and Engelhardt 2012, 40).[38] Akin to every new software update on our personal computers, the Gorgon Stare and the ARGUS are likely to experience various types of malfunctions, which will result in their diminished effectiveness and/or accuracy. Yet, based on the current trend in the manufacturing of military drones, the US is doubtlessly conceiving Gorgon Stare 2.0 and ARGUS 2.0, or whatever next breed of drones. In short, if a given model is not as precise as the US wants it to be, the superpower is likely to keep tuning it.

According to Turse and Engelhardt, the US Air Force's foremost aim regarding military research and development is to "rule the skies with MQ-Mc drones and 'special' super-fast, hypersonic drones for which neither viable technology nor any enemies with any comparable programs or capabilities yet exist" (ibid., 44). The Air Force expects that it will have reached this ambitious objective in 2047 (ibid.). While this would have sounded like

[38] For more on DARPA's ARGUS project, see Hambling (2009).

pure science fiction a few years ago, recent progress in the field of AI suggests that this drone world is in fact not too far away (McCormick 2014, 18). To top it off, Turse and Engelhardt (2012, 45) predict that if the Pentagon adheres to its master plan and remains as militarily enterprising as it currently is, in 2047 it will be working towards its 2087 goals. It seems that the US is taking part in an arms race *with itself*, akin to the early portrayal of Scrooge McDuck whose main aspiration was to become richer *ad infinitum*, even though he was already the wealthiest Walt Disney character (Ewalt 2013). Unlike Scrooge who could attain his objective by simply waiting for the return on his investments, the US needs to keep on innovating if it wishes to have an everlasting state-of-the-art military, a durable edge Singer maintains is not achievable (Brown 2010, 27; Singer 2010, 60). In the next section, I will argue against Singer's position, showing why ASI drones are the extension of the US virtuous war.

Why ASI drones are a logical continuation of the US quest for war virtuousness

For students, the advent and democratization of online databases meant that they no longer had to go through the shelves of a library as they could now retrieve (most) information through the Internet, download it, and bring it with them anywhere they went so long as they had access to a computer connected to the Web. It also meant, however, that they would have to go through the extensive amount of useless data disseminated online, hunting for the articles that contained the information they needed. In itself, this pinpointing exercise could be a challenge, since when conducting research there is usually a greater quantity of unwanted information than there is of desired one rather than the other way around. And so the quest to finding the few articles that will be useful to write a term paper on topic X can end up being similar to searching for a needle in a haystack.

The twelve and ninety-two cameras, with which the Gorgon Stares and ARGUSes are respectively equipped, create a similar and more accentuated problem for the US military than online databases did for students. In fact, theses cameras will be producing a tremendous quantity of video footage, creating intelligence that the US will have to assess meticulously to be able to base military actions or counterterrorism measures on it. Turse and Engelhardt (2012, 40) substantiate this point, maintaining that the ARGUS would simply generate an overwhelming amount of video data. Others (Adams 2011, 9; Suarez 2013) have also addressed this inevitability of an information overspill, arguing that the logical (although not necessarily moral) solution to this problem lies in granting more (lethal) autonomy to machines. The calculation is straightforward: for every hour spent on a mission, an ARGUS drone would produce ninety-two hours of video. Also, it is improbable that the US will acquire only one ARGUS drone. The numbers I discussed at the beginning of this chapter concerning the increasing amount of drones (and robots) employed by the US evince that there will be hundreds if not thousands of ARGUSes flying simultaneously to cover larger areas of the sky. Such a fleet would literally produce millions of hours of video, rendering any attempt by human beings to analyze them exacting, if not counterproductive. Hence and for lack of ASI, the most advanced AI systems become quite appealing.

Singer (2009d, 274) argues that integrating AI technology with surveillance systems would contribute significantly to the latter. The ARGUS technology comprises of one such surveillance system that could benefit from an AI enhancement. However, the utilizations surveillance mixed with AI that Singer anticipates are relatively modest. To be sure, he expects that security cameras such as those found in large cities will be able to identify behaviors that suspiciously stand out and alert the police force (ibid.). Granted, this would certainly represent an improvement of policing techniques, making interventions more effective as police would know where and when to get involved, but let us apply this logic to the ARGUS. Once an AI-equipped ARGUS drone would locate a potential terrorist it would have to relay the information to a human controller sitting at a Nevadan military base in front of a monitor containing a myriad of screens. The system would show a signal on the screen(s) in which the potential terrorist is broadcasted. The controller would then have to assess the information and decide whether (s)he should intervene.[39] Should (s)he choose to act, (s)he would send a drone, which may or may not be the one which spotted the terrorist in the first place, to carry out the strike—keeping in line with virtuous war's clean exercise of violence *from afar*.

But the main problem with the "kill loop" described above is that it is too long and decisions are made too slowly. While Singer is most certainly accurate by stating that "[t]he real breakthrough in counterterrorism may come from combining automated and artificial intelligence systems with our broader network of surveillance" (2009d, 273), he needs to take one more step down the path of lethal autonomy—which he does elsewhere (Singer 2009b)—to understand where this trend is going. The real value of AI combined with surveillance systems is unveiled once drones are given James Bond's 00 status. A license to kill—signifying that drones would not need an authorization to kill before every strike—would unleash enormous military potential, which would itself enhance the "technical capability [… to] actualize violence from a distance" (Der Derian 2009, xxxi). The ability to fully delegate a lethal task to a computer has existed for some time already, dating back to the Aegis computer used to defend Navy ships in the 1980s (Singer 2009b). Singer argues

[39] According to Singer (2009b; 2010, 63), drone pilots tend not to question the validity of the data that is digested for them by a computer or robot. Hence, they are very likely to simply follow whatever advice the computer or robot offers them. If pilots blindly assent to the evidence that is brought to them by a machine, then it becomes useless to even bring that evidence to their attention in the first place. At that point, "the operator really only exercises veto power" (Singer 2010, 63).

that as computerized and robotized systems grow more autonomous, “the human power ‘in the loop’ [becomes] actually only veto power” (ibid.). He adds that more often than not, humans are simply too slow to act on time and make use of their veto anyways. If the US decides to withhold the authorization to kill and always requires that a human controller make the final decision to shoot (or not), the robot may be shot down by the enemy precisely because valuable seconds will have been spent by the human to choose whether to shoot—a decision it no longer needs to make. Hence, the decision to keep a human in the loop becomes one that is merely symbolic rather than strategic or moral.

In a reaction involving several chemical elements and compounds, the substance that is contained in the least quantity, in an unbalanced equation containing all the reagents, is called the limiting reagent. It prematurely terminates the chemical reaction although certain quantities of the other reagents have yet to be consumed. There are two possible options to restart the reaction: using a greater quantity of the limiting reagent or substituting it with another reagent that possesses analogous chemical properties. And so as robots become stronger, faster, more intelligent, more lethal, more capable, and more [fill in the blank] than humans, the latter become the limiting reagent. Unlike in chemistry, however, adding more human to the equation will not restart the reaction. Thus, (adaptive) autonomy becomes the most effective substitute (Adams 2011, 9). Restraining the new capacities and features of these augmented robots to the level of what humans can do simply defeats the purpose of why these machines were upgraded in the first place.

Singer (2009b) puts forward several other arguments explaining why full autonomy is a logical (and inevitable) course of action in warfare and counterterrorism. I will not list them, as it would become a mundane enumeration of points that have already been made. Each of these arguments is compelling and considered jointly they strongly suggest that full automation of military robots seems guaranteed. Of course, there is political opposition, which I mentioned in the introduction. Thomas K. Adams (2011, 11), who also argues that the automation of lethal robots is inevitable, presents a key, strategic argument that could get the US to simply dismiss any political dissent and move forward with a plan to designing and deploying a hefty fleet of ASI military drones, or at the very least fully automate its military drones and other robots. His argument implies a victory of pragmatism over morality as he claims that once a "less moral" enemy realizes the potential of removing humans from the decision-making loop and decides to unleash it, the "more moral" side will have no choice but to unleash it as well. This creates a potent incentive to be the first to free this capability, favoring the (creation of the means for) offense.[40]

The speed and processing power of computers and military robots will surpass human capacities and, according to Adams (2011, 8), the logical continuation of the robotization and computerization of warfare is a world in which humans will no longer be in control—another way of saying utmost automation. When this happens, warfare will have moved away from what Adams call the "human space." Ok, but what happens once war leaves the human space and that humans are simultaneously removing themselves from war—as they increasingly distantiate themselves from the battlefield? Can there ever be a final plateau in military innovation, leading to a permanent status quo? As I alluded to in the previous section, Singer argues that "[i]n technology, there is no long-term first mover, advantage" (quoted in Brown 2010, 27).[41]

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[40] Stephen Van Evera (1998, 16) argues that the idea of offense dominance contains an inherent circular perpetuity. That is, offense dominance can self-generate. Thus, if the potential of *fully* autonomous weapons creates an incentive to be the first player to have them, and that their possession leads to (a perception of) offense dominance, then there is an even greater incentive to be the first one to take control of them.

[41] Singer's position is supported by the economical argument put forward by Paul Kennedy (1987, 533) who maintains that the US' somewhat improvident military expenditures demonstrate how a long-term

While I am tempted to agree with Singer's statement given the many pioneering inventions that have been emulated shortly after their creation, I wonder if it will *always* hold true. What about a technology that is so powerful that it is able to learn and evolve, consequently defeating any potential (non-)state enemy that would seek to counter it *before* it even acquires the means to do so? Here, I am thinking about a fleet of fully autonomous ASI drones that could ameliorate their lethal abilities after each of the missions they would be sent on, akin to ALVINN's parking skills. Would not such a technology assure whoever controls it to remain the apex forever? I think so. For instance, if nuclear-armed state M continuously nukes state Q—somewhat akin to the US consecutive bombings of Hiroshima and Nagasaki—whenever the latter starts developing a technology that could pose a risk to the former, therefore compelling Q to stay in the Stone Age, M is guaranteed to stay ahead without continuously having to develop new types of weapons. Yet, M is unlikely to nuke Q incessantly as the damage to Q would be far disproportionate. Also, nuclear bombs are not in line with the idea of virtuous war—although the technostrategic language used by defense intellectuals suggests so (Cohn 1987)—for they are not engineered to be precise and they generate an excessive amount of death. However, if it had a fleet of fully autonomous ASI drones, M could deploy them and keep Q in a perpetual check, without the collateral damage. These drones would *surgically* target key elements of Q's means of producing weaponry. Plus, counterterrorism would not benefit much from relying on nuclear weapons, but definitely would gain should it bank on a breed of weapon that could eventually inflict unerring force because it would continuously get better at doing what it is it does, namely exercising violence in an ever cleaner way. Didier Bigo (2014) who studies

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hegemony is not viable. I will not expatiate on Kennedy's rationale aside from conceding that it is cogent. Yet, I argue that ASI drones could prove him wrong.

(cyber)surveillance, explains that several states, including the US, have increasingly relied on comprehensive online data gathering to counter terrorism. While I do not discuss them here, non-lethal cyber-weapons such as cyber-surveillance are also worth considering, because for ASI drones to act, they need intelligence on which to act in the first place. This intelligence can be obtained via such types of surveillance—at least according to the US (Thierer and Wayne Crews 2001).

And so I argue that this is where the US ways of war and counterterrorism strategy are headed. The arguments I presented in this chapter concerning the likelihood of (full) automation of warfare are weighty and strongly intimate an end that seems inevitable. Although this is just a theoretical extrapolation, the fact that it is based on a logical continuation of the US *current* ways of war calls for a serious discussion on the implications such a grand strategy—assuming it were implemented—would have not only in terms of military ethics, but also for the field of International Relations as a whole. This is a task I turn to in the final chapter.

Chapter 3

The Matrix: Conceptualizing the logical extrapolation of American counterterrorism and assessing its ensuing ethical implications

With great power comes great responsibility.
—Uncle Ben to Peter Parker

It starts with a seed of imagination

Defining ASI is a formidable challenge. Incidentally, it is the comment I received the most often every time I talk about my thesis topic to a colleague. To overcome this definitional hurdle a discussant (Cameron Thies) actually provided me with a most welcome hint: "Ask yourself, if I could study ASI (that does not exist (yet)), how would I study it? Be imaginative!" Imagination is a powerful tool, one that is used by each of us on a regular basis to accomplish various goals. Along with resourcefulness, it allows us to figure out ways of circumventing the barriers we encounter in our personal and professional lives. It shapes our thoughts, capacitating us to perceive solutions to problems that are not necessarily evident and that require thorough thinking. It enabled individuals like Guy Laliberté to devise truly beautiful creations such as the Cirque du Soleil. Imagination is what allowed author J. K. Rowling to ideate a magical universe, which resulted in her writing of the seven Harry Potter bestseller novels. It was imagination again that built on the lengthy descriptions found in these books and gave life to the characters depicted by Rowling, leading the Warner Bros team to produce eight full-length motion pictures.

While there is some level of imagination behind every fantastic book or movie, this attribute is at the heart of a particular genre, namely science fiction, a genre whose very identity is itself open to contest when it comes to defining it.[42] But how exactly is science

[42] Eric S. Rabkin (2004, 458) traces the beginning of science fiction back to the 1920s. He also recognizes the lack of consensus around a single definition of the genre (ibid., 459). Having defined it as "the branch of fantastic literature that claims plausibility against a background of science" (ibid.), Rabkin argues that this depiction is insufficient, for it inevitably excludes non-textual manifestations of the genre. Rather than merely being a category within literature, he regards it as a "cultural system" (ibid., 461) that encompasses much more than just texts. Andrew Milner (2011, 393), however, argues that science fiction emerged as early

fiction related to politics? Science fiction represents the precursor of—perhaps even the catalyst for—many technologies that are used to fulfill military objectives. These military inventions subsequently shape the ways of war, ergo having consequences on the field of security studies, a subfield of IR that is in part studied to inform political decisions on the matter of war (Walt 1991, 211). Thus, science fiction has a *non*-fictive effect on war. In fact, Franklin explains that it shapes warfare, arguing that,

> [t]o create the objects that menace our existence, some people first had to imagine them. Then to build these weapons, a much larger number of people had to imagine consequent scenarios—a resulting future—that seemed desirable. Thus our actual superweapons originated in their imagined history, which forms a crucial part of our culture (1988, 4).

Franklin (ibid., 5) further argues that science fiction, which speaks to the realm of military, has influenced actual inventions, since throughout history scientists have attempted to emulate the military technologies that had been depicted in movies or fantastic novels.[43] Singer (2010, 60-61) gives the example of French fictionist Jules Verne, whose famous *20,000 Leagues under the Sea* inspired the submarines now used by several states, yet especially the US. Movies or books like *Star Wars*, *Star Trek*, or (almost) any of Ian Fleming's *James Bonds*, to name a few, contain a panoply of ideas for the weapons of the future, from which military manufacturers and scientists can choose and endeavor to engineer in the years to come.

While it provides military experts with proposals for the next superweapons, science fiction is not only useful to these specialists. It is also valuable for each of us in that it smoothens the transition from one military era to the ensuing one. As Singer phrases it,

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as during the second half of the nineteenth century, as a continuation of the purely historical genre. The fact that Rabkin and Milner locate the genesis of science fiction at two different times is indicative of the contested character of this specific genre. Furthermore, Milner views science fiction as a branch of literature, which simultaneously shapes and is shaped by a broader science fiction tradition (ibid., 408).

[43] Jean-Marc Lévy-Leblond puts it straightforwardly, arguing that, "Scientists deal with the facts. But they wouldn't get anywhere without dreaming up stories first" (2001).

"science fiction creates both an expectation and early acceptance of technologies that are not yet fully developed" (2009d, 164). Science fiction allows us not to be awestruck or bemused when we see something new. Without necessarily allowing us to fully comprehend military newness, it offers us a conceptual template, which we can use in an attempt at making sense of the novelty we are faced with. Referring to *The Matrix*, Mattias Ågren argues that the film "provided a platform for looking at ourselves" (2010, 271). To be sure, science fiction helps each of us to conceptualize present and future technological phenomena precisely because it is ingrained in popular culture, which we continuously experience in our every day life.

Lakoff (2009, 21) compares narratives to stories found in (popular) culture and that are interpreted in our brains. He adds that narratives are composed of frames, which he argues organize our thinking and understanding of real life events (ibid., 22). To put it simply, we rely on frames that are already present in our brains and which contain a large quantity of information about the world to try to understand situations that we have never encountered before. Although Singer does not explicitly refer to narratives or frames, he describes the utility of science fiction in a way that parallels Lakoff's explanation thereof, arguing that "[b]y allowing us to imagine the unimaginable, it helps prepare us for the future, including even in war" (2009, 165).

Three research questions recalled

I started this thesis with three research questions: first, what would be the military ethical implications of ASI firstly on drone warfare and, secondly, on the American counterterrorism strategy? So, as to make sense of a grand strategy that would rely on ASI drones, how can this military program be conceptualized? My aim in this third chapter is thus straightforward: I attempt to provide an answer to the three research questions stated above, building on what I have argued so far in the first two chapters.

To facilitate our answering of the first two questions, I will begin with the third one, as conceiving an abstraction of the US counterterrorism strategy can guide us towards imagining the results and blowbacks of one logical extrapolation. To create this abstraction, I borrow from one ideational representation of science fiction deeply embedded in popular culture, namely “the Matrix” from the movie *The Matrix* (1999), which is a virtual world populated by computer programs and virtual selves of the human race bred and cocooned by AI machines. I will use this representation as a heuristic tool to produce an imaginative tool that will act as an interpretative guide for the current and future US ways of war. I will execute this task in two stages, starting with a delimitation of my science fictive or conceptual tool—the Matrix. Subsequently, I will apply the Matrix to the American counterterrorism strategy, showing how the former can be conceptually superposed on the latter and, more importantly, trying to assess the systematic continuation of this military campaign into the twenty-first century (and subsequent ones). Once these two tasks will have been executed, I will discuss the implications of these futuristic US ways of war firstly on military ethics and secondly on the field of IR at the same time addressing the first two research questions.

Conceiving a conceptual tool

The Matrix? Yes, I am talking about the movie staring Keanu Reeves who personates Neo—that man who wears black sunglasses and a black leather coat and is famous for dodging bullets in slow motion.[44] But why use the Matrix? Because it is lodged into Western—and to some extent non-Western—popular culture and can therefore be employed as a means of picturing the US counterterrorism strategy in a way that will resonate with a larger audience.[45] Moreover, Ågren (2010, 250) notes that *The Matrix* has been at the center of a considerable amount of academic research and that since its appearance in 1999 no other film has garnered as much attention in popular culture. Many scholars who have analyzed the movie have observed the all too obvious connection with Plato's allegory of the cave, making the argument that the Matrix is analogous to the cave depicted by Plato inside of which what is seen or sensed are nothing more than shadows on the cave's wall, mere illusions of the real world (Ågren 2010, 263; Gunkel 2006, 199; Haddad 2005, 403; Lazar 2004, 618; Shenk 2006, 253; Woodward 2008, 442). The character of Morpheus, portrayed by Laurence Fishburne, refers to the Matrix as "the world that has been pulled over your eyes to blind you from the truth" (*The Matrix* 1999). Additionally, David J. Gunkel (2006, 200) remarks that when Morpheus offers Neo a blue pill and a red pill, the latter individual is confronted with a very similar choice than that of the prisoner in Plato's cave who must decide between remaining oblivious to the "real" world and staying inside the cave or getting out of it and discovering the "truth," with whatever it may entail.

[44] According to Ågren (2010, 250), the first movie of the trilogy offers sufficient material about the Matrix to grasp its essence. Hence, I will rely exclusively on the first movie to conceptualize the US counterterrorism strategy and its extrapolation. While I disregard the two sequels of the franchise, namely *The Matrix Reloaded* (2003) and *The Matrix Revolutions* (2003), I am not opposed to their inclusion in future research on the matter of US counterterrorism. In fact, both 2003 movies reveal information about the Matrix that is not present in the first motion picture and which could therefore be used to enhance our understanding of the Matrix, allowing us to refine this conceptual guide for the appraisal of the US counterterrorism strategy.

[45] In his introductory class to IR, Miguel de Larrinaga (2014) uses the example of Neo's rebellion from *The Matrix* to illustrate Gramsci's concept of counter-hegemony, which suggests that this film can serve as a useful educational tool. Besides, Singer (2009a) argues that *The Matrix* might offer a better conceptual tool for the prospect of hostile robots than the movie *Terminator* itself.

The philosophical undertone of *The Matrix*, rooted in Plato's Republic, cannot be understated. The fact that many scholars have studied this aspect of the movie bears witness to the saliency of the introspective quest Neo and Plato's prisoner undertake. In creating the film, the Wachowskis have also made apparent links with the 1865 novel *Alice's Adventures in Wonderland*. One of the first scenes of the movie shows Neo being wakened up by his computer, having been hacked by Trinity who tells him to "[f]ollow the white rabbit" (*The Matrix* 1999), which he subsequently sees tattooed behind the shoulder of another character in the movie and decides to go after. Later on in the movie, when Morpheus offers Neo the choice between the two colored pills mentioned above, the former makes an explicit reference to Alice's Wonderland, stating: "You take the red pill, you stay in Wonderland, and I show you how deep the rabbit hole goes" (*The Matrix* 1999). This Alice's Wonderland analogy that runs throughout the story presented in *The Matrix* has also been at the center of Ron Shenk's (2006) research.

While these parallels with Plato's allegory of the cave and *Alice's Adventures in Wonderland* are essential to *The Matrix*, in that they form the philosophical complexity of the movie, which led it to be studied in academia and also contributed to its becoming a cult movie in science fiction and popular culture, they are not the elements I want to focus on for my assessment of the US counterterrorism strategy. The aspect of *The Matrix* that is useful for my purpose is the actual Matrix—the software program that the Matrix itself represents. It is apropos to start by looking at the way the Matrix is defined in the film. As Morpheus explains, "[t]he Matrix is a computer generated dream world, built to keep us [humans] under control" (*The Matrix* 1999). "Control" is the key word in this definition, for it entails that a certain authoritative actant be present. That is, there needs to be someone or something actively controlling the computer program—akin to the moderators regulating Internet forums. In the Matrix, these “moderators” are called Agents, the most famous one being Agent Smith. Ågren characterizes Agent Smith as “a sentient program described by Morpheus as a ‘gatekeeper’ ‘guarding all the doors’ and capable of moving in and out of the software that comprises the world of the Matrix” (2010, 255). In other words, Agent Smith is able to roam over (or within) the Matrix so as to ensure the hierarchical nature of the latter.

Should the rules of the Matrix be broken, as they often are by Neo, Morpheus, Trinity and the other members of their crew, Agent Smith’s role is to intervene and restore the order—that which is dictated by the artificially intelligent machines created by human beings and whose materiality only exists outside of the Matrix. He can do so nearly anywhere inside the Matrix, at any time. The logic that exists behind the Matrix is also found in spider webs. To be sure, while a spider can physically only be at a singular location at the time, it is simultaneously everywhere on its web—abstractly speaking. This is because a minute vibration caused by an insect anywhere on the web, except perhaps at its extreme edges, is sufficient for the spider to sense the presence of its prey. The spider does not need to search the whole web to find its prey; rather, it can perform a targeted “intervention” at the exact location of the insect stuck in the web, expeditiously neutralizing the bug that is still helplessly and nervously quivering. Unlike spiders, Agent Smith does not rely on actual vibrations to intervene inside the Matrix. His mode of identification of an anomaly within the Matrix is dependent on the myriad eyes found in it. That is, the eyes of the individuals who populate the Matrix act in a way analogous to the meshes that comprise a spider web. Although they do not sense physical vibrations, they can *see* irregularities.

One of the final scenes of *The Matrix* best encapsulates this way of intervening inside the Matrix. Neo, Morpheus, and Trinity find themselves in a subway station and are looking for a way out of the Matrix, namely through a telephone booth. As Morpheus literally disappears outside of the Matrix after having picked up the ringing phone, a homeless man who was laying in the corner of the station and who witnessed the scene expresses mystification, sending a signal directly into Agent Smith's earphone. Trinity is second to disappear through the telephone. When she does, the camera zooms on the homeless man who is puzzled once again, subsequently leading Agent Smith to teleport himself into the body of the homeless man and becoming him so as to stop Neo from leaving the Matrix. Relying on the sight of the homeless man who disseminated the inconsistency he perceived—Morpheus and Trinity's seemingly supernatural disappearance—across the Matrix, Agent Smith was able to intervene. Granted, Agent Smith failed to stop Neo, but this is because the latter is the One. This intervention was nonetheless successful in the sense that Agent Smith manifested himself at Neo's precise location despite the immensity of the Matrix. Of course, (geographical) space—important in military strategies—does not hold the same significance inside the Matrix for distances can be bent, as the rules by which our physical world is regulated do not apply within it. That difference notwithstanding, Agent Smith's involvement illustrates the idea of a targeted intervention akin to that of surgical drone strikes—an element I elaborate later in this chapter.

The intervening mechanism described above is crucial to my chapter because it forms the essence of the conceptual tool I will use to fathom the extrapolation of the US counterterrorism strategy. In the next section, I apply this abstraction to this military campaign.

The Matrix and US counterterrorism

In the previous chapter, I pointed to the seemingly inevitable direction in which the current US counterterrorism strategy was headed. The evidence is compelling. The US is actively expanding the size and capabilities of its unmanned fleet, not only building new models of drone, but also manufacturing and deploying a large quantity of units. These High-Altitude Airships, VULTUREs, Gorgon Stares, and ARGUSes will be harder, faster, and stronger than the Predators and Reapers used by the US in its fight against al Qaeda. Based on the current trend in the US ways of war, to be effective and allow for virtuous war to be waged, this next generation of drones will be highly dependent on advanced forms of AI, however military effectiveness this technological transition may actually bring about. In fact, to generate the means for what is being sold as an ever cleaner form of war, achieved through the two founding principles of *jus in bello*, this future breed of drones would likely need to encompass adaptive autonomy, a concept described by Singer as representing the ability of a robot to act independently of human intervention and "update or change what it should search out, even evolving to gather information in new ways" (2009d, 74).

As I attempted to demonstrate in the second chapter, the trend towards the automation and robotization of warfare has been long-present in the US. This trend parallels a desire to conduct war virtuously. I also argued that the inclusion of ASI into the US counterterrorism strategy would represent the logical continuation of this military campaign, which has the attainment of virtuous war as its objective. Upgrading drones to the level of ASI will result in the further "networkization" of the American weaponry—even more than it already is. That is, the many robotic parts that comprise the US military apparatus will be connected with each other into an integrated, automated, computerized, roboticized, and, more importantly, *sentient* network.[46] Without this networkization, the removal of humans from the kill loop would result in an uncoordinated military campaign. For instance, because Apple devices are networked I do not need to worry about whether the new song I bought on iTunes and placed in my MacBook's library will be synced on my iPhone and iPod. This is precisely because the three devices are connected to a centralized network called iCloud, which ensures a harmonious synchronization of the information contained in any of my electronic devices.

Ok, but how are drones and Apple products related? Similarly to my iPhone and MacBook being connected through iCloud, multiple drones will be connected with one another via ASI, the principal difference being that they will learn and get better at what they were first engineered to do. Where does the increased connectedness of the drones forming a comprehensive fleet, that will be capacitated through (forerunning forms of) ASI, take us? To the drone world I described in the previous chapter, a universe that has been referred to as the "Predator Empire" (Shaw 2013), the "dronesphere" (Benjamin 2013, 218), and the "Drone-Eat-Drone World" (Turse and Engelhardt 2012, 145). It takes us to a military domain akin to that of the Matrix. The *raison d'être* of these futuristic drones is to enable a cleaner counterterrorism strategy, which is part of a broader virtuous war campaign. Cleanliness is likely enhanced through increased precision, which results in less civilian casualties. Precision demands proportionality and discrimination. The two *jus in bello* principles require accurate intelligence on which lethal actions—drone strikes—can be taken. Until drones become fully automated, their cameras and other sensors will collect this intelligence, which

[46] Timothy C. Lethbridge, P.Eng, who teaches at the School of Electrical Engineering and Computer Science, University of Ottawa was my discussant when I presented the first chapter of this thesis. According to him, if and when ASI is devised, we will not be talking about a single ASI, but rather several independent ASIs. Thus, although the inclusion of ASI into a fleet of drones will result in the creation of a centralized network, this network should not be regarded as a single actor. Composed of several independent drones, it will function as a unit only insofar as hockey players, for instance, work in team but are each capable of taking their own decisions when they have the puck or are trying to take it away from the adversary.

is processed by drones themselves, and subsequently displayed on the computer screens facing human controllers who then have to make the final decision to kill or not. I already argued that the human presence in this kill loop renders the process too slow and therefore represents a technical impediment to military effectiveness, which in turn reduces the prospect for lethal cleanliness because its prevents the implementation of a kill loop without human intervention. A human-free kill loop, if you will, might not necessarily reduce the number of civilian casualties on the opponent's side—although it could—but it would certainly increase cleanliness inasmuch as the "keeping *our* soldiers out of (psychological) harm's way" element of virtuous war is concerned.

Adams posits that the success of US warfare is contingent on knowledge and speed—"the keystone of planning for the future Army" (2011, 7). While the gathering of intelligence or knowledge can be done with or without human involvement, the fulfillment of speed warrants the removal of humans from the kill loop. Furthermore, speed can be intensified via the linkage of each drone through networkization. This interconnectedness creates a network similar to a spider web or the Matrix. In fact, the countless cameras with which the drones composing that network are equipped with are exactly what enable the creation of a Matrix—even data captured by drone camera is not necessarily rendered as a smooth and clear image as the sight of the homeless man, leaving room for mistakes, as these images are still analysed by humans and, increasingly, algorithmic systems. While they are each able to operate separately, it is once they are connected with one another and operated as a single unit that they form a hermetic dronesphere—the US counterterrorism matrix.[47] I use the term

[47] It is important to note that the parallel between the Matrix and the US counterterrorism matrix is in no way meant to suggest that the US is similar in character to Agent Smith who is considered the main villain of the Matrix trilogy. I only use this comparison as a way to illustrate the way military drones intervene. That

"US counterterrorism matrix" to refer to the military apparatus that is composed of (several swarms of) drones that hover over specific geographic locations, creating spatial zones where deathly interventions by the US are rendered possible because of the presence of these drones. While they do not share the software-like characteristics of the actual Matrix from the movie, these spaces become matrixes insofar as drones continuously monitor the activities taking place within them and are therefore in a constant position to intervene via strikes. In fact, Sharkey notes that the US already employs Reapers "around the clock so that there is a constant overhead presence" (2009, 17). The advent of ARGUSes will without question increase this (lethal) aerial presence.

This US counterterrorism matrix currently covers certain regions of Afghanistan, Iraq, Pakistan, Somalia, and Yemen (Byman 2013; Cole 2013; Grondin 2013, 191; Shaw 2012; Vogel 2010, 132). Within the confines of this Matrix, the US performs two types of drone strikes, namely personality and signature strikes (Benjamin 2013, 131). Benjamin explains that the former category of strikes refers to the killing of *known* individuals, whose names are found on a kill list. The grounds for putting a name on this list are irrelevant. What matters is that once a person's name is on it, that individual becomes a target and once inside the spatiality of the US counterterrorism matrix, that human target will have a hard time dodging the Hellfire missile coming its way. Because he was on Agent Smith's kill list, Neo became a target every time he found himself inside the Matrix. Thus, known terrorists would only need to be spotted by one camera placed on a US surveillance drone for the information to be spread across the network of ASI drones and result in a personality strike minutes if not seconds later. ASI would connect each drone in the same way the homeless man and Agent

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is, how they strike their target. I remain silent on the issue of whether the US actions should be regarded as those of a villain.

Smith were linked with one another or a spider fuses with every meshed filament of its web. The present generation of drones does not enjoy the technical advantage that ASI would bring. If ASI is devised and combined with drones, however, this military upgrade would put the US counterterrorism strategy in a position where it would be able to more effectively perform strikes—akin to the way Agent Smith and a spider can execute *targeted* interventions on Neo and insects, respectively.

Signature strikes would also benefit from the advent of ASI, simultaneously contributing to the effectiveness of the US counterterrorism matrix. More commonly used by the US, Benjamin mentions that signature strikes are executed on the basis of the identification of specific patterns of life, which are deemed irregular or "associated with terrorist activity" (ibid.). The names of the individuals being killed in signature strikes are *unknown* to the US. Let us recall a part of Obama's speech regarding the US efforts to beat ISIL. As the Commander in Chief stated,

> Our objective is clear: we will degrade, and ultimately destroy, ISIL through a comprehensive and sustained counter-terrorism strategy. First, we will conduct a systematic campaign of airstrikes against these terrorists. Working with the Iraqi government, we will expand our efforts beyond protecting our own people and humanitarian missions, so that we're hitting ISIL targets as Iraqi forces go on offense. Moreover, I have made it clear that we will hunt down terrorists who threaten our country, wherever they are (Obama 2014).

The fact that the US aspires to deploy its military might in a "comprehensive and sustained" fashion entails a long-term strategy, otherwise it could hardly be characterized as being sustained. Moreover, the objective of this aerial strategy is to strike "ISIL targets," but these targets need to be identified in the first place, hence strongly suggesting that the strategy described by Obama will involve the pinpointing of patterns of life to distinguish them, ensuing with signature strikes. This could be more effectively achieved with the help of ASI because of the learning nature of this technology contained in adaptive autonomy. Thus, ASI drones would once again be conducive to a more efficacious US counterterrorism matrix in that they would get better at identifying patterns, whatever elements they may contain.[48] This matrix composed of ASI drones would only reinforce the technical capacity to wage virtuous war, at least in theory. These martial benefits entail ethical expenses that it would be ill advised to overlook. Having answered my third research question with the use of a Matrix analogy, I now turn to addressing a portion of these important and timely ethical issues.

ASI drones and their ethical implications

Let us recall that the extrapolation of the US counterterrorism strategy that I laid out above is made on the basis of a determination to conduct virtuous war and that behind Der Derian's (2009, xxxi) concept is the belief that there would be fewer casualties because violence would be exercised in a risk-free fashion, namely from afar. In theory, this military objective seems ethical. Ronald Arkin (2010, 333-334) lists six reasons why autonomous robots will be better than human soldiers at discriminating between combatants and non-combatants, hence reducing the number of civilian casualties. First, robots do not have to worry about their own survival. A robot could therefore get closer to its target or wait a little longer before shooting it to make sure that it is indeed an enemy. Second, the many sensors of robots make them more accurate. For instance, Singer (2009b) explains that "counter-sniper" is a laser technology allowing robots to instantly locate the precise emplacement where an enemy—such as a sniper—fired from, and fire back forthwith, leaving virtually no chance to

[48] Benjamin (2013, 131) points out that the criteria that are used to determine that a certain pattern of life is terroristic and therefore warrants a signature strike—*according to the US*—are unknown. Indeed, the nature of these patterns and their (conceptual) boundaries would have to be determined clearly, for a military campaign or operation that relies on information derived from them to be truly virtuous. In fact, the virtuous war-related advantages that the hardest/best/fastest/strongest/most effective/etc. technologies could help bring about would be partially if not entirely defeated by a poor or prejudiced circumscription of patterns associated with terrorists and/or loose definitions of words like terrorist, collateral damage, (non-)combatant, civilian, etc.

the opponent. Third, the emotional void of robots prevents the possibility for disobedience, at least in theory.[49] Fourth, robots can better make sense of conflicting information, which can be crucial when making a decision in a short lapse of time. Fifth, they have an obvious edge on humans when it comes to assessing large quantities of data—a point I elaborated on in the previous chapter. Sixth, robots can put a check on immoral human soldiers. This last point, however, assumes that humans will still be sent on the battlefield. Yet, the trend in the US ways of war to which I have pointed so far in this thesis suggests that they will not.

Together, the above six elements cogently support the argument that ASI drones would be more effective at executing virtuous war. In fact, Arkin is "convinced that they [autonomous unmanned system] can perform more ethically than human soldiers are capable of performing" (2010, 334). But what is it exactly about robots that would allow them to be "moral" killers? The answer is called "ethical autonomy" (ibid., 338), a term that refers to the possibility of preventing the immoral behaviors of unmanned systems by constructing them on moral foundations. This is easier said than done, however, because like with Asimov's laws, someone has yet to figure out how to input these values into (military) robots (McCauley 2007, 153). Robert Sparrow (2011, 122-123) also notes the challenge that this task represents, arguing that even if inherent laws could be placed in a robot, the appropriate application of *jus in bello* is a matter of context, thus rendering any attempt at imputing "universal" laws very difficult if not futile. Sparrow (ibid., 123) believes that this hurdle might be circumvented once robots will encompass advanced forms of AI. But even if scientists were to never find a way to overcome this mechanical barrier, the first five arguments laid out by Arkin would still hold true, indicating that there is a moral added value

[49] An example would be that an emotionless robot would not engage in a rampage after the death of one of his friends on the battlefield.

to having robots fight on behalf of humans despite the fact that we cannot make these machines moral through fixed internal laws.

To prevent robots from acting immorally, Barrat (2013, 238) proposes that they be built with a system analogous to apoptosis, a biological process that ensures that the cells of a living organism that have been affected by cancer self-destruct so as to prevent the spreading of the cancer towards healthy cells. Using an equivalent of apoptosis with robots could therefore result in their auto-destruction should they act in certain ways that would be deemed unethical by their human creators.[50] Apoptosis can also be regarded as a contraceptive to an ASI going bad, a scenario that constitutes the core of the Terminator argument mentioned by scholars (Barrat 2013, 17-18; Singer 2009a; 2009d, 414-415) and often illustrated in movies or on television, as is the case of *Eureka* (2008).[51] That is, should an ASI-equipped robot turn against humans, the apoptosis-like mechanism installed in that robot would be of great use, precipitating the demise of the bad apple robot. It is important to

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[50] An easy criticism of apoptosis would be that it might be hard if not impossible to program into the robot or ASI. Apoptosis would obviously involve a highly complex series of codes, but some of them could be more easily implemented than Asimov's laws. For instance, drone manufacturer DJI recently updated its famous Phantom 2 in response to the incident of January 26, 2015 where a recreational drone crashed on the White House lawn (Schmidt and Shear 2015). The new version of the Phantom 2 includes fail-safe mechanisms such as automatic landing and no-fly zones over certain geographical regions, which are processed via the drone's internal Global Positioning System (DJI 2015). Such mechanism was pictured in the movie *Oblivion* (2013) when the character of Tech 49 Jack Harper, portrayed by Tom Cruise, attempts to fly his spacecraft into a restricted area, but the internal system of his vehicle forces him to turn around. A similar system is also found in countless videogames, which prevent players from taking their avatars in places that have yet to be unlocked.

At least two more questions arise from the idea of apoptosis. Given the scope of this thesis, however, I will be unable to address them fully. They are nonetheless worth mentioning. First, humans would have coded these fail-safe mechanisms, which would make them subject to human's understandings of (im)moral actions. Second, there is the issue of ensuring that an eventual ASI would not simply outwit apoptosis. This is no doubt a very tricky challenge and a tentative answer might be found in Singer's (2009a) argument about the unlikelihood of a Terminator-like ASI.

[51] *Eureka* is a US television show, which gained attraction in the science fiction community for its depiction of scenarios that while clearly fictive, seemed sometimes not too implausible. One of the central themes of the show is the investigation of the repercussions or unforeseen consequences of new technologies, with each episode tackling a specific case study. For instance, in the premiere of the third season, Martha—a drone equipped with a technology similar to ASI—learns to become independent of the engineers who built her and rebels against humans, like a teenager would challenge the authority of parents. Fortunately, the characters in the show successfully convince Martha to calm down and become friendly again.

note that even the most effective contraceptives often, if not always, have a slim chance of failure, hence even apoptosis could prove insufficient as a means of protecting us against a potential Terminator.

Singer (2009a) nonetheless offers a convincing fourfold argument to explain why the Terminator slippery slope rationale is unlikely to happen in practice. Let us therefore leave aside the possibility of unfriendly ASI drones and focus on the ethical implications of a scenario in which drones would actually bring about the benefits Arkin believes they are capable of. Moreover, the ASI drones that would form the US counterterrorism matrix are expected to fulfill the purpose of the US, namely to enable a cleaner exercise of violence on terrorists. Thus, it is relevant to investigate the ethical ramifications the course of events *envisaged by the US* would have, as it is actually the end the US is trying to reach. When he was interviewed on the use of US military drones, Arkin (2011, 7-8) stated that his main moral concern had to do with CIA strikes. Although Obama (2013) admitted to the use of drones *by the military* during his National Defense University speech, there is much more secrecy around strikes that are performed by the CIA. In fact, as I write these lines CIA-led drone strikes have not been officially recognized by the US. Jens David Ohlin points out that "the use of force carried out by the CIA is legally covert and unacknowledged" (2013, 42). Arkin's (2011, 7) worry about this particular type of strikes is rooted in the fact that CIA drone pilots are civilians who do not fall under the protection of the Geneva Conventions. Consequently, the strikes that these civilians conduct could be considered as assassinations, as they have by many critics of US drones strikes (Benjamin 2013, 128; Williams 2013, 205). Defending the legality of military strikes in a speech he gave at Northwestern University Law School, Eric Holder even specified that, "They are not [assassinations], and the use of that loaded term is misplaced" (2012). Nevertheless, the Attorney General remained silent on the issue of CIA strikes, which only reinforces Arkin's disquiet regarding the (im)morality of these strikes.

Arkin (2011, 8) explained that the current ethical issues regarding military drones pertained to their use rather than the technology itself.[52] Furthermore, when he was asked whether advanced forms of AI would open the door to new military ethical questions, Arkin dismissively responded that he was "more concerned with more immediate issues, rather than the 'singularity'" (ibid., 10). The fact that Arkin disregarded this question, but is at the same time seriously concerned with whether the individuals effectuating CIA strikes are soldiers or civilians perplexes me, for it suggests that he is missing a crucial inevitability that could be brought about by the advent of ASI, namely that moment in (military) history where a weapon becomes a soldier. If there is one aspect of the post-singularity era we can be certain about, it is precisely that *if* ASI is achieved and is incorporated into military drones[53] the technology will assume soldiers' functions—responsibilities that will have previously been peculiar to humans. Instead of merely assisting humans in these tasks, they will take on the tasks themselves. This ineludible situation calls for a military ethical reflection on the effects of ASI on drone warfare and American counterterrorism.

When the weapon *is* the soldier, who is responsible? Where does liability lie when a military robot makes a mistake that leads to the harming or killing of humans? To give but one example of such possibility, let me simply mention the 1988 catastrophe partially caused

[52] The use of military drones brings about several other ethical questions. I do not wish to address them here, as they would each require a separate, in-depth discussion. Some of these issues include the question of proportionality since Hellfire missiles that were aimed at presumed combatants have killed civilians. The issue of transparency is another topic that deserves attention, especially given the high secrecy surrounding CIA strikes and the "kill lists" used by the US. This enumeration should not be regarded as a comprehensive list of the ethical questions that arise from the utilization of killer drones, for as these military tools continue to evolve with the state-of-the-art technological advancements new ethical concerns are likely to appear.

[53] In the introduction, I put forth the two premises that form the foundation of my thesis. The certitude that ASI will be combined with military drones *if* and once the former will have been developed is the second of these premises.

by Aegis, a computer system who mistakenly identified an airliner for an enemy plane and whose assessment was left unquestioned by the 18 humans behind the screen, killing 290 civilians (Singer 2009b). The key word here is *accountability*. Sure, one could argue that the humans bear a part of the blame for the 1988 event, as they could have vetoed Aegis' decision to fire at the passenger plane. But what happens once Aegis becomes entirely autonomous, as it would once equipped with ASI? How is accountability assigned then? As drones and robots in general gain more autonomy on the battlefield, it becomes increasingly important to address this ethical question. In fact, it is the first of several questions raised by Gary E. Marchant et al. (2011, 281) in their research on the appropriate policy, legal, and ethical measures that they deem need to be taken in the coming years to successfully govern the use (or behavior) of lethal autonomous robots, also referred to as LARs. Unfortunately, Marchant et al. do not elaborate on this issue aside from stating that software programmers or engineers might have to be considered when it comes to being responsible for the actions of a robot on the battlefield. Jürgen Altmann et al. (2013, 75) reference the work of Thomas Hellström who suggests that a potential answer to this question will be to attribute a *shared* responsibility to the individuals who will have played a role in the creation of the military robot. Disagreeing with Hellström's proposition of a shared responsibility, at least when it comes to LARs, Sparrow argues that "[w]here an agent acts autonomously, then, it is not possible to hold anyone else responsible for its actions" (2007, 65). He nonetheless acknowledges the philosophical arduousness of the task of attributing responsibility (ibid., 67).

Sparrow makes a cogent case, for it would be illogical to blame X for the actions of Y if Y carried out these actions independently of X, as it would if it enjoyed a sufficient amount of autonomy such as that capacitated by ASI. But what he is arguing might not be easy to achieve. Why? Because while the US counterterrorism matrix is composed of individual drones, it will be hard to determine which of these drones is even responsible for a given strike. It would be too simplistic to point the finger at the drone whose (Hellfire) missile was launched, because that payload would have been fired on the basis of previously gathered and assessed intelligence, which may *or may not* have been acquired by that same drone. To better illustrate why this is so, let us go back to *The Matrix* for a moment. Who should we hold accountable for the damage that was done to Morpheus when the three Agents held him prisoner at the end of the first movie? Agent Smith, the Matrix he is part of, or perhaps some(one/thing) else? It is unclear. While Agent Smith was the actant who intervened, his action was only made possible because of the interconnectedness of every bit of the Matrix. Although the information needed to locate Morpheus within the Matrix was not detrimental to Morpheus *per se*, it was collected with the exact purpose of finding and hurting him, and should therefore be considered at least partially responsible for the harm that he suffered from.

Behind the US counterterrorism matrix is the same network logic, which makes the attribution of responsibility/liability/accountability to a single part of it quite complex, if not unattainable. Although ASI drones would each be empowered by adaptive autonomy, their military power would be highly diffused across the matrix. This is because the martial advantage of having ASI drones is maximized when they are used as a comprehensive counterterrorism apparatus—not when they are used separately. Thus, the information gathered by an ASI drone that will have identified a terrorist will in itself constitute part of the killing of that terrorist and the responsibility cannot be said to lie solely on the drone that struck.[54] As Sparrow argues,

> [i]f the nature of a weapon, or other means of war fighting, is such that it is *typically* [original emphasis] impossible to identify or hold individuals responsible for the casualties that it causes then it […] will not be ethical to employ this means in war (2007, 67).

That might well be the case of ASI drones, which fluidly circulate lethal capabilities across the US counterterrorism matrix—a network within which it is difficult to locate that power and the moral responsibility it engenders. Suarez takes a diverging position, positing "autonomous robotic weapons concentrate too much power in too few hands" (2013). I agree with him insofar as the decision to deploy ASI drones (as part of a counterterrorism strategy) is a choice made by a small group of individuals found in military circles. As undemocratic as Suarez argues such decision is, however, it might in theory be regarded as ethical *if* the goal of upgrading military drones to the level of ASI is to enable these machines to more effectively wage virtuous war via the principles of *jus in bello*—a path I argued is merely the logical continuation of the US counterterrorism strategy. In that case, the decision of using ASI drones in the first place could be regarded as ethical, however undemocratic. In fact, referring to the occurrence of war crimes, which are unarguably unethical, Arkin conceded that "[t]here is clear room for improvement, and autonomous systems may help" (2010, 336).

As I have attempted to demonstrate here, the intention of creating a fleet of ASI drones to better counter terrorism may be *a priori* moral in that it represents an attempt at refining the precision and effectiveness of weapons, which could enable a cleaner combat in

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[54] When I questioned Didier Bigo (2014) regarding trends towards automation in the field of cybersurveillance, given the immense amount of information gathered, I took as a given that the intelligence being gathered was collected with the purpose of taking actions on it. Although he did not share my thoughts about the trends towards automation of cybersurveillance techniques, he conceded that the primary purpose of this big data gathering was to be able to act on the intelligence.

line with the logic of virtuous war. But the nature of this technology may make its exploitation unethical in the first place since once it is present on the battlefield determining moral responsibility becomes unfeasible, which renders the use of that technology immoral according to Sparrow. This conclusion allows me to answer my second research question. Based on the above military ethical discussion, ASI would have the effect of rendering the American counterterrorism strategy unethical—even if the rationale for introducing this technology into drones would represent an attempt at exercising violence in the cleanest way. In other words, using ASI drones would be immoral despite the fact that it would in theory (or even in practice) lead to the epitome of virtuous war with null collateral damage. In the next and last section of this thesis, I conclude with a brief discussion on the ethical implications the US counterterrorism matrix would have for the field of IR, simultaneously answering my first research question.

ASI's implications on drone warfare and the discipline of IR

In this final portion of my thesis, I wish to fulfill two objectives. I must firstly answer my first research question and secondly open up the discussion for further research on the topic of military applications of ASI. In the introduction, I quoted US General Billy Mitchell who argues that the dominance of the world can be more effectively achieved through the mastery of airspace, as a missile coming from the air can reach nearly a hundred percent of the geography of our planet's surface. This is why I decided to study the possibility of drones being upgraded to the level of ASI, as unmanned aerial vehicles would more efficaciously enable the exercise of the power that would be unleashed by the advent of this highly advanced form of AI. In the second chapter, I built on the learning ability of ASI to argue against Singer who believes that no technology can provide its creator a permanent advantage over its enemy. Finally, in this third chapter, I used the Matrix analogy to illustrate the logical continuation of the US counterterrorism strategy, maintaining that lethal intervention within the spatiality of this hermetic counterterrorism matrix was rendered prevalent by the ASI-driven networkization of military drones.

According to Dale L. June (2011, 340), the current trend in military and policing practices aimed at countering terrorism, which encompass technologies derived from science fiction movies, is insidiously leading towards the universe George Orwell depicted in *Nineteen Eighty-Four*. Once ASI will have been combined with military drones, this Big Brother society will have not necessarily been created, but it will have certainly been rendered possible. The extrapolation of the US counterterrorism strategy is unlikely to yield the three gigantic drones built by S.H.I.E.L.D. in *Captain America*, but the creation of thousands of ASI drones—which does not seem to be a stretch when considering the current speed at which the US is expanding and reinforcing its fleet of Predators and Reapers—would certainly put the US in a position where it could have a permanent edge on its enemies, or anyone else. So what would be the military ethical implications of ASI on (drone) warfare? The answer here is similar to that offered for the second research question. If the impracticability of determining moral accountability within the US counterterrorism strategy is engendered by the inclusion of ASI, which then renders the use of this technology for lethal purposes unethical, then its utilization in a broader drone warfare will be no different. Thus, whether a drone is upgraded to the level of ASI to kill a terrorist or to launch an attack on a state against which one is at war, as would be the case under drone warfare for instance, the deadly use of ASI should be considered unethical because it diffuses responsibility to the point where it is no longer possible to locate it. This argument would hold even if the primary reason for deploying an ASI-equipped weapon was to implement virtuous war and exercise violence in a truly cleaner fashion by surgically achieving discrimination and proportionality, merits the US is currently attributing to its ways of war.

Critics may find that the arguments I offered to answer my research questions are unsatisfying. However, given the ethical stance I adopted in my thesis, these answers represent one position among many to come, as ASI or other types of strong AI are likely to be studied increasingly across academic disciplines given the clear trend towards the development and deployment of these technologies in the (US) military. Hopefully, those whose intellectual curiosity will have been left unsatisfied will have cogitated on the important and timely ethical issues military uses of ASI bring about and will begin partaking in this military ethical reflection on the effects of artificial *super*intelligence on drone warfare and American counterterrorism.

Although all three research questions have been answered, a last point deserves attention. The fact that ASI *could* enable the first actor to control it to become a permanent hegemon is a possibility that should not be dismissed right away, however far-fetched it may sound. Based on current technological developments across nations, that actor is likely to be the US although it needs not be. IR scholars wishing to contribute to the discussion on ASI could start by considering this eventuality because the formation of a permanent hegemon would warrant new ways of looking at the distribution of power on the international scene. If ASI inherently contains the seed for long-term dominance because of its ability to evolve and improve the weapon that it is, then it becomes rational for great powers to try to be the first to develop that technology, at least from a purely military standpoint.[55] This could certainly be the next arms race.

[55] Small powers are unlikely to attempt to develop ASI because it would necessitate the mobilization of a massive amount of resources. Moreover, the possibility of ever devising this technology still represents an unsettled debate.

Conclusion

Artificial *super*intelligence: An understudied technology

In the attempt to make scientific discoveries, every problem is an opportunity, and the more difficult the problem, the greater will be the importance of its solution.

— Edward O. Wilson, US biologist and author

Where does a thesis about the military uses of ASI leave us?

Trends towards the automation and robotization of warfare, which enable the exercise of violence from a distance, have been long-present, as I have pointed to in the second chapter. The advent of military technologies such as machine guns and armored tanks have increased the physical distance between combatants and changed the way warfare is conducted (Singer 2009d, 100). Prior to modern warfare, soldiers fought in close proximity, at great risk of being wounded or killed. Rudimentary inventions such as bows and arrows have also changed the ways of war, for an archer could kill *from afar*. Machine guns, tanks, and bombers only increased this long-range peril. Today's drones, such as Predators and Reapers, represent an archetypical separation between military rivals. Military manufacturers are fervently devising the next generation of drones, which will be harder, (possibly) better, faster, and stronger, further increasing the distance between killer and killed and enabling virtuous war—at least in theory. More importantly and as I have attempted to demonstrate in this thesis, a next step in this military progression appears to be the inclusion of advanced forms of artificial intelligence, namely artificial *super*intelligence (provided it comes about), for weapons, thusly further restricting and re-drawing front-line human participation, extending kill zones and killer reach. Of course, such technological advancements in the military domain would engender significant ethical implications that may be difficult to address adequately *ex post facto* according to Barrat (2013).

In fact, this thesis endeavored to determine the ethical implications of ASI on drone warfare and the US counterterrorism strategy. More specifically, it attempted to address the question of accountability. Furthermore, it argued that—*if* it were invented—ASI is a technology that would be inserted into the US war machine at some point in the future and that this advancement would represent nothing more than a logical continuation of the way the US is and has been waging war. It therefore sought to conceptualize this extrapolation making use of an imaginative, heuristic tool derived from the movie *The Matrix* (1999).

While I was able to offer an answer to the three research questions, more research needs to be done on the subject. I approached the topic of my thesis from an ethical standpoint, and like any ethical question, there are usually at least two sides to the debate. My arguments laid out in my thesis represent only one of these sides. A more comprehensive understanding of the question of accountability would require that other perspective be looked at. For instance, research could be done to try to determine how the application of ASI for military purpose could be considered moral. This position could then be used to challenge the arguments I presented above. It would be interesting and important to establish which reasoning carries more weight and explain why. Only then could we fully appreciate the implications of ASI on drone warfare and US counterterrorism

Military robotics and drone warfare are timely issues, which are popularly being researched by scholars. This academic burgeoning occurs because drones are now at the center of the US counterterrorism strategy (Byman 2013) and its new ways of war. This thesis contributes something new to the existing literature in (critical) security studies, which is focused almost exclusively on the use of drones but neglects the importance of ASI or any other form of advanced AI that could significantly enhance military robotics. This thesis represents one step towards the investigation of this understudied technology. The fact that renowned physicist Stephen Hawking (Cellan-Jones 2014) and Chief Executive Officer of SpaceX and Tesla Motors Elon Musk (Gibbs 2014) have warned about the potential detrimental effects of AI indicates that the technology is likely to have a game-changing impact on whatever it is applied to—and humankind. It should also highlight the importance of studying this technology, in the fields of engineering and computer sciences, but also in philosophy and political science among other disciplines.

One of the greatest obstacles to studying advanced forms of AI such as ASI will be to define them. The inability to offer a precise definition of ASI has been the main limitation of my thesis. However, it did not completely prevent me from investigating its potential effects—at the theoretical level. As engineers and computer scientists achieve progress on strong AI, it should become more manifest what components—such as stronger neural networks or an equivalent of self-awareness—will be necessary to transform AI into ASI or simply a strong(er) AI that would locate itself between AI and ASI on an artificial intelligence scale. It should then be less difficult to define ASI. Yet, researchers should not wait until such progress is attained to start proposing descriptions of ASI. The first chapter of my thesis represents a valuable first effort at doing so.

Moreover, the nightmarish course of events that I depicted in the second chapter and that would resemble an Elysium-like world could represent the climax of war cleanliness. Yet and as I have mentioned, Der Derian states that "in the final analysis that it seeks to evade, virtuous war is still about killing others" (2009, xxxiii). And in this case, the killing has become much easier, simultaneously lowering the threshold for the decision to wage war—an issue that others have pointed to (Campaign to Stop Killer Robots 2015; Kaag and Kreps 2014, 54; Lin 2010, 313).

One final element is worth mentioning and could constitute the starting point for future research. The creation of the US counterterrorism matrix, which I described in the third chapter, could in theory capacitate war virtuousness through a clean execution of violence. My main argument was that even if this were the case, the use of ASI for such purpose would be unethical. But this matrix has implications that fall beyond the field of military ethics. As I alluded to in the third chapter, this matrix could simultaneously set the stage for a space akin to that ubiquitously monitored by Big Brother, bringing about the problem of balancing security and fundamental freedoms—a debate that emerges time and again when dealing with counterterrorism measures.[56] While the fields of IR and (critical) security studies might not be the most appropriate venues to study these implications, these questions must certainly be addressed. As I suggested above, the creation of ASI-equipped drones could lead to the next arms race—a very fast one that could potentially enable the winner to secure itself a permanent edge on its adversaries. It is therefore paramount to address these important questions sooner than later.

[56] See Holder (2012) and Obama (2013; 2015).

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