

**WIRED FOR WAR: THE ROBOTICS REVOLUTION AND
CONFLICT IN THE TWENTY-FIRST CENTURY¹**

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I. Introduction

Pity the librarian who receives a copy of P.W. Singer's *Wired for War* and must decide where to put it. Since the book wrestles with the changing nature of warfare, it could fit in with other books on war and military affairs. It may also belong in the science fiction section, since it is largely a tribute to the vision of science fiction writers such as Isaac Asimov. Perhaps *Wired for War* should go alongside works by other futurist thinkers such as George Orwell and Freeman Dyson. Is it really an ethics book? A science text? Strong arguments could be made for each of these.

All these topics, and more, come together in *Wired for War* for a thought-provoking exploration of how technology is driving the most recent revolution in military affairs. The author convincingly defends his thesis that while the infusion of unmanned systems and robots into the frontlines of combat offers tactical advantages, it also presents a number of strategic issues that our nation must address as our war machines become inexorably more autonomous. The author has succeeded in creating that rarest combination: a rousing page-turner that is also comprehensive, timely, and well-indexed. Dr. Singer, who is the son of a former Army judge advocate (JA),³ has compiled an excellent resource that will help uniformed attorneys and military scholars anticipate future issues at the intersection of law and warfare. Predicting the future may be tough, but predicting that *Wired for War* will be just as relevant fifteen years from now as today seems like a safe bet. Singer has created a masterpiece.

¹ P.W. SINGER, *WIRED FOR WAR: THE ROBOTICS REVOLUTION AND CONFLICT IN THE TWENTY-FIRST CENTURY* (2009).

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³ E-mail Interview with P.W. Singer, Senior Fellow and Dir. of the 21st Century Def. Initiative at the Brookings Inst. (Sept. 5, 2009, 00:41:13 EST) [hereinafter Singer Interview].

The book is divided into two parts, and each part is so different from the other that *Wired for War* could have been written as two separate books. In the first part, *The Change We are Creating*, Singer's enthusiasm for gadgets is on display as he catalogues cutting-edge consumer and military products. Singer then canvasses the scientific and defense communities, where we learn that not only are robots doubling in number every nine months,⁴ but that exponential advances in computing ability could lead to thinking and feeling robots in the not-too-distant future.

Wired for War's real excellence is in the second part, *What Change is Creating for Us*. Here, Singer matures from ebullient YouTube generation spokesman into a thoughtful and wide-ranging visionary. Singer views the continuing encroachment of technology into warfare from dozens of angles, and is often uncomfortable with what he finds. A technological revolution has already played out since the Iraq and Afghanistan wars began, and even greater changes loom. However, nobody has really planned for the strategic, legal, and ethical consequences of this revolution. We are good at making things, Singer finds, but we tend to avoid setting goals for developing and regulating our cutting-edge technological advances. It is naïve to think that technology will end war; in fact, Singer's gravest concern is that the robotics revolution (and its tendency to remove humans from the front lines of combat) will make going to war easier than ever. The book's final sentence is apt: "Sadly, our machines may not be the only thing wired for war."⁵

II. What (or Who) Are These Robots?

Wired for War starts with Singer's reason for writing about robots: "Because robots are frakin' cool."⁶ This proves true: the robots of the future will indeed be frakin' cool. Future warbots will range from autonomous infantry robots⁷ to drone warplanes that can pilot themselves and hover for years⁸ to self-driving automobiles⁹ to robots that can

⁴ SINGER, *supra* note 1, at 99.

⁵ *Id.* at 436.

⁶ *Id.* at 1.

⁷ *Id.* at 130.

⁸ *Id.* at 117.

⁹ *Id.* at 88.

“morph”¹⁰ and change form like in *Terminator 2*.¹¹ Singer gives fair treatment to the risks of these advances, particularly the human tendency to defer to machine judgment,¹² the dangers of trusting machines to distinguish between combatants and non-combatants,¹³ and the competing views about whether unmanned systems on the battlefield tend to demoralize or embolden opposing insurgencies.¹⁴

What is a robot? An obvious problem must have faced Singer when he decided to write *Wired for War*: how to interweave the machines in use today by the U.S. military in Iraq and Afghanistan into a book about robots. As it turns out, many of our current war machines are called robots, but they do not live up to the billing. Singer provides a helpful definition of “robot”:

Robots are machines that are built upon what researchers call the “sense-think-act” paradigm. That is, they are man-made devices with three key components: “sensors” that monitor the environment and detect changes in it, “processors” or “artificial intelligence” that decides how to respond, and “effectors” that act upon the environment in a manner that reflects the decisions, creating some sort of change in the world around the robot. When these three parts act together, a robot gains the functionality of an artificial organism. If a machine lacks any of these three parts, it is not a robot.¹⁵

Curiously, Singer never acknowledges that many of his featured gadgets do not meet his own definition. Instead, he relies on descriptions that breathe humanlike traits onto simple machines that are operated by videogame-style controllers. For example, a remote-controlled platform called the Warrior is touted by its manufacturers as able to “run a four-

¹⁰ *Id.* at 92–93.

¹¹ *TERMINATOR 2: JUDGMENT DAY* (Tri-Star Pictures 1991). In this action movie, an evil T-1000 Terminator robot is sent from the future to kill John Connor in Los Angeles. The T-1000 robot is made of a futuristic alloy that allows it to change its appearance.

¹² In a harrowing example, the author describes the U.S.S. *Vincennes* in 1988, also known as the “Robo-cruiser,” whose automated Aegis radar system mistook an Iranian passenger jet for an enemy F-14. The crew trusted the Aegis and without further verification fired at the plane, killing all 290 passengers. See SINGER, *supra* note 1, at 125.

¹³ *Id.* at 383.

¹⁴ See *id.* at 35, 212–23, 307, 312.

¹⁵ *Id.* at 67.

minute mile” rather than the more vehicular description of traveling fifteen miles per hour.¹⁶ The PackBot, a remote-controlled vehicle used for explosive ordnance disposal (EOD) missions in Iraq, is described as a “brave”¹⁷ beloved lost member of an EOD team after it was destroyed on a bomb detonation mission.¹⁸ One suspects that these descriptions are efforts by the machine manufacturers to present their products as high-end technology rather than commodities, and to price them accordingly in defense contracts. Dr. Singer, eager to include “frakin’ cool” war machines in his book on robots, temporarily lets down the guard of his scrutiny by repeating the manufacturers’ labeling of lesser machines as robots. After all, a machine that “runs a four-minute mile” is still basically the same technology as a remote-controlled toy car. This is twenty-first century window dressing on twentieth century gadgets. Resembling WALL-E¹⁹ does not make a robot. These definitions matter, since if we are going to regulate our new machines, we must be able to speak with clarity about which ones we are talking about.

Although many American machines now touted as “robots” do not yet live up to the billing, lots of Japanese robots do. *Wired for War*’s missed opportunity was the chance to explore Japan to ponder robotic possibilities. Japanese robots range from lifelike receptionist drones to factory workers to “life assistance robots”²⁰ who often become beloved companions to their owners. (The United States, by contrast, has built an autonomous vacuum cleaner robot.)²¹ Japan, which hopes to replace 15% of its workforce with robots in the next twenty years,²² presents the most logical groundwork for discussing possibilities for autonomous machines and how society must adjust (if at all) to science-fiction turned science-reality. *Wired for War* does offer a glimpse of Japanese robots and the Japanese cultural response, but only enough to whet the reader’s appetite for more.

¹⁶ *Id.* at 24.

¹⁷ *Id.* at 40.

¹⁸ *Id.* at 20.

¹⁹ WALL-E (Pixar Animation Studios 2008). WALL-E, the title character, is a fictional robot in the future whose job is to clean up trash on Earth, until he falls in love with another robot named Eve and follows her to adventures in outer space. The PackBot and other new machines (perhaps intentionally) resemble WALL-E, with cameras for eyes and tank-like treads for movement.

²⁰ SINGER, *supra* note 1, at 242.

²¹ *See id.* at 22–23. The Roomba is a commercially available robot vacuum cleaner that can measure the room it is assigned to vacuum, return to its charger, and avoid stairs. The Roomba was designed by iRobot, the same manufacturer of the PackBot.

²² *Id.* at 242.

III. An All-Seeing Eye in the Sky: Get JAG on the Phone!

Robots or not, unmanned aerial vehicles (UAVs) are transforming warfare, with even more profound changes on the horizon. In fact, UAVs have the potential to entirely transform war as we know it. Singer explained in a television interview that “[w]e’ve gone from having a handful of these unmanned drones in the air when we invaded Iraq to now we have 5300 of them. . . . And these are like the Model-T Fords compared to what’s coming.”²³

It would be unwise to assume lasting American military dominance with UAVs. More than three dozen countries operate UAVs, and any country with cash can easily contract for private UAV services.²⁴ In February 2009 (just after *Wired for War* went to press), the American military shot down an Iranian UAV flying over Iraq.²⁵ Human rights groups are pursuing their own UAVs to perform wartime monitoring to support their own objectives.²⁶ Cities are hiring UAVs, such as those flown by the City of Los Angeles, to monitor high-crime neighborhoods.²⁷ Based on current research, future UAVs may be as small as insects,²⁸ number in the millions, and operate in huge “swarms.”²⁹ Once this technology is commercially common, anyone could potentially monitor anything, at any time. This omnipresent, omniscient monitoring may feel like an all-seeing eye in the sky.

These UAV notions brim with possibility for the uniformed attorney. Strategic contracting could advance American military interests in such a future. While any citizen or nation can now purchase UAV surveillance, the more sophisticated drones and monitors will likely be operated by a smaller group of private contractors from technologically advanced countries such as Israel and the United States. If these firms seek future defense contracts with the American Government, we ought to insist on contractual terms that they not hire themselves out for any missions of

²³ Interview by Jon Stewart with P.W. Singer, Senior Fellow and Dir. of the 21st Century Def. Initiative at the Brookings Inst., in New York, N.Y., *The Daily Show with Jon Stewart* (Comedy Central television broadcast Jan. 29, 2009), available at <http://www.thedailyshow.com/watch/thu-january-29-2009/p-w--singer>.

²⁴ *Attack of the Drones*, ECONOMIST TECH. Q., Sept. 5, 2009, at 22, in ECONOMIST, Sept. 5–11, 2009.

²⁵ *Id.* at 24.

²⁶ SINGER, *supra* note 1, at 268.

²⁷ *Id.* at 420.

²⁸ *Id.* at 118.

²⁹ *Id.* at 228.

monitoring the U.S. military. This power of contract would tend to deny a growing intelligence capability to the United States' enemies. Had the French military pursued such a plan, they may have avoided a 2004 surprise attack in which the Ivory Coast (then the 157th poorest country in the world),³⁰ hired two Israeli drones to gather intelligence on occupying French military forces, then attacked and killed nine French troops by using contracted planes flown by ex-Red Army Belarussian pilots.³¹

Singer's research will also prod the minds of military lawyers about how the law of armed conflict may apply in the future. In the present age of television and the Internet, the notion of the "strategic corporal"³² has resonated. Since television cameras presently capture just a small fraction of what happens on the battlefield, will our troops behave less boldly with an "all-seeing eye"? It seems likely that judge advocates in the future will have a greater role in ferreting out war crimes allegations as non-governmental organizations (NGOs) gain more tools to monitor our forces, or if our enemies heighten efforts at "lawfare" with their own UAV coverage. Alternatively, judge advocates will have more ability than ever to harness and document our enemies' law of war violations, thus aiding public perceptions about the legitimacy of American military operations. The concept that may be best described as "law as a weapon system" seems to have a bright future.

IV. "Dr. Frankenstein Doesn't Get a Free Pass, Just Because He Had a PhD"³³

As our machines become more autonomous, who should be held accountable when they go awry? Given the eerie similarities between forthcoming autonomous robots and Dr. Frankenstein's fictional monster,³⁴ the standard legal framework of product liability through principles of tort and contract could be insufficient. Thus, Singer boldly calls for manufacturer criminal liability for scientific discoveries that

³⁰ *Id.* at 268.

³¹ *Id.*

³² Coined by Marine General Charles Krulak in the late 1990s, "strategic corporal" refers to the strategic consequences of leadership and decision-making at the lowest levels of the American military, given the advent of the internet, television coverage, and propaganda campaigns in modern warfare.

³³ Singer Interview, *supra* note 3.

³⁴ MARY SHELLY, FRANKENSTEIN; OR THE MODERN PROMETHEUS (1818).

wreak intended or unintended havoc.³⁵ Several months after *Wired for War* came out, Singer explained that this proposal turned out to be one of the book's most controversial, and that he was challenged about it during a presentation to a group of engineering graduate students. "I still held firm to the idea that accountability should not just fall on the person at the pointy end of the spear, but in every other field where we try to apportion accountability to wherever in the chain of events it is appropriate. Robotics should be no different."³⁶

While troops at the pointy end of the spear are liable for what they do in battle, notions of what it means to be at the pointy end are changing. The UAV flying overhead in Iraq may now be flown by a pilot halfway around the world in Nellis Air Force Base near Las Vegas. In one way, this greater detachment is the next step in a familiar continuum, since many previous technologies such as arrows, firearms, cannons, and airplanes each in their own time increased the physical distance between combatants.³⁷ To address the remote operation of war machines, which he rightly concludes is an inherently military function, Singer recommends that the operation of military unmanned systems should never be handed off to private contractors.³⁸ This recommendation will be important for both military discipline and also for unity of military effort. However, the ever-present need for contractors to tend to our technology-heavy systems will require vigilance in enforcement if we are to achieve Singer's objective.

V. Conclusion

Looking into the future and drafting the governing framework for anticipated technological frictions are both tasks fraught with uncertainty. *Wired for War* prods the reader to think about the questions we must ask as a military and a society in order to set a proper

³⁵ SINGER, *supra* note 1, at 410. The author's proposal could lead to a predicament in which legislatures are not able to specify what scientific conduct should be criminalized until further advances in robotics show the possibilities. In other words, we may not be able to outlaw the creation of Dr. Frankenstein's monster until the first one is let loose. For more on the American concept of advance legislative crime definition, see John C. Jeffries, *Legality, Vagueness, and the Construction of Penal Statutes*, 71 VA. L. REV. 189, 191 (1985).

³⁶ Singer Interview, *supra* note 3.

³⁷ SINGER, *supra* note 1, at 407.

³⁸ *Id.* at 407-08.

groundwork for our war machines that (like it or not) are inexorably becoming more autonomous. Though we cannot accurately predict the future, we also cannot afford to *not* think ahead. Chinese writers have noted that the United States is a world leader in technological development, but is unable to anticipate technological applications.³⁹ The Chinese have recognized the virtue of having a viable plan: “Technology is like the ‘magic shoes’ on the feet of mankind, and after the spring has been wound tightly by commercial interests, people can only dance along with the shoes, whirling rapidly in time to the beat that they set.”⁴⁰

In *Wired for War*, American ingenuity is on abundant display, as are the tough issues we must work through in order to avoid the techno-nightmares that keep science fiction and Hollywood writers busy. For better or worse, warfare will radically change. The most important lesson from *Wired for War* is that American technology will not decide our future. Our ideas will.

³⁹ *Id.* at 247.

⁴⁰ *Id.* at 246 (quoting Qiao Liang and Wang Xiangsui, UNRESTRICTED WARFARE: CHINA’S MASTER PLAN TO DESTROY AMERICA (Beijing: PLA Literature and Arts Publishing House, 1999)).

