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# The Debate Over Autonomous Weapons Systems

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# THE DEBATE OVER AUTONOMOUS WEAPONS SYSTEMS

*Dr. Gregory P. Noone and Dr. Diana C. Noone<sup>1</sup>*

*The debate over Autonomous Weapon Systems (AWS) has begun in earnest with advocates for the absolute and immediate banning of AWS development, production, and use arguing AWS should be banned because these systems lack human qualities, such as the ability to relate to other humans and to apply human judgment, that are necessary to comply with the law. In addition, the weapons would not be constrained by the capacity for compassion, which can provide a key check on the killing of civilians. The opposing viewpoint in this debate articulates numerous arguments that generally include: it is far too premature and too speculative to make such a proposal/demand; the Law of Armed Conflict should not be underestimated in its ability to control AWS development and future operations; AWS has the potential to ultimately save human lives (both civilian and military) in armed conflicts; AWS is as inevitable as any other technology that could potentially make our lives better; and to pass on the opportunity to develop AWS is irresponsible from a national security perspective. The purpose of this article is to help refine the AWS debate.*

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I. INTRODUCTION

The debate over Autonomous Weapon Systems (AWS) has begun in earnest with advocates for the absolute and immediate banning of AWS development, production, and use planting their flag first. They argue that AWS should be banned because these systems lack human qualities, such as the ability to relate to other humans and to apply human judgment, that are necessary to comply with the law. In addition, the weapons would not be constrained by the capacity for compassion, which can provide a key check on the killing of civilians.<sup>2</sup> The opposing viewpoint in this debate articulates numerous arguments that generally include: it is far too premature and too speculative to make such a proposal/demand; the Law of Armed Conflict should not be underestimated in its ability to control AWS development and future operations; AWS has the potential to ultimately save human lives (both civilian and military) in armed conflicts; AWS is as inevitable as any other technology that could *potentially* make our lives better; and to pass on the opportunity to develop AWS is irresponsible from a national security perspective.<sup>3</sup> Some of the most respected and brilliant lawyers in this field are on opposite sides of this argument. The purpose of this article is to help refine the AWS debate.

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2. See HUM. RTS. WATCH, LOSING HUMANITY: THE CASE AGAINST KILLER ROBOTS 2, 4 (2012), available at [http://www.hrw.org/sites/default/files/reports/arms1112ForUpload\\_0\\_0.pdf](http://www.hrw.org/sites/default/files/reports/arms1112ForUpload_0_0.pdf)
  3. Michael N. Schmitt & Jeffrey S. Thurnher, “*Out of the Loop*”: *Autonomous Weapon Systems and the Law of Armed Conflict*, 4 HARV. NAT’L SEC. J. 231, 234 (2013).

## II. WHAT ARE AUTONOMOUS WEAPONS SYSTEMS?

The International Committee of the Red Cross defines Autonomous Weapon Systems as weapons that can “independently select and attack targets, i.e. with autonomy in the ‘critical functions’ of acquiring, tracking, selecting and attacking targets.”<sup>4</sup> The U.S. Department of Defense defines AWS as: “a weapon system that, once activated, can select and engage targets without further intervention by a human operator. This includes human-supervised autonomous weapon systems that are designed to allow human operators to override operation of the weapon system, but can select and engage targets without further human input after activation.”<sup>5</sup>

AWS is *not* artificial intelligence.<sup>6</sup> There will not be “human qualities such as consciousness, emotion, sociability, semantic understanding required for human moral decision making.”<sup>7</sup> AWS also isn’t a *Terminator* science fiction movie scenario.<sup>8</sup> “SkyNet” is not going to take over the world.<sup>9</sup> Unless of course you think we are from the future and we’re here to convince you autonomous weapon systems *should* be developed and *trust us* there is *no Terminator* scenario. In that case, have Sarah Connor give us a call.<sup>10</sup> “The autonomous robots being discussed for military applications are closer in operation to your washing machine than to a science fiction *Terminator*. The way the term ‘autonomy’ is used in robotics should not be confused with how the term is used in philosophy, politics, individual freedom or in common parlance. It is more related to the term automatic. An automatic robot carries out a pre-programmed

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4. INT’L CMTE. RED CROSS [ICRC], AUTONOMOUS WEAPONS SYSTEMS: TECHNICAL, MILITARY, LEGAL, AND HUMANITARIAN ASPECTS 7 (2014).
  5. *See* Autonomy in Weapon Systems, DoDI 3000.09 (Nov. 2, 2012).
  6. Matt McFarland, *Elon Musk: ‘With artificial intelligence we are summoning the demon,’* WASH. POST (Oct. 24, 2014), <http://www.washingtonpost.com/blogs/innovations/wp/2014/10/24/elon-musk-with-artificial-intelligence-we-are-summoning-the-demon/>, (addressing the comparison of artificial intelligence to “summoning the demon.”).
  7. *See* WENDELL WALLACH & COLIN ALLEN, MORAL MACHINES: TEACHING ROBOTS RIGHT FROM WRONG 9 (2009).
  8. *See* Gabi Siboni & Yoni Eshpar, *Dilemmas in the Use of Autonomous Weapons*, 16 STRATEGIC ASSESSMENT 75, 75 (2014) (addressing cultural anxiety toward autonomous weapons systems due to movies in popular culture like *The Terminator*).
  9. SkyNet is a fictional self-aware artificial intelligence robot that is *The Terminator*’s main antagonist. TERMINATOR (Hamdale Film Corporation 1984).
  10. Sarah Connor is one of the film’s protagonists. *Id.*

sequence of operations or moves in a structured environment. A good example is a robot painting a car.”<sup>11</sup>

Autonomous Weapon Systems would be able to select and engage targets without human involvement in an unstructured environment. This is really the crux of the argument. Should weapons be developed that do not have a human in the “loop” (i.e. a closed “loop” system)? There are three types of weapon systems and they are generally described as:

1. *Human-in-the-loop* or *semi-autonomous systems* require a human to direct the system to select a target and attack it, such as Predator or Reaper UAVs.
2. *Human-on-the loop* or *human-supervised autonomous systems* are weapon systems that select targets and attack them, albeit with human operator oversight; examples include Israel’s Iron Dome and the U.S. Navy’s Phalanx Close In Weapons System (or CIWS).
3. *Human-out-of-the-loop* or *fully autonomous weapon systems* can attack without any human interaction; there are currently no such weapons.<sup>12</sup>

Similarly the U.S. Navy characterizes autonomous weapons in terms of mission complexity. “Supervised” weapons have human operators making the decisions (i.e. “human-in-the-loop” such as UAVs), “scripted” weapons carry out a “pre-planned script of the ‘point, fire and forget’ variety” (e.g. CIWS), and “intelligent” systems that are fully autonomous.<sup>13</sup> The U.S. Department of Defense has directed that “[a]utonomous and semi-autonomous weapon systems shall be designed to allow commanders and operators to exercise appropriate levels of human judgment over the use of force.”<sup>14</sup> They also make it clear that all AWS should not be viewed in isolation but “considered in terms of human-system collaboration” (i.e. all supervised by human operators at some level and designed to be readily understandable to those trained operators).<sup>15</sup>

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11. Noel Sharkey, *Saying ‘No!’ to Lethal Autonomous Targeting*, 9 J. MIL. ETHICS 369, 376 (2010).
  12. See HUM. RTS. WATCH, *supra* note 1, at 2; see also Michael N. Schmitt, *Autonomous Weapons Systems and International Humanitarian Law: A Reply to the Critics*, 4 HARV. NAT’L SEC. J. 231 (2013).
  13. See Sharkey, *supra* note 10, at 377.
  14. See Schmitt, *Autonomous Weapons Systems*, *supra* note 11, at 6.
  15. See *id.*

### III. COMMON GROUND

#### *A. Law of Armed Conflict*

First and foremost, there is immediate common ground to be found in this debate. Any weaponry development shall be done so in accordance with the Law of Armed Conflict (LOAC, also referred to as International Humanitarian Law, IHL, or the Law of War). With respect to AWS, its development and deployment would be required to adhere to LOAC's core principles of distinction, proportionality, humanity and military necessity.<sup>16</sup> There is readily accepted treaty law as well as customary international law that makes this area of discussion easy. AWS is, as all weapons and weapon systems are, a means of warfare (whereas a method of warfare involves deployment and tactics). All AWS would have a legal review conducted prior to formal development as a weapon (or prior to any modification of an existing weapon) and another legal review prior to being deployed in the field.<sup>17</sup> Therefore, the concept of AWS is not *per se* unlawful. At their core, autonomous weapon systems must be able to distinguish combatants from noncombatants as well as friend from foe. LOAC is designed to *protect those who cannot protect themselves*, and an underlying driver is to protect civilians from death and combatants from unnecessary suffering.<sup>18</sup> Everyone is in agreement on this. No academic or practitioner is stating anything to the contrary; therefore, this part of any argument from either side must be ignored as a red herring. Simply put, no one would agree to any weapon that ignores LOAC obligations.<sup>19</sup>

Some argue on behalf of AWS development and usage on the claim it can reduce human casualties, collateral damage, and war crimes by making war less inhumane through lessening the human element from warfare.<sup>20</sup> Future AWS may perform better than humans because when combatants do violate LOAC it is usually for one or more of several reasons and among those reasons are fear,

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16. Schmitt, *Autonomous Weapons Systems*, *supra* note 11, at 29; *see also* LAURIE R. BLANK & GREGORY P. NOONE, INTERNATIONAL LAW AND ARMED CONFLICT: FUNDAMENTAL PRINCIPLES AND CONTEMPORARY CHALLENGES IN THE LAW OF WAR (2013).
  17. Schmitt, *supra* note 11 at 29.
  18. *See generally* YORAM DINSTEIN, THE CONDUCT OF HOSTILITIES UNDER THE LAW OF INTERNATIONAL ARMED CONFLICT (2010).
  19. Of course we must recognize that there are current weapons that remain points of contention with respect to LOAC (e.g. white phosphorous and cluster munitions) but the conversation continues, and the focus on the legal deployment of such weapons is constant and in some cases possible elimination, or at the very least limitations, may be achieved.
  20. Ronald C. Arkin, *The Case for Ethical Autonomy in Unmanned Systems*, 9 J. MIL. ETHICS 332, 332-339 (2010).

anger, frustration, revenge, fatigue, stress, and self-preservation.<sup>21</sup> This is the same rationale for the effectiveness of Unmanned Aerial Vehicles (UAVs or the misnomer “drones”) in complying with LOAC in armed conflicts. UAV operators do not have self-preservation concerns forcing them to make a split second decision on whether to pull the trigger. They have the ability to circle around and acquire more information from multiple sources that will allow them to make the best decision possible.<sup>22</sup> UAV operators are also considerably less likely to succumb to emotion and the other stresses experienced in a combat environment.<sup>23</sup> Overall, AWS could potentially remove much of the unpredictability of human behavior in the battlespace.

Of course, developing and deploying AWS that have the capability to adhere to LOAC while accomplishing the mission is indeed *the* challenge to any such technology. “If an autonomous system is to minimize harm, it must also be ‘cognizant’ of possible harmful consequences of its actions, and it must select its actions in light of the ‘knowledge’ even if such terms are only metaphorically applied to machines.”<sup>24</sup> Frankly, it may be impossible to develop such a capability, and if not impossible, it is decades away, if not scores of years away and perhaps a century or more. This leads to another area of agreement and that is the lack of immediacy in the AWS debate. No designers, engineers, academics, or practitioners believe we will see a deployable AWS within ten or twenty years – at the least.<sup>25</sup> Without a doubt, we should be discussing future weaponry, and the engineers who design and create AWS must do so with a clear understanding of LOAC principles, but any attempt to outright ban a weapon still in the concept stage is not practical as there are far too many variables in the development of AWS to fully appreciate and understand what AWS may ultimately look like.<sup>26</sup>

The final piece of the LOAC argument that has been raised is accountability, as in, “Who will be accountable for autonomous weapon systems that commit a LOAC violation?” Although on its

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21. See *id.* at 333; see also Ryan Tonkens, *The Case Against Robotic Warfare: A Response to Arkin*, 11 J. MIL. ETHICS 149, 152–55 (2012).
  22. Michael N. Schmitt, *Unmanned Combat Aircraft Systems (Armed Drones) and International Humanitarian Law: Simplifying the Oft Benighted Debate*, 30 B.U. INT’L L. J. 595, 597 (2012).
  23. Arkin, *supra* note 19, at 333.
  24. See Wallach & Allen *supra* note 7, at 17.
  25. See Michael N. Schmitt, *Autonomous Weapons Systems and International Humanitarian Law: A Reply to the Critics*, HARV. NAT’L SEC. J. FEATURES 37 (2013).
  26. There was an outright ban on permanently blinding lasers before they were used in the field, but there is little precedent to ban weapons prior to development. See *id.* at 36.

face it appears to be a point of contention – it is not. All lawyers in this conversation agree that anyone who commits a LOAC violation should be held accountable (i.e. in the AWS scenario that may be the system programmer) and anyone in a superior / command position who knew or should have known about the violation may be held accountable as well.<sup>27</sup>

In sum, the “rise of autonomous weapons is creating understandable concern for the international community as it is impossible to predict exactly what will happen with the technology. This uncertainty has led some to advocate for a preemptive ban on the technology. Yet the emergence of a new means of warfare is not a unique phenomenon and is assumed within the Law of Armed Conflict.”<sup>28</sup>

### *B. Human Error*

More common ground may be found in that all parties also agree that human error exists and that we collectively strive to eliminate the pain and suffering caused by such error. We have investigated civilian train, ferry, and airline crashes such as the 1985 Japan Airlines that killed 520 people, caused by improper maintenance techniques.<sup>29</sup> We try and compensate for poor witness identification in criminal cases that may lead to the death penalty for an accused. Every civilian law enforcement shooting is thoroughly reviewed. Human error in the medical field results in 100-200 deaths every day in the United States that may lead to litigation and extensive discovery.<sup>30</sup>

Likewise, in the military, human error has claimed more than its share of lives. A deadly steam fire onboard the USS IWO JIMA killed ten sailors because the civilian maintenance crew used brass nuts instead of steel ones on a steam valve.<sup>31</sup> In 1987, during the Iran-Iraq

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27. Kenneth Anderson and Matthew P. Waxman, *Law and Ethics for Autonomous Weapon Systems: Why a Ban Won't Work and How the Laws of War Can* 16–17 (Am. U. Wash. Coll. L., Research Paper No. 2013–11).
  28. Shane Reeves and William J. Johnson, *Autonomous Weapons: Are You Sure These are Killer Robots? Can We Talk About It?*, ARMY LAW., April, 2014, at 27.
  29. Mark Johanson, *Worst Plane Crashes in History and Their Aftermath*, INT'L. BUS. TIMES (Jun. 19, 2013 10:54 PM), <http://www.ibtimes.com/worst-plane-crashes-history-their-aftermath-1315189>.
  30. Wallach & Allen *supra* note 7, at 22.
  31. See, e.g., Jodi Enda, *Bahrainian Blamed in Fatal Ship Blast the 1990 Explosion Was Due to Faulty Repair, a Report Says. Rep. Andrews Charges the Navy Broke the Law*, PHILA. INQUIRER (Aug. 14, 1992), [http://articles.philly.com/1992-08-14/news/25989895\\_1\\_navy-report-repair-ships-ships-at-american-shipyards](http://articles.philly.com/1992-08-14/news/25989895_1_navy-report-repair-ships-ships-at-american-shipyards).



war, in which the U.S. was supporting Iraq, the USS STARK did not adequately identify a threat from an Iraqi fighter jet, that (supposedly) misidentified the STARK as an Iranian ship, and as a result 37 sailors died when two 1,500-pound *Exocet* missiles impacted the ship.<sup>32</sup> As a result of the STARK's under reaction error, the next year the USS VINCENNES had an overreaction of human error and shot down an Iranian civilian Airbus A300 in the Persian Gulf, killing all the civilian passengers and crew. The VINCENNES believed the airplane was descending into an attack profile and was identified as a military aircraft by its "squawk" transmission, when in reality it was ascending after takeoff en route to Dubai and was recorded with a civilian squawk.<sup>33</sup>

Nearly all friendly fire incidents are the result of human error. The friendly fire that shot down a pair of U.S. Army Blackhawks by U.S. Air Force F-15's in northern Iraq's "No Fly Zone" in 1994 was the result of human error by the AWACS crew as well as the F-15's that made visual contact prior to shooting.<sup>34</sup> U.S. Army Ranger, and former NFL player, Pat Tillman was killed in Afghanistan as a result of human error by his fellow unit members when he was misidentified as the enemy in a firefight in 2004.<sup>35</sup> "Such tragedies demonstrate that a man in the loop is not a panacea during situations in which it may be difficult to distinguish civilians and civilian objects from combatants and military objectives. Those who believe otherwise have not experienced the fog of war."<sup>36</sup> In short, human error causes untold deaths – perhaps AWS can perform better.

### *C. Machines Instead Of Humans*

Even more common ground in this debate is the fact that both sides agree there should not be a "robot army" fighting "robot wars." The U.S. Department of Defense has made it clear AWS will not replace humans in combat but will instead reduce their exposure to life threatening tasks (such as at check points dealing with suicide

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32. See *Officer Errors Reportedly Left USS Stark Vulnerable*, CHI. TRIB. (Jun. 1, 1987), [http://articles.chicagotribune.com/1987-06-01/news/8702100123\\_1\\_sea-skimming-radar-warning-receiver-exocet](http://articles.chicagotribune.com/1987-06-01/news/8702100123_1_sea-skimming-radar-warning-receiver-exocet).
  33. George C. Wilson, *Navy Missile Downs Iranian Jetliner*, WASH. POST (Jul. 4, 1988), <http://www.washingtonpost.com/wp-srv/inatl/longterm/flight801/stories/july88crash.htm>.
  34. Iver Peterson, *Court-Martial Begins in 'Friendly Fire' Deaths in Iraq*, N.Y. TIMES (Jun. 3, 1995), <http://www.nytimes.com/1995/06/03/us/court-martial-begins-in-friendly-fire-deaths-in-iraq.html>.
  35. Josh White, *Tillman Killed by 'Friendly Fire'*, WASH. POST (Jun 30, 2004), <http://www.washingtonpost.com/wp-dyn/articles/A444-2004-May29.html>.
  36. Schmitt, *Autonomous Weapons Systems*, *supra* note 11, at 13.

bombers) and reduce the potential cognitive overload of operators and supervisors.<sup>37</sup>

Another area of agreement can be found in that both sides of this debate understand the inherent weaknesses in AWS. Any system is subject to breakdowns, malfunctions, glitches, interference (i.e. hacking by the enemy or others), and beyond those mechanical issues in a conflict setting, information / intelligence will always be the *Achilles' heel* of any tasking and deployment of any weapon system.

One rather interesting argument against AWS replacing human combatants is that humans are “capable of morally praiseworthy and supererogatory behavior, exemplified by (for example) heroism in battle, something that machines may not be capable of... [and] replacing humans with such machines may also eliminate the occurrence of soldiers ‘going beyond the call of duty’... [and] unduly threatens the ability of human soldiers to exhibit morally exceptional behavior, and undermines important aspects of the military profession.”<sup>38</sup> This may be true, and a few combatants may seek combat glory, but 99.99% of combatants simply want to get the mission done efficiently with the least amount of casualties as possible. If you are in a situation that requires individuals to “go beyond” what is asked of them, your situation is probably less than ideal and the overall environment you’re operating in could be dire. Another point to be made here is that many medals for heroism are for defensive actions (i.e. throwing oneself on the grenade to save your foxhole buddy’s life) and AWS would be ideally suited for a unit’s overall defensive posture.

Another argument put forth against AWS is that it is “disrespectful” to be killed by a machine. First and foremost, it is easy to assume that seeing the man’s eyes as he stabs you doesn’t make your death any more palatable than the proverbial “you never hear the round that kills you.” Secondly, we are in an age of over the horizon weapons, indirect fire, and buried IEDs therefore the concept of being killed by one type of weapon versus another is somehow more “respectful” is misplaced.

#### IV. TECHNOLOGY

Those who argue against AWS must first consider the significant impact that automated and semi-automated systems have on our day-to-day lives. For example, financial institutions worldwide employ computer networks that approve or reject millions of transactions

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37. *Id.* at 6.

38. Ryan Tonkens, *The Case Against Robotic Warfare: A Response to Arkin*, 11 J. MIL. ETHICS 149, 151.

every minute.<sup>39</sup> Utility grids are controlled by computer systems and human activity is being facilitated, monitored and analyzed by computer chips in every conceivable device.<sup>40</sup> Of course, none of these systems are designed to kill people in combat, but there is an element of “automation bias” that results in a *de facto* delegation of responsibility for decisions to a computer and the result is that decision support is allowed to become decision making by default. For example, the APACHE computer based decision support system helps physicians care for ICU (Intensive Care Unit) patients. It has become increasingly difficult for even the best physicians to challenge the “authority” of APACHE. As a result, an open-loop consultation system essentially becomes a closed loop system where the computer dictated clinical decisions.<sup>41</sup> Will a highly developed open-loop system (i.e. with a human in the loop) become hard to countermand? Or would truly Autonomous Weapon Systems programmed and thoroughly tested arguably be more reliable? At the very least, if we don’t develop AWS we need to develop better computer decision support.

With respect to inevitability argument – society “already have engineered systems making decisions that affect human’s lives and have ethical ramifications.”<sup>42</sup> Due to “operator errors and the inability of humans to monitor the entire state of system software, the pressures for increased automation will continue to mount.”<sup>43</sup> Other thinkers raise the “precautionary principle,” which states that, “humans should err on the side of caution. But few would sacrifice computer technology advances of the past 50 years for fear of a robot takeover.”<sup>44</sup> Traffic accidents annually kill on average more than one and half million people worldwide, so if “people knew how destructive automobiles would be 100 years ago would they have stopped their development? Probably not as advantages outweigh disadvantages.” In sum, “[i]ncreasing reliance on autonomous systems will not undermine people’s basic humanity. Nor will advanced robots enslave or exterminate humanity. Humans have always adapted to their technology and the benefits will outweigh the costs.”<sup>45</sup>

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39. Wallach & Allen *supra* note 7, at 16.

40. *See generally id.*

41. *Id.* at 40-41.

42. *Id.* at 8.

43. *Id.* at 32.

44. *Id.* at 52.

45. *Id.* at 7.

## V. CONCLUSION

At the present time, there are many questions and as yet few answers with respect to Autonomous Weapon Systems. Not the least of which include the policy implications of such systems. For instance, “How does this technology impact the likely successes of counter-insurgency operations or humanitarian interventions? Does not such weaponry run the risk of making war too easy to wage and tempt policy makers into killing when other more difficult means should be undertaken?”<sup>46</sup> Will countries be more willing to use force because their populations would have less to lose (i.e. their loved ones) and it would be politically more acceptable?

An immediate outright ban on AWS is the simplest way forward as this approach eliminates any issues with research and development, technology, the law, and policy implications. However, life is not that easy and the technological development will take place because the market and political forces will demand the benefits these technologies can provide.<sup>47</sup> The esteemed Professor Michael Schmitt of the United States Naval War College sums up the position of those opposed to an immediate outright ban when he states, “[I]n the absence of even a single such system being fielded, it is premature to draw conclusions either as to their legality or to the broader issue of whether they should be banned as a matter of policy. Understanding of the systems’ potential for both positive and negative ends is simply too primitive at this time to comfortably draw conclusions as to their legal, moral, and operational costs and benefits.”<sup>48</sup>

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46. Killing by Remote Control: The Ethics of an Unmanned Military, Bradley Jay Strawser, Oxford University Press, 2013.

47. Wallach & Allen *supra* note 7, at 6.

48. Schmitt *supra* note 11, at 37.

