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USAWC Student Awards Program

More than a Game: Decision Support Systems and Moral Injury

by

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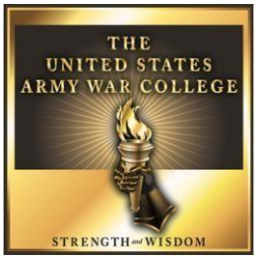

United States Army War College
Class of 2017

REPORT DOCUMENTATION PAGE

Form Approved--OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
01-04-2017	STRATEGY RESEARCH PROJECT	

4. TITLE AND SUBTITLE
More than a Game: Decision Support Systems and Moral Injury

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Chaplain (Colonel) James L. Boggess
United States Army Reserve

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Dr. C. Anthony Pfaff

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army War College, 122 Forbes Avenue, Carlisle, PA 17013

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT Distribution A: Approved for Public Release. Distribution is Unlimited.
To the best of my knowledge this SRP accurately depicts USG and/or DoD policy & contains no classified information or aggregation of information that poses an operations security risk. **Author:** ☒ **Mentor:** ☒

13. SUPPLEMENTARY NOTES
Word Count: 7741

14. ABSTRACT

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15. SUBJECT TERMS
Ethics, Artificial Intelligence, AI, Decision Support System, DSS, Human-Machine Integration, Third Offset

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. TELEPHONE NUMBER** *(w/ area code)*
UU	UU	UU	UU	33	

More than a Game: Decision Support Systems and Moral Injury

(7741 words)

Abstract

Computers are becoming an ever-increasing part of the decision-making process. From managing data to help humans make informed decisions to decision support systems that develop and recommend or select courses of action, computer enhanced decision-making is already impacting the way America fights her wars. As computers carry more and more of the decision-making burden, humans are left to wrestle with the ethical and moral issues. The potential for psychological and moral injury remains and may even grow as a result of computer enhanced decision-making. As decision support systems make decision-making seem more like a game, humans will have less time and may be less likely to fully review courses of action for ethical and moral compatibility. In some instances, especially if collateral damage results in civilian casualties, the human “in, on, or over” the decision loop may feel personally responsible for the action and, as a result, find that their ethical and moral core has been violated, leading to psychological or moral injury. As the military continues to pursue artificial intelligence, automated, and autonomous systems, equal care must be taken to ensure these systems operate within approved ethical and moral boundaries and that their operators are properly trained in ethical decision-making.

More than a Game: Decision Support Systems and Moral Injury

Many believe that the advent of artificial intelligence (AI) may be the most important aspect of the Third Offset. AI will, for the first time, enable fully autonomous systems to actively learn from their environment and make lethal decisions without a human in or on the decision-making loop. While true AI is still waiting somewhere in the future, advances in AI research have already been incorporated into current operations. Perhaps the most widely used technological advances coming out of the research for AI are computer enhanced decision-making systems, often called decision support systems (DSS) as a subset of human-machine team integration.

The Navy's Aegis system is a good example of a current computer enhanced decision-making system that not only manages data but detects, monitors, and prioritizes hundreds of potential threats against the ship, managing data so decision-makers can act on it. The Navy describes this system as "a centralized, automated, command-and-control (C2) and weapons control system that was designed as a total weapon system, from detection to kill."[1] The Aegis system has the ability to defend the ship against anti-ship missiles by identifying a beyond the horizon threat, plot its trajectory and automatically launching intercept missiles all in less time than it would take a human to review the data.

The use of DSS, like the Aegis, advances the use of computers from managing data to support informed decision-making to synthesizing data in order to provide real-time recommendations to decision-makers. In some cases, DSS can choose and initiate a course of action while the human operator simply watches. This technology enables military decision-makers to use a computer-generated probability of enemy actions to predict likely enemy actions and, in some cases, preemptively act. Being able to

accurately predict and counter enemy actions quickly give decision-makers an advantage on the battlefield.

Some soldiers liken decisions made in a command and control center using computer based DSS as being similar to playing a computer game.[2] The adversary is represented as an icon on the screen, courses of actions by arrows and words. It seems easy to forget that in battle the icons represent real people and not just a part of a game. Since the use of DSS can approximate a game environment, this research provides insight into how soldiers might make moral and ethical decisions while using a DSS.

Research indicates that gamers use a different set of rules to make ethical decisions in the game than they use for real world decisions.[3] In some cases, gamers simply accept the computer's output without any additional consideration, after all, it's "just a game." Since the DSS environment emulates a game environment, Soldiers may end up using game ethics in place of their personal ethics which has the potential to result in ethical and moral reflection coming after the fact, if at all, instead of as an integral part of the process. Delaying ethical and moral reflection has the potential to increase incidents of psychological or moral injury.

The proliferation of DSS risks increasing moral injury in soldiers by bypassing their normal moral and ethical decision-making process during battle and leaving them exposed to feelings of moral transgression when they reflect on the consequences of their actions. Several circumstances may contribute to this moral transgression. Soldiers may see computer enhanced decision-making as a game, which may contribute to psychological or moral injury, so reviewing studies of the ethical behavior

of gamers playing virtual-reality computer games may provide insight into how soldiers might disengage their personal moral code. Soldiers in combat have experienced moral injury, so it is important to establish an understanding of moral injury and examine the similarities between traditional combat and DSS, which come with their own inherent set of potential dangers that can contribute to moral disengagement. Fortunately, there are a number of ways the Army can mitigate the possible negative impacts of using DSS through the development of computer subroutines designed to consider the ethical validity of recommended courses of actions, and through training and education.

In the movie, *Ender's Game*[4], the main character, Ender, is a strategically gifted student groomed for mission command. In what Ender believes is a virtual reality final test scenario, he is defending earth against an aggressive, swarming alien species capable of collective thought and controlled by one superior being. In order to buy time to position and prepare his main weapon, Ender fights a delaying action, sacrificing thousands of human lives, a sacrifice he accepts because he does not believe the fight is real. With the computer system anticipating a few minutes until all defenses collapse, Ender is able to fire his weapon which destroys the enemy planet, wiping out the enemy population. Ender's entire experience is one based on information provided by a computer enhanced decision-making system. Stationed on a planet far from the battle, Ender and his team are never in any physical danger and are unable to differentiate between the reality of the battle and the perceived game environment. Ender is so intent on winning the game that he uses a set of "game rules" for decision-making which are at odds with his internal ethical code.

Ender's initial euphoria for winning a simulated battle dissolves into rage and disbelief as he learns that instead of being a hypothetical virtual reality scenario, his actions were real and, not only did he actually sacrifice thousands of human lives, but he is also responsible for the apparent extermination of an entire alien species. Although his mentor believes his actions are justified by victory[5], Ender vehemently questions the morality of destroying an entire species without attempting to negotiate and is unable to reconcile his deep personal turmoil over his role in their extinction. As a result of this moral injury, Ender pledges his life to making restitution for his perceived sins.

While *Ender's Game* is a work of fiction, it highlights one of the potential problems with relying on computer enhanced decision-making systems. Initially, Ender was able to accept the loss of life because, in his mind, it was just a game. Once it became apparent that this wasn't just a game, his moral center was violated. Recent research in moral and ethical decision-making in the gaming world support this outcome.

Game World Ethics

Many Decision Support Systems (DSS) are similar to playing a computer game, with friend and foe represented by icons on a computer screen. Since it is possible that soldiers might approach the use of DSS in the same way that gamers approach virtual-reality games, some insight can be gained by exploring the world of game ethics. Gaming is a multimillion dollar industry that involves providing the gamer with "a series of interesting choices" that are non-trivial in nature.[6] The most popular games on the market are sophisticated games in which "player choice and decision-making have expanded in scope and complexity."[7] Today's games present complicated and multi-

faceted problems which involve ethical decision-making and accompanying repercussions.

Gamers prefer characters who are easy for them to understand and who have a similar moral base. Gamers seem to shy away from playing morally difficult characters who engage in morally ambiguous situations, which suggests "that although there is certainly a suspension of certain real-life strictures ('killing others is wrong') – that players cannot always so easily set aside their own moral systems and beliefs when they pick up game controllers."[8] For some players, how they play the games "is tied to their personal sense of identity, and even a fictional universe cannot disengage them from their own stated moral values but in fact supports and encourages it."[9] For players to feel that their actions are moral and ethical in the game, they must conform to the game's ethics. "The player has become an ethical being by accepting the rules and limits of the game, as an ethical being, the player also has the potential of looking at these rules and limits with moral values and determine what is right and wrong within these rules."[10]

For many gamers, the characters in the game are not real, or even represent reality, instead they are seen as simply obstacles to overcome in order to reach an objective. "Players of violent games may enjoy the thrill of socially unacceptable behavior as long as they have some reason (e.g., remembering that this is 'just a game' or believing one's intents are good) to free themselves from guilt."[11] Research shows that gamers who choose to kill adversaries "argued that the most effective mechanism for moral disengagement is that it is only a game," while over half of the participants in one study claimed "that killing in video games should not have to be justified because it

is no (sic) real."[12] This response is likened to soldiers who dehumanize their enemy in order to justify their actions in war.

This tendency to morally disengage may place "digital natives,"[13] who have a long history with gaming, at a disadvantage when it comes to selecting ethical courses of action developed by a DSS. Computer enhanced decision-making may mirror rather closely the virtual world of gaming, resulting in the short-term suspension of normal ethical rules and a blurring of the line between virtual reality and real life. In the virtual world, gamers have taught themselves to accept the game's *ludonarrative dissonance*, where the mechanics of the game, i.e., killing hundreds of expendable characters, is antithetical to the concept of being the hero.[14] P. W. Singer, a writer and Senior Fellow at the Brookings Institution, observes that people do things in a virtual world that they would never do in the real world. This disengagement has the potential to take all emotion out of the act of killing, dehumanizing the process by reducing both friend and foe to icons on a computer screen. Singer observes:

> A possible psychotic like Steven Green talked about the experience of killing someone as being the same for him as merely "squashing an ant." The true fear is that turning killing into merely the elimination of icons on a computer screen might make the experience feel the same way even for otherwise normal troops. As a young air force lieutenant described what it was like to coordinate unmanned airstrikes in Iraq, 'It's like a video game, the ability to kill. Its (sic) like… [he pauses, searching for the right words] freaking cool.'[15]

As the process for decision-making becomes more "game-like" and their role in the process begins to approximate "playing the hero" of the game, there is the possibility that soldiers using a DSS will accept inappropriate violence. This could result in the soldiers using a set of rules for decision-making similar to those generally used in virtual reality games which do not fully engage their own ethical and moral core,

approving courses of action that they would not approve under normal conditions. Soldiers who approve a course of action that does not square with their internal ethical code may be susceptible to feelings of guilt and shame when they reflect on what actually happened.

Regardless of the outcome, gamers generally accept the outcome without question, understanding that it is “just a game” and the decisions they make are not real. This is not an option for military decision-makers using computer enhanced decision-making since their decisions do have real world consequences. “Clearly, there is a distinction between death, artificially portrayed, in a computer game and ‘real’ death on the ground.”[16]

Soldiers using a DSS usually have a limited understanding of the program and may not have any control over the data used to formulate the decision. Not understanding the processes by which the DSS arrived at the decision being offered and feeling as though they are in a game environment, soldiers may be prone to simply accept the provided course of action without question. What happens when, as in the fictional case of Ender, soldiers acting on the course of action provided by the DSS find the results morally reprehensible due to collateral damage such as civilian casualties? This type of situation leaves them open to feelings of shame, guilt, and possibly psychological or moral injury.

Tyler Boudreau, an Iraqi war veteran who writes about moral injury, made the following observation about civilian casualties, “‘moral injury’ by definition includes the memories of those who have been harmed. Without the Iraqi people, the troops can have no moral injury to speak of.”[17] One way to understand the potential psychological

danger of moving from a non-real setting to a real setting is to examine how performance in battle (reality) that closely mimics training (game-like environment) has resulted in psychological and moral injury because in the heat of the moment, it did not seem real, it seemed like a game.

Moral Injury

The study of moral injury as separate from posttraumatic stress disorder is relatively recent. In 2009 Brett T. Litz, professor of Psychiatry at Boston University wrote, “we are doing a disservice to our service members and veterans if we fail to conceptualize and address the lasting psychological, biological, spiritual, behavioral, and social impact of perpetrating, failing to prevent, or bearing witness to acts that transgress deeply held moral beliefs and expectations, that is, moral injury.”[18] In 2015 Nancy Sherman, professor of Philosophy at Georgetown University defined moral injury as “experiences of serious inner conflict arising from what one takes to be grievous moral transgressions that can overwhelm one’s sense of goodness and humanity.”[19] She adds, “In some cases, the moral injury has less to do with specific (real or apparent) transgressive acts than a generalized sense of falling short of moral and normative standards befitting good persons and good soldiers.”[20] It is important to note that moral injury is experienced as an intense inner conflict resulting from the violation of deeply held moral beliefs.

Moral injury is not the same as posttraumatic stress although they often happen at the same time. Generally moral injury results from being, or perceiving one could be, an agent, either by causing trauma or by failing to prevent it, making moral injury guilt- and shame-based. Posttraumatic stress results from being a target or believing one could be the target of a traumatic event, including witnessing an event, seeing the

aftermath, or feeling fear associated with being a target, making posttraumatic stress fear-based. Litz believes that moral injury needs further study, noting, “moral injury in service members and veterans appears to be a distinct phenomenon warranting its own line of inquiry and development of special intervention strategies.”[21]

Whatever its exact nature, moral injury is likely to occur when there is incongruence between deeply held beliefs and actions that violates those beliefs. William Mahedy, a chaplain and Vietnam veteran who works with veterans diagnosed with PTSD, observes that combat is often so severe that it alters the soldier’s view of life. The soldier’s old world view is no longer adequate to address the horrors of war. “The question that most often arises is “where was God?” It is at this point that American civil religion is most harmful.”[22] An inadequate understanding of God only exacerbates the internal turmoil of the veteran compounding the effects of the trauma. When a soldier’s morals are loosely based in a mix of civil religion and culture rather than firmly fixed based on belief in a higher ideal, deep incongruence can develop between what soldiers believe is right and the actions they take in war. These issues manifest themselves when the soldier’s ethical and moral base are rooted in a mix of culture, civil religion, and a loosely held ethos which is unable to sustain exposure to traumatic events. A deep incongruence develops between the soldier’s internal beliefs and actions on the battlefield. It is this incongruence, this seemingly perpetual dissonance between the soldier’s internal moral code and what happened in battle, which results in moral injury.

Incongruence between the internal moral code of decision-makers and the realization of how their action resulted in transgressions of their internal moral code

could arise with the use of DSS. There exists the real possibility that decision-makers using DSS will inherently, but subconsciously, come to an understanding that the situations presented by the DSS are not real. Since a majority of the time that decision-makers will use a DSS will be in training using situations they know are not real, they may create a default set of “game rules” for accepting the outputs of the system. Since the decision-makers have created an environment where they do not process their own moral understanding of the ethical implications of implementing the decisions in training, this same practice is likely to transfer to actual battle situations.

This use of “game rules” for actual combat has the potential to result in a deep and abiding incongruence between their actions and their internal moral code. As was noted above, gamers become habituated to gaming situations, using a different set of moral and ethical rules than they use in the real world. Through repeated training, soldiers may become habituated to the DSS outcomes, since training mimics gaming, much in the same way that gamers become habituated to the game. This could lead to soldiers, who use a DSS, developing an alternate set of ethical and moral rules that vary from their own deeply held beliefs. When it comes to actual battle, these same soldiers might naturally react the same way they do in training, i.e., not processing their actions as “real” in the moment, leaving them open to psychological or moral injury as they reflect on the aftermath of their actions.

Examples of moral injury are not hard to find, mainly because soldiers are repeatedly trained on the mechanics of marksmanship with little done to prepare them for the moral dilemmas presented by combat. Military training produces soldiers who automatically respond to their environment, a process called “muscle memory,” by

habituating the application of violence through repetitive exercises. The result is that soldiers learn to simply react to their environment rather than to observe, process, and then engage. While this habituation allows the soldier to react quickly in combat, it can also lead to soldiers taking action without first considering the moral implications of their actions.

To improve the reflexive nature of engaging the enemy, Army firing ranges even use human silhouettes to simulate combat in a morally benign setting that, in many ways, is like a game. Prior to the Vietnam War, standard circular targets were used for marksmanship training. From the Vietnam era onward, the standard circular targets were replaced with targets shaped like silhouettes of soldiers. Marksmanship training changed from simply engaging a circular target to a system that was designed to mimic the act of killing on the modern battlefield and taught solders to reflexively react to the movement of the silhouette. “In behavioral terms, the man shape popping up in the soldier’s field of fire is the ‘conditioned stimulus,’ the immediate engaging of the target is the ‘target behavior.’”[23] This behavior is reinforced through the use of marksmanship badges and rewards much in the same way gamers are rewarded in the game.

The results of reflexive training are an incredible increase in small arms efficiency, but this increase in efficiency came with a cost. At the end of World War II retired Brigadier General Samuel (S.L.A.) Marshall, a storied military historian, found that only fifteen to twenty percent of U.S. soldiers engaged the enemy with their personal weapon.[24] This is compared to a study of American soldiers who served in Vietnam which showed that an estimated ninety to ninety-five percent of soldiers in

Vietnam engaged an enemy combatant with their personal weapon.[25] Lieutenant Colonel Peter Kilner, an Army historian, writes:

> This conditioning, training on popup marksmanship ranges, enables soldiers to kill on the battlefield, and the 1993 battle at Mogadishu provides evidence of that. In that 17-hour fight, a few hundred soldiers from Task Force Ranger and the 10th Mountain Division battled thousands of Somalis in fierce, urban combat. The United States suffered only 19 dead while they killed an estimated 300 to 1,000 Somalis. They achieved this extraordinary casualty ratio by being well trained. Based on extensive interviews with the soldiers involved, journalist Mark Bowden wrote a best-selling account of the battle, *Black Hawk Down*, which states: '[Ranger Sergeant Scott] Galentine just pointed his M16 at someone down the street, aimed center of mass, and squeezed off rounds. The man would drop. Just like target practice, only cooler.'[26]

The reaction of Private First Class Jason Moore, a comrade of Galentine's, shows how military training results in the effective by-pass of the soldier's normal moral decision-making process. The result of this training is that often soldiers do not act; they react. During an interview on the Public Broadcasting System's news show, *Frontline*, Moore said:

> I just started picking them out as they were running across the intersection two blocks away, and it was weird because it was so much easier than you think. You hear all these stories about "the first time you kill somebody is very hard." And it was so much like basic training, they were just targets out there, and I don't know if it was the training that we had ingrained in us, but it seemed to me it was just like a moving target range, and you could just hit the target and watch it fall and hit the target and watch it fall, and it wasn't real... Well that day, I had absolutely no ethical or moral problems with pulling the trigger and taking out as many people as I could. And being back here, years later, I think they had wives, children, mothers, sons, just like I have a mother and a dog, and all these things. Our government sent us there to do a mission, and I'm sure somebody was paying him to do a mission. [I just] real[ized] that he was another human being, just like I am. And so, that's hard to deal with, but that day it was too easy. That upsets me more than anything else, how easy it was to pull the trigger over and over again.[27]

After the battle was over, Moore's reaction mirrored that of the character Ender in *Ender's Game*. Even though Moore knew he was not in a game and Ender did not,

Moore was not using his own internal ethical code during the battle. His reaction is similar to gamers using game ethics instead of their internal ethical code. During the battle, Moore was simply reacting to his environment without first working through the moral and ethical implications of his actions. Simply put, the battle seemed like a game. Though the source of this disregard for ethical consideration for Moore is different than it was for Ender, the effects are the same. Once the "game" was over and Moore had time to consider what he had done, he found that his actions had violated his moral and ethical standards. If training can habituate violence without moral consideration on the battlefield, the use of DSS may make moral disengagement even easier through the use of icons to dehumanize the enemy and blind trust in the system.

Kilner adds, "The methods that the military currently uses to train and execute operations enables soldiers to kill the enemy, but they leave soldiers liable to posttraumatic psychological trauma caused by guilt,"[28] what many are now calling moral injury. Computer enhanced decision-making may allow for soldiers to make or accept decisions provided by the DSS without understanding the moral and ethical implications of those decisions. Simply accepting those decisions, without fully considering the moral and ethical implications, could lead to feelings of guilt along with psychological or moral injury. Advances in DSS may make it even harder for soldiers to ethically and morally evaluate computer-generated courses of action.

Computer Enhanced Decision-making

Decision support systems (DSS) have become more prevalent as the military seeks to decrease the time it takes to make a decision. Today's military command and control centers have access to an increasing number of potentially networked collaborative systems providing an overwhelming amount of data. Research indicates

that there comes a point where additional task-relevant data is detrimental to sound decision-making, reducing situational awareness, and lowering trust in teams tasked with making time-sensitive life and death decisions.[29] Because of the vast amounts of available data, decision-making is becoming increasingly complex and the military continues to look for ways to leverage the power of computers in order to shorten the Observe, Orient, Decide, Act or OODA loop.[30] This desire to create a competitive advantage by shortening the OODA loop makes DSS valuable as they manage vast amounts of data, lowering the time necessary to make a decision, and helping to develop actionable courses of action.

To overcome human limitations, DSS are capable of detecting, categorizing, and deciding on a response much faster than a human is capable of processing the situation. As the amount of information increases, these DSS will become increasingly complex. These systems are designed to integrate and organize information so it is useful to the operator, often providing suggested courses of action, and in some limited cases, initiating action automatically. To be of value, the information must be meaningful, timely, and easy to access. The military will continue to look for systems that shorten the OODA loop in order to gain an advantage on the battlefield for offensive as well as defensive purposes.

The Course of Action Display and Evaluation Tool (CADET) is an example of an Army DSS. This computerized tool is capable of automatically producing detailed and actionable battle plans. “In brief, the human planner defines the key goals for the tactical course of action (COA) and CADET expands them into a detailed plan/schedule of operation.”[31] CADET is capable of estimating the route and timing of enemy movement

in order to determine decision-points for the employment of friendly forces. In a 2002 experiment, the CADET DSS went head to head with a team of field grade officers using the standard manual system. The CADET system produced a plan in approximately two minutes which was reviewed and edited by a field grade officer before being submitted for evaluation. Total time for the CADET system and the subsequent review was approximately 20 minutes per scenario. It took approximately 16 hours per scenario for a team of field grade officers to produce a plan. A total of five scenarios were developed and a panel of nine judges evaluated the products without knowing their source. Each judge evaluated four scenarios assigned on a random basis. "The results demonstrated very little difference between CADET's and human performance"[32] except that the CADET DSS reduced the OODA loop by more than fifteen hours and reduced the staffing to one reviewer, both of which would be a significant advantage in actual battle.

Just as the increase in lethality resulting from a change in marksmanship training came with some unforeseen negative consequences, the advantages of DSS may obscure a potential down side. DSS advantages may lead to an over-reliance on a technology that does not fully account for moral consideration in the same way as an all human team. A Korean study indicated that decision-makers may feel compelled to rely on a DSS. The study was conducted to determine which factors were needed for military leaders to integrate a DSS system into Command and Control. Three primary factors were significant for the DSS to be accepted and used. The strongest factor was institutional pressure.[33] There is a need for organizational legitimacy within the military which helps to institutionalize and standardize actions across the force. Along with

institutional pressure, top management support was the third most important factor.[34] Leaders are more likely to adopt and use a technology when their next higher level of leadership is pushing them to use that technology. While these two factors help to drive change, and overcome resistance to new technology, they can also result in operators or decision-makers feeling compelled to use the technology even if they have personal moral or ethical reticence.

The second strongest factor for assimilation of a DSS was the maturity of the information technology hosting the program.[35] When the operators and decision-makers are confident in the reliability of the technology, they are more likely to trust the result. It is surprising that the *quality of the information* provided by the DSS was the least important of the six areas studied while *reliability of the system* was seen as very important.[36] This seems to indicate that reliability, system performance, and ease of use are important factors for acceptance of technology, however, it is difficult for the operator to understand and evaluate the quality and accuracy of the data provided by the system. The often-used computing phrase, “garbage in, garbage out” could result in a faulty decision from the DSS based on faulty inputs. With DSS use approximating the world of gaming and when institutional pressure to use the system is present, operators are prone to approve the output without additional moral or ethical review. When operators take responsibility for implementing (or allowing the implementation of) a decision produced by a DSS and the results lead to tragedy, the operators may have additional feelings of betrayal, guilt, and moral transgression which could lead to psychological or moral injury.

In addition to feeling compelled to use a DSS, another potential hazard is increased risky behavior based on over confidence in the products provided by the DSS. Research indicates that overconfidence may result from two errors, the illusion of knowledge and the illusion of control. A study on the use of a DSS to make investment decisions resulted in overconfidence and risky behavior. The study showed that the more familiar the individual was with the system, the riskier their behavior.[37]

The Korean study mentioned above suggested that the quality of the data was not an important factor in acceptance of the DSS's product.[38] When this is coupled with the possibility of over confidence in the system's ability, there is an increased likelihood that soldiers approving or supervising the DSS's decisions will not scrutinize the output effectively before implementing or allowing the decision to go forward. This could potentially allow the implementation of an ethically or morally questionable course of action.

In critical situations, soldiers will be faced with ethical challenges that are characterized by ambiguity and complexity. In order for soldiers to make an ethical decision, they first must make sense of the situation. According to research involving active duty military in the Netherlands, "Such dilemmatic and challenging situations usually cannot merely be dealt with on the basis of regular routines or rules; they require ethical decision making competence."[39] However, the speed of battle may not allow enough time for soldiers to make sense of the situation and process an ethical decision especially if they have not developed ethical decision-making competency. Under pressure to produce an answer, soldiers, who may be over confident in the DSS's ability to produce an acceptable plan, may be disposed to accept its output,

potentially defaulting to “game ethics,” where the effects of the outcome on innocent human beings is not taken into account. Since they did not take the time to fully comprehend the situation before approving the DSS’s output, implementing the DSS course of action may end up violating their ethical or moral norms. As noted in the Netherland research, “Insufficient sensemaking may result in unethical behavior regardless of an individual’s personal level of moral development.”[40]

To avoid or at least to mitigate moral injury, it is important that soldiers understand the impact of the decisions they make, especially when those decisions have moral consequences. Tyler Boudreau writes, “Moral injury is about the damage done to our moral fiber when transgressions occur by our hands, through our orders, or with our connivance. When we accept these transgressions, however pragmatically (for survival, for instance), we sacrifice a piece of our moral integrity.”[41] As the military moves forward with developing and implementing more DSS, every caution must be taken to ensure that the outcomes are ethically and morally based, and that the soldiers using these systems are morally competent.

Making Artificial Intelligence Moral

As technology advances, artificial intelligence (AI) will also advance to the point where machines of all kinds will operate independent of humans, sharing the human commons and interacting with humans, including on the battlefield. Decision support systems (DSS) using AI that dictate action, rather than provide options, and autonomous weapons could end up making life and death decisions without adequate human over watch and approval. Fully autonomous systems using AI “would be capable of learning from experience and improving performance relative to their narrow domain-specific goals. They will acquire great volumes of data themselves and categorize it in

new, sometimes unexpected, ways."[42] These systems will be able to evaluate, interpret, and act on the data with speed and precision, outpacing the ability of humans to evaluate or supervise in real time. Since it would greatly restrict the efficiency of such systems by having every decision reviewed by a human, the systems must be structured and employed in such a way as to make morally and ethically acceptable decisions every time.

War in the past has benefited from having humans make decisions that innately included moral reflection, with those who choose to violate accepted ethical norms being held accountable. However, computer systems do not innately have a moral center. How they "interact with people depends a great deal on how much their creators know or care about such issues, and robot creators tend to be engineers, programmers, and designers with little training in ethics, human rights, privacy, or security."[43] Since DSS represents the most immediate application of AI research, these actions must be incorporated as the technology progresses.

Computer based systems do have some advantages over human decision-makers. For instance, computers are able to process exponentially more information and reach decisions at speeds that dwarf human efforts. Computers are not susceptible to psychological and physical factors like fatigue, pride, revenge, anger, social pressures, and biases. Computers do not become more risk-adverse or risk-loving if the battle does not trend according to projections. A computer does "not employ 'mind-guards' to isolate dissenting opinion; and does not deploy spurious analogies of past events without systematically considering parallels."[44] These advantages are what make AI and DSS so appealing.

In an effort to ensure computer based decision-making processes are ethical, there is an emerging field called “machine ethics” which develops systems “with ethics codified as principles, parameters, and procedures, allowing them to consider ethical implications of potential actions.”[45] Machine ethics incorporates logic models in a computer subroutine designed to evaluate whether or not a course of action meets ethical standards.

A recent study considered the efficacy of a model called the Relative Ethical Violation (REV) model. This model was developed for use with a military planning and design DSS. The study involved pitting the REV model against the survey results of one thousand military members and humanities experts. The end result was that “the REV model, although very simple mathematically (a linear weighted sum of inputs), turned out to be rather accurate, its effectiveness deriving from the proper choice of principles and weights.”[46] This study shows that a quantitative model is capable of replicating ethical tradeoffs indicating that integrating an ethical model into DSS and AI is possible.

However, the process of developing “ethical weighting” may limit its effectiveness. First, the developers of the system must define a comprehensive set of ethical standards and weight each one, which could be difficult to properly balance. Second, “because the model addresses ethical issues, it has the potential to be misused, e.g., by manipulating the weights to justify a questionable COA.”[47] It is imperative that the ethical subroutine be properly developed and thoroughly tested. In addition, the security of the system should prevent the operator from manipulating the subroutine in order to “trick” the system into providing a preferred course of action.

In order for military operators to have confidence in the ethical and moral veracity of DSS and AI outputs, all systems must undergo vigorous testing involving moral dilemmas based on real life historical situations. For DSS that develop actionable plans, those systems must be able to recognize the moral problem, evaluate the problem from different moral perspectives and generate the ethical pros and cons of each course of action. “A good recommender system not only provides recommendations that the user is likely to like, but also gives the user rationales behind the choices offered.”[48] Only then can military leaders feel confident in employing advanced DSS and IA systems.

One of the problems facing policy makers is that while DSS systems are already here, “we do not yet have the military doctrine, training, and technological safeguards for employing learning machines. Existing legal frameworks can address some of the concerns, but they will not prepare us for a new brand of fog of war that stems from the uncertainty inherent in AI.”[49] And it is this new “fog of war” that has the potential to create situations in which the actions taken by AI and DSS violate the moral center of the human held ultimately responsible for allowing the systems to be used in the battle. Although the potential for these systems to limit collateral damage and shorten conflict may actually make war more humane, mistakes made by these systems could undermine U.S. goals. When humans make a mistake, appropriate authority can hold accountable those responsible. However, some people are quick to stop using a machine or system they find unreliable, sometimes after a single major error. Therefore, “to be trusted in combat, these machines must be able to make correct judgments nearly 100 percent of the time, which means they will be held to a higher standard than human combatants.”[50] Anything less will undermine people’s trust in the machine or

system and result in calls for the military to discontinue their use, especially if there is not a human who can be held accountable for the machine or system's ethical violations.

Additional worries surround the security of the system itself. Complicated systems always seem to have weaknesses and backdoors that can be exploited by hackers. A critical limitation of DSS and AI is the fact that they must rely on data inputs in order to make decisions. Therefore, the quality of their decisions relies on the quality of the data.[51] Legal and ethical experts studying the use of AI are concerned about the "possibility of a flaw in one subprogram or sensor layered into a larger system, which causes a catastrophic failure."[52]

Perhaps the worse-case scenario is not the total failure of the system, but a sub-system failure leading to the system operating with flawed data or corrupted algorithms. In this case, the system would be making decisions outside of its original boundary sets, resulting in the production of sub-optimal and potentially unethical courses of action. Although adverse results may be the result of a system's error, the soldier who is responsible for approving or implementing the course of action may still feel morally culpable and suffer moral injury as a result. For example, a virus introduced by a hacker could corrupt the system's ethical principles subroutine, resulting in the DSS or AI recommending the wrong course of action (from an ethical point of view). Since it is possible, based on the available research, that operators or decision-makers relying on DSS outputs will not conduct a separate, detailed moral or ethical review of the product, flawed products could lead to collateral damage and civilian casualties. In this scenario,

operators responsible for ensuring the integrity of the system and its employment may suffer from psychological or moral injury as a result.

DSS products are only as good as the data provided to the system. In 2005, I was the commander of a medium truck company deployed to Iraq.[53] A sister unit was tasked with transporting building supplies to a new prison being built in northeastern Iraq. The nascent DSS being used by the Operations and Intelligence sections to monitor route conditions listed part of the shortest route to the destination as “green.” Based on the number of attacks over the previous thirty days, the DSS coded routes as green (no attacks), yellow (low likelihood of attack), red (attacks likely) or black (extremely dangerous). Normally routes in Iraq were coded “red” or “black” due to the high number of insurgent attacks against convoys.

The Operations section approved the route without questioning the assessment provided by the DSS. Subsequently, the convoy was attacked and lives were lost. An investigation determined that the green portion of the route went through an insurgent stronghold. The DSS had coded the section as green because the previous command had simply placed that route off limits, resulting in no attacks for over thirty days, which, according to the parameters established in the DSS made the route green. The failure to pass along the information that the route was simply too dangerous to use, and the failure to add that information to the DSS decision matrix, resulted in the DSS reporting the route as green when in fact it was extremely dangerous.

There may be several factors that led to the acceptance of the DSS’s recommendation. One, the technology was reliable, leading to the likelihood that the operators would accept the output. Two, there was institutional pressure to use the

system. Three, the team using the system may have been over-confident in the DSS. Fourth, being isolated at headquarters, the development and approval of routes may not have seemed real, but more like training drills or a game. Those who accepted the DSS output at face value, and without questioning the probability of any route in Iraq being green, were left to face the consequences of their decision to accept the DSS's output and approve the route.

Recommendations

The use of decision support systems (DSS) and artificial intelligence (AI) will only increase as these technologies mature. For the time being, it is U.S. policy to have a human as a part of the decision loop for lethal use of force; "The kill decision is still subject to many layers of human command, and the U.S. Defense Department recently issued a directive stating that emerging autonomous weapons 'shall be designed to allow commanders and operators to exercise appropriate levels of human judgment over the use of force.'"[54] The nature of war will not change with the addition of AI and DSS, only the methods and speed by which the destruction is carried out.

War is traumatic. All soldiers who serve in combat are susceptible to psychological or moral injury because war conditions cause moral anguish. "As every veteran of combat knows, the ideal of war service, the glamor of its heroics, and the training for killing fail to prepare warriors for the true horrors and moral atrocities."[55] Moral conflict will always be a part of war because acceptable conduct in war will always conflict with norms accepted in civilian life. "In American society seriously injuring or killing another human being is viewed as unconscionable or immoral in most instances, which is why we have laws that punish individuals for engaging in that behavior. On the other hand, American society readily accepts the killing and maiming

of others in a conflict or war."[56] This ambiguity creates a moral dissonance for all warriors and places a burden on the military to do everything in its power to prevent these psychological and moral injuries, especially when employing DSS.

The following recommendations will help prevent psychological and moral injury resulting from the use of DSS:

1. Training. The Army needs to provide training at all levels that reinforces ethical standards and includes exploration of each soldier's personal religious or spiritual center. Soldiers must be given the opportunity to fully explore how their religious or spiritual center informs their decision-making as an integral part of ethical training using real-life historical combat scenarios. This will allow soldiers to become competent ethical decision-makers and may identify inadequate understandings of their religious base which potentially opens them up to moral injury. For soldiers who will work with DSS, they must be trained on the moral implications of using these systems. By understanding how DSS processes moral dilemmas and the potential ethical shortcomings of these decisions, DSS operators can learn to engage their own ethical code to ensure the decisions made are morally and ethically acceptable.

2. System Design. Programmers must design systems which produce courses of action that are morally defendable, including the development of advanced computer subroutines using ethical models that are reliable, tested, and acceptable. Since no system can be create that is 100 percent reliable, a soldier, who is trained to recognize morally questionable decisions, must always remain in or on the loop in order to stop unacceptable courses of action before they can be are implemented.

3. System Education. The Army must thoroughly educate leaders responsible for the decisions employed as a result of DSS and IA systems on the way the system integrates ethical principles into the decision-making process. In addition, the Army must provide a feedback loop that allows decision-makers, who are training with DSS, to provide input to the programmers in order to enhance the effectiveness of the system's ethical model. By emphasizing moral decision-making during training and actively looking for ways to enhance the system's moral consideration subroutine, decision-makers will be less likely to develop a game mentality and more likely to engage their personal ethical decision-making process.

4. Moral Review After DSS Training. The Army must include after-action reviews assessing the moral and ethical implications of the decisions made during training events for all training involving the use of DSS and AI. This will help counter the default position of "it's only a game" and reinforce the need for all soldiers to morally evaluate their actions. When moral and ethical consideration are a part of training, there is a higher likelihood soldiers will also make moral and ethical consideration a part of battle.

The march toward DSS using AI is inevitable. It is incumbent on the Army to do everything in its power to mitigate the potential negative impacts of using these technologies. Anything less could lead to an increased number of soldiers suffering from psychological or moral injury. Those who work with these systems must understand the potential consequences, they must understand that using these systems is more than a game.

Endnotes

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[7] Consalvo, Busch, and Jong, "Playing a Better Me," 2.

[8] Ibid., 3.

[9] Ibid., 5.

[10] Perrson, *To Kill or Not to Kill*, 5.

[11] Hartmann and Voderer, "It's Okay to Shoot a Character," 113.

[12] Perrson, *To Kill or Not to Kill*, 32.

[13] A Digital Native is a person who was raised with digital technology as an integral part of everyday life.

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