The Impact of Emerging Military Technology on the Human Element of Conflict

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Abstract

Scholars have long considered technology a critical element in discussing war and security, and significant efforts have been made towards understanding this connection. However, when examining the effects of certain technologies, existing explanations often fell short. This paper seeks to serve as an initial effort at finding an alternative perspective to understand the impacts new technologies will have in future conflicts by highlighting the changing role played by humans. Several of today's emerging technologies carry the potential to shift existing understanding on how humans are configured into military operations and hence, they can have a significant impact on nature of future war. In particular, we propose that these technologies redefine the human role by creating distance, altering perceptions, and presenting challenges to current legal and ethical frameworks on human action in conflict. Through carefully constructed case studies based on existing and projected military uses of information technology, unmanned vehicles, and cognitive neuroscience research, this paper shows that emerging technologies can create different conceptions of military capabilities and the nature of warfare. We find that reintroducing the human element into studies of technology and warfare allows the impact of emerging technologies to be better understood.

Introduction

Technology has long been considered an important element in determining a state's security on the international stage. In particular, scholars have often reported a strong association between technological progress and advancements in military affairs. Progress made in transportation during the interwar period marked the advent of the mechanization of warfare, the destruction of Hiroshima and Nagasaki served as the harbinger for the nuclear era, and from the 1990s onward, the rapidly advancing information age has produced an entirely different set of civilian and military capabilities unthinkable just decades ago. The records of military history seem to agree with the assessment that when it comes to security and military affairs, technology truly matters.

For this reason, military strategists and security scholars take technology as a central part of their concern. Technology is often said to contribute to determining national capabilities, the dynamics of conflict, and the outcomes of war. In the realm of international security theory, defensive realists argue that technology plays a prominent role in determining the offense-defense balance, and such a balance can impact international stability and states' foreign policy choices. In the area of strategic studies, revolution in military affairs (RMA) scholars posit that the adaptation of revolutionary technology can lead to military reorganization and doctrinal change. Such changes can lead to new ways of fighting wars. From the field of innovation studies, the causes to changes in military technology, doctrine, and organization, and the linkages between them, are debated. To the extent that they have provided meaningful explanations, these existing theoretical discussions have purportedly helped scholars and policymakers understand the potential impact technology may have on security issues.

Today, the world is facing yet another set of technological and scientific advancements. Rapid progress in information technology, the increasingly pervasive use of unmanned vehicles resulted from robotics research, and the technological breakthroughs occurring in the research of human cognition, are some of the areas in which emerging technologies have been said to carry significant military utility and thus security implications. Yet, despite the often suggested potentials of these technologies, their actual influence on the security environment or the military is poorly understood. Existing theories like the ones introduced above have thus far provided very little utility, and security scholars are left with a set of unanswered questions: why is it difficult for existing theories to provide clarity on the potential impact these technologies may have on security? How do emerging technologies influence issues of security, such as armed conflicts? How can such an impact be evaluated? What changes are occurring within the military structure that will significantly affect the ways in which it operates in conflicts? What implications do these changes have for understanding international stability and the future of war?

This paper seeks to serve as an initial effort at filling these theoretical gaps and engaging these questions. It provides an alternative perspective to understand the impacts new technologies will have in future conflicts by highlighting the changing role played by humans. It

is argued that existing theories, focusing on military and weapons systems, operational art, and innovations often overlook the integral and central role humans occupy in conflicts and the effects technology has on them. As a result, the pictures painted by existing theories concerning the influence emerging technologies have on security and the military are often opaque or incomplete. We argue that since wars are not being fought the way they used to be, the technologies used to fight them have also changed. At the center of these changes are the humans operating and being affected by technology. This interaction, in turn, has implications for the types of conflicts currently being fought as well as those fought in the future. By focusing squarely on warfighters, we argue that these emerging technologies carry the potential to shift existing understandings on how humans are configured into military operations and hence, they can have a significant impact on the future of human warfare.

In particular, we propose that these technologies redefine the human role by creating distance, altering perceptual capabilities, and presenting challenges to current legal and ethical frameworks on human action in conflict. Through carefully constructed illustrative cases based on existing and projected military uses of information technology (both in terms of information and cyber warfare), unmanned vehicles, and cognitive sciences research, we intend to show that emerging technologies can create different conceptions of military capabilities, strategic choices, and nature of war by configuring individual warfighters into conflict operations in unprecedented ways. We find that reintroducing the human element into security theories allows the impact of emerging technologies to be better understood. The discussion below suggests that a careful examination on the configuration of the human elements in the military can lead to broader implications and new opportunities for studying the impacts of emerging technologies on security and military affairs.[1]

Overview: Military Technology, Doctrine, and Security

Offense-Defense Theory and War

Technology's impact on warfare, or more broadly, security, is a subject that concerns both theorists and practitioners alike. However, to date, whether through the lens of an international relations theory-driven perspective of defensive realism, a military strategist perspective of revolution in military affairs (RMA), or an organizational theory perspective in understanding military innovations, the mechanisms through which technology influences the way military force is produced and the way that military operations are conducted are rather opaque.

[1] The types of emerging technologies mentioned earlier may only apply to certain countries with a particular technological endowment. It is for this reason that the questions raised here are highly U.S.-centric, most notably concerning existing technical advancements, the concept of RMA, and the discussion surrounding casualty aversion. With this being said, the theoretical discussions are still relevant to understanding the nature of future conflicts, especially with evidence of countries besides the United States spearheading technological developments within their respective militaries.

For international relations theorists, the impact of technology on security has been understood primarily through defensive realism, a strain of which has become known as offense-defense theory (ODT). The offense-defense theory attempts to link technology to security by suggesting that an epochal technology can exacerbate or ameliorate the security dilemma by altering the offense-defense balance (ODB) in the international system. International stability is influenced by the strength of the security dilemma, which can be affected by two factors: the offense-defense balance and the ability to distinguish between offense and defense.[2] Offense-dominance and inability to distinguish offense from defense worsen the security dilemma and encourage conflict. Defense-dominance and the ability to distinguish defense from offense lessens the severity of the security dilemma, suggesting the potential for peace and cooperation.

Traditionally, offense-defense theorists have argued that the ODB can be measured according to how a particular technology will be used in a conflict. Offensive advantage is usually attributed to technologies that are mobile and highly mechanized, which result in states perceiving conquest to be easy.[3] The types of technologies associated with offense dominance have included those used in siege warfare and mass produced weaponry facilitated by cheap iron. Defensive advantage on the other hand has been assumed to exist with technologies that favor fortification or firepower. These technologies have historically included fortresses, the machine gun, and railroads, the latter two of which were neutralized by the introduction of motorized armor, an offensive technology.[4] Determining whether offense or defense has the advantage has thus hinged upon the nature of one particular technology that defines a period of warfare.

Despite its parsimony, the offense-defense theory has several significant gaps in its framework that make its utility in analyzing an emerging technology particularly difficult. First, in ODT, the offense-defense balance is an exogenously given variable that relies on the determination of an epochal technology. Since epochal technology, by definition, can only be understood retrospectively, the utility of ODT in predicting state's choices in pursuits of emerging technologies and the potential impact of such choices is limited. Second, the ODT presumes that a technology impacts military operation through only a single mechanism, be it mobility, firepower, vulnerability, or others, despite the fact that many technologies can influence the offense and/or defense in a military operation through multiple mechanisms. As a result, ODT has limited utility in predicting the impact certain technologies will have. Third, the ODT pays very little attention to the multiple levels in which a military operation is conceived: strategic, operational, or tactical. A lack of distinction of whether the offense-defense dominance is applied at a strategic, operational, or tactical level in most ODT analyses has rendered ODT predictions confusing. Finally, understanding the ODB as an exogenously given variable would mean that a technology must have system-wide effect. However, empirical

[2] Robert Jervis, "Cooperation Under Security Dilemma," in *Offense, Defense, and War*, ed. Michael E. Brown, Owen R. Coté Jr., Sean M. Lynn-Jones, and Steve E. Miller (Cambridge, MA: The MIT Press, 2004), 3-50.

[3] Jervis, 33; Stephen Van Evera, "Offense, Defense, and the Causes of War," in *Offense, Defense, and War*, ed. Michael E. Brown, Owen R. Coté Jr., Sean M. Lynn-Jones, and Steven E. Miller (Cambridge, MA; The MIT Press, 2004), 227.

[4] Van Evera, 239.

evidence shows that states, in fact, do often have choices in their pursuit of military technological innovations.

The problems discussed above have revealed that offense-defense theory, while having served as a dominant theoretical framework in analyzing a technology's impact on security, is not entirely well-suited to explain the security implications of an emerging technology that may have wide-ranging military applications. This is because the theory treats its main operational variable, the offense-defense balance, as exogenously determined. Recent works examining and refining the ODT tend to emphasize that politics, or national strategy, determines the technologies pursued,[5] but these revisions often fail to provide further understanding as to how states make the choices they do, particularly when the impact of the military technology chosen is uncertain. In light of this gap, an alternative framework that can more dynamically account for a developing technology's impact on the ODB is needed.

Furthermore, the offense-defense theory risks being outdated in providing useful explanations for current trends of armed conflicts. Theories of war and peace have been built upon age old conceptions of the types of military engagements conducted. In the particular case of the offense-defense theory, the framework is constructed upon the notion of states conducting a particular type of warfare – one that is a state-on-state conflict in which the mission and the scope of operation are more easily definable. From the original conception of the theory by Robert Jervis, through the debates of the "Cult of Offensive," to contemporary reinterpretations, the offense-defense framework is highly influenced by the great wars experiences of the twentieth century, and the many discussions and tests conducted on the offense-defense framework have not escaped the World War I mantra. This phenomenon has led critics to refer to offense-defense's use of World War I as a scenario of "overmilking."[6]

Of course, as many critics have noted, this over-reliance on the World War I experiences have become an inherent weakness in offense-defense theory. Ultimately, a theory devised and tested on the same case renders the predictions moot. What critics have often refrained from saying explicitly, however, is that the generalizability of offense-defense is largely undermined from this over-reliance. Trying to apply concepts and predictions associated with offense-defense theory become difficult due to the fact that they have been derived from similar events. The introduction of emerging technologies into conflicts starkly different from the world wars fought in the Twentieth century has implications for future conflicts and instability in the international system. In order for ODT to become more relevant for current trends, it must be able to accommodate varying types of conflicts.

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[5] Keir A. Lieber, *War and the Engineers: The Primacy of Politics Over Technology* (Ithaca: Cornell University Press, 2005); Jonathan Shimshoni, "Technology, Military Advantage, and World War I: A Case for Military Entrepreneurship," in *Offense, Defense, and War*, ed. Michael E. Brown, Owen R. Coté Jr., Sean M. Lynn-Jones, and Steven E. Miller (Cambridge, MA: The MIT Press, 2004), 195-223.

[6] Richard K. Betts, "Must War Find a Way? A Review Essay," in *Offense, Defense, and War*, ed. Michael E. Brown, Owen R. Coté Jr., Sean M. Lynn-Jones, and Steven E. Miller (Cambridge, MA; The MIT Press, 2004), 342.

It is for reasons discussed above that ODT is insufficient in accounting for current and for potential future instability in the international system. Emerging technologies like the ones discussed here present new ways to think about warfare: novel military technologies are used in new types of conflict against a different brand of enemy. While these technologies are not likely to turn the tide of war as the longbow, machine gun, railroad, and cannon did, they are altering the way wars have traditionally been fought. In order to conceptualize the emergence of these technologies and their effects on future conflicts, one must examine how military organization and doctrine have been affected by such technologies or vice versa. By looking at technological influences on organizational and doctrinal change within the military, one can discover the role humans are currently playing within the military organizational structure and what implications that has for the future of conflict and stability in the international system.

Revolution in Military Affairs (RMA) and Operations

From the perspective of a strategic studies scholar, the relationship between technology and security can be understood through a different framework of revolution in military affairs that is less concerned with the offensive or defensive nature of the technology. As described by the United States Department of Defense, RMA is "'a major change in the nature of warfare brought about by the innovative new application of new technologies which… fundamentally alters the character and conduct of military operations.'"[7] The concept of RMA suggests that, when there is an opportunity of technological innovation, the military will either attempt to drive the research behind such an innovation, or it will try to adopt the technology for its own use in order to stay ahead.

Furthermore, the RMA thesis argues that a technology by itself does not constitute a revolution. In order to achieve a revolution in military affairs, changes in operational concepts or military organizations need to accompany the technological drivers. As Andrew Krepinevich argues, a military revolution occurs when "the application of new technologies into a significant number of military systems combines with innovative operational concepts and organizational adaptation in a way that fundamentally alters the character and conduct of conflict."[8] In other words, the revolution occurs when the appearance of combat and the structure of militaries change along with technological advancements. It is also possible for technical changes to lead to the creation of new elites in the military organization by changing the kind of technical expertise required, and alterations in states' power positions resulting from technical changes may occur. According to the thesis, when such a scenario exists as a result of a technical change or an adaptation of a technical change, a revolution in military affairs occurs.

In addition to its elucidation on the linkage between military operational doctrine, force constitution, and technological innovation, the concept of RMA serves an additional function by

[7] Qtd. in Jeffrey McKitrick and others, "The Revolution in Military Affairs," in *Battlefield of the Future: 21st Century Warfare Issues*, ed. Barry R. Schneider and Lawrence E. Grinter (Maxwell AFB, AL: Air University Press, 1995), Chap 3, 1.

[8] Andrew F. Krepinevich, "Cavalry to Computer: The Pattern of Military Revolutions," *The National Interest* 37 (Fall 1994): 30.

helping to elucidate some of the determinants that are important drivers for change: capability, incentive, and interest. If a state does not have the capability to develop a new technology, then its military will not have the opportunity to drive or exploit innovations made possible by that technology. Since capability does not equal interest, states lacking capability may still attempt at military technological innovation based upon their strategic interests. Finally, dependent on the incentives that exist in the international system, state interests may be shaped and defined differently. Eliot Cohen clarifies this distinction by suggesting that without certain external conditions, such as a severe competition, even states with available technologies are unlikely to exploit them fully, and the technology would likely evolve rather than radically change when structural incentives are absent.[9]

In short, the scholars of RMA propose a framework with a set of criteria that when met, a technology can not only influence but also change the way the military operates. However, despite the future-looking orientation of the RMA framework, the RMA thesis itself provides very little information on the avenues through which a technology may change the operational concepts and military organization. In other words, RMA scholars do not elaborate on the necessary mechanisms through which a technology changes the operational art. As a result, it is difficult to use the RMA thesis to make predictions about an emerging technology's influence a priori, especially when the ways through which the technology can impact the military force composition or operation are underspecified. For this reason, an alternative conceptualization of the relationship between an emerging technology and the military is necessary in order to supplement the RMA framework.

Explaining today's emerging technologies in the context of RMA is particularly difficult. While this may seem like an oxymoron, for RMA is intended to explain how novel technologies will change the appearance of conflict, this difficulty nevertheless arises out of the lack of specificity that RMA scholars provide to the concept of organizational and doctrinal change.[10] RMA scholars often diverge on their interpretation of what technology would drive or be exploited in the next military technical revolution, but they nearly unanimously endorse the view that without some forms of organizational adaptation or doctrinal change, RMA would not be considered complete.[11] This agreement among the scholars of RMA highlights the fact that the imperative component of a RMA lies in the ability of the military to shift the way it operates in order to facilitate or adapt to the technological changes occurring. Yet, despite the importance of organizational adaptation or doctrinal change, the discussions in the RMA literature on the scope and mechanisms necessary to achieve such adaptation and change are surprisingly scant.

The relative difficulty in predicting the future landscape of military operations through the RMA framework is a logical but not necessarily always apparent consequence of this lack of specificity in understanding what constitutes the organizational and doctrinal changes to the

[9] Eliot A. Cohen, "A Revolution in Warfare," *Foreign Affairs* 75 (March/April 1996).

[10] Theodor W. Galdi, "Revolution in Military Affairs? Competing Concepts, Organizational Responses, Outstanding Issues," CRS Report for Congress (December, 1995), 2.

[11] Richard O. Hundley, *Past Revolutions, Future Transformations: What Can the History of Revolutions in Military Affairs Tell Us About Transforming the U.S. Military?* (Santa Monica, CA: RAND Corporation, 1999), xiv.

technological drivers. In other words, without providing sufficient details as to what particularly about the military doctrine and/or organization is changing as a result of the changes observed in military technological breakthroughs, the RMA thesis encounters difficulty in providing predictions about a given technology's future. Of the many scholarly accounts of what RMAs look like, many paint high-level depiction of future war, but few have been able to show reasoning behind the change, and fewer, if any, are concerned with how the technologies may impact the warfighters.[12] As a consequence, the RMA discourses often produce pictures about future warfare that can only be viewed from a distance: without providing details as to how such pictures are painted, the RMA thesis lacks the granularity that would be necessary when a closer examination of causal mechanisms for change is wanted.

Military Innovation and Doctrines

Whereas the RMA discussions have grabbed the attention of policymakers, particularly in the 1990s and the early 2000s, a related and vigorous debate on military innovation has also taken place in academic circles. RMA discussions often focused on harnessing the technological potential and provide high-level pictures of "change," but a significant gap exists in the RMA literature, since there is no vision as to why and what specific changes are taking place. Indeed, the military, frequently viewed as a mammoth organization replete with bureaucracies, is often considered to be slow to adapt and resistant to change. As Stephen Peter Rosen describes, "in bureaucracies the absence of innovation is the rule, the natural state."[13] Militaries, in particular, are argued to be particularly averse to change, for the security tasks facing them require routinized and efficient responses that can only be afforded by stable bureaucracies with tried and true procedures in problem-solving. For this reason, the reality that militaries innovate, be it organizationally, doctrinally, or technologically, becomes a puzzling phenomenon.

A multitude of scholars have spent abundant efforts in understanding why militaries change, how they innovate, and whether or not they can sustain a given transformation. Similar to the discussions by offense-defense theorists and RMA scholars, technological innovation has been attributed as a potential driver for military doctrinal change, especially when the technology has been tested in combat.[14] While others have advocated that the differing military doctrinal changes may be more a result of institutionalized delegation between civilian authorities and the military, it is nevertheless noted that technological innovation is sensitive to changes in military doctrine.[15] Military innovation scholars, as a result, come to similar observations as RMA

[12] For an example of high-level discussions on potential missions and mission requirements as a result of RMA, see Andrew F. Krepinevich, Jr., *The Military-Technical Revolution: A Preliminary Assessment* (Washington D.C.: Center for Strategic and Budgetary Assessments, 2002).

[13] Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca: Cornell University Press, 1991), 5.

[14] Barry Posen, *The Sources of Military Doctrine: France, Britain and Germany between the World Wars* (Ithaca: Cornell University Press, 1984), 59.

[15] Deborah D. Avant, *Political Institutions and Military Change: Lessons from Peripheral Wars* (Ithaca: Cornell University Press, 1994).

analysts that revolutionary innovations in military affairs rely on both changes in military organization and doctrine as well as technological advancements.

Scholars of military innovations have also taken a direct interest in the development of innovative military technologies. In examining the dynamics of an arms race, it is noted that external forces, such as concerns for power balancing and peer competitors' technological prowess, as well as internal drivers, such as the interests of domestic groups and the advocacies of scientists and military personnel, are at varying times and in differing political institutions both critical to the development of military technologies.[16] Bypassing the discussion on the development of nuclear weapons and discounting the competitive pressure from the international system as the source to technologically innovation, Rosen suggests that technological innovations in the military largely occurs as a consequence of the need to managing future uncertainties.[17] Technological innovations, in this sense, are understood as an integral component of the dynamics and the processes of a state's military planning.

The discussions on military innovations provide reasons for change in military organizations. Whereas RMA analyses provide high-level descriptions of future warfare brought about by accompanying changes in military technologies and doctrines, innovation scholars provide the avenues through which one can understand *why* such changes occur. Yet, when it comes to understanding the impact that emerging technologies have on the nature of human warfare, the innovation literature provides very limited insight as to what the changes and innovations *mean* to the international security environment. In other words, the discourse on military innovation helps to pave the way for states to overcome the organizational and bureaucratic impediments to change, but it offers little guidance as to how such change will shift, challenge, or transform the ways that wars are being fought. The discussions on RMA and military innovation, consequently, only provide a slice of the picture on how technologies impact war, but neither establishes a framework to interpret military technological advancements.

Similar to the RMA discourse, studies on military innovation also reconfirm the observation that there is a strong association between technology, doctrine, and organization when it comes to military change. However, exactly how these three elements of military innovation are connected lacks clarity and is subject to continued debate. Do technological changes precede doctrinal adaptations? Or are technological advancements always framed by existing security doctrines and requirements? Or, as some may assert, are the determination of technological and doctrinal change always a result of organizational culture or bureaucratic dynamics? In short, discussions on military innovation lack operative mechanisms that clarify the linkages between the three components of military change, further limiting its utility to providing details of the nature of future wars.

A pivotal component of the ways that militaries operate that would lend insight into the unanswered questions raised by the existing ODT, RMA, and innovation literature is the role

[16] Matthew Evangelista, *Innovation and the Arms Race: How the United States and the Soviet Union Develop New Military Technologies* (Ithaca: Cornell University Press, 1988).

[17] Rosen, 221.

humans play within a changing military organization. Emerging technologies have the tendency to redefine the capacity and role that humans occupy in warfare. The essence of change and pursuit of technologies are the byproduct of human action. Those human actions in turn affect the individuals responsible for using those technologies. Examining the human role within the military organization has significance for understanding the nature of future conflicts. The following section seeks to clarify the historical role humans have played in conflict, elucidating the costs of war and the nature of certain emerging military technologies as they relate to humans.

The Human Element of Conflict

Although not explicitly discussed or argued by scholars discussed above, humans are the key agents of change involved in the revolution in military affairs. In any military organizational structures, humans are a necessary component, and their configuration in relation to technological systems matters when one considers operational efficiency. This is not to say that countries consistently succeed at achieving this goal. However, arguments have been made that countries experiencing technological breakthroughs should strive to optimize their military organizational structure to harness technological advancements to their advantage. According to Stephen Blank, states are able to move from technological to strategic superiority by achieving organizational superiority.[18] At the most basic level, this organizational change is made by humans and affects humans. Doctrinal adjustments are the product of decisions made through human deliberations, the results of which change how individuals are configured within the organizational structure.

With this in mind, the human role within the military organizational structure has historically been a central component of discussions on war. The human element of war at the most basic level has involved individuals "running, dodging, and hurling things at each other."[19] Militaries have relied on humans to carry out missions in times of peace and war, oftentimes at risk of losing their lives. Even before the existence of a clearly defined military, humans were on the frontlines, dying in the name of their nation or, in some cases, for the causes of an ideology. Death, along with life, has been the crux of human involvement in warfare. Technological advancements within the military have been pursued to improve the ability of one side to inflict as much damage as it can on the other. Whether soldiers or noncombatants are the victims of a conflict, the cost to conducting wars has been, at its core, very human.

Approaching the human role in conflict must then logically focus on what cost-benefit analyses countries consider leading up to, during, and at the conclusion of a conflict. What costs have countries been able to withstand before conceding? Along these lines, how have humans

[18] Stephen J. Blank, "Preparing for the Next War: Reflections on the Revolution in Military Affairs," in *In Athena's Camp*, ed. John Arquilla and David Ronfeldt (Santa Monica, CA: RAND Corporation, 1997), 63.

[19] Thomas K. Adams, "Future Warfare and the Decline of Human Decisionmaking," *Parameters* 31 (December 2001): 57.

configured into this type of analysis, if at all? Before most operations, top military leaders meet to discuss the expected losses in the initial phases of force deployment. The use of atomic bombs against Japan is an example of how humans are configured in cost-benefit analyses that lead to important operational decisions: at least as some may argue, the estimated losses of American lives played a significant part in the consideration of the first use of nuclear weapons, and such concern outweighed the impact atomic bombs would have on the Japanese populace. It is important to note, then, that decisions to pursue certain military objectives cannot be evaluated without giving due consideration to the kinds of costs, often human ones, such operations can incur. In other words, considerations for human costs provide the basis for evaluating the salience of a military objective.

This evaluation of the meaning of war through a cost-benefit analysis based upon the conception of human participation in war is not only a consideration prior to force deployment, but the very nature of any military operation relies heavily on the calculations associated with utilizing resources effectively and efficiently to achieve an objective while minimizing the cost.[20] The central considerations that occupy the attention of decision-makers in a military operation, such as the arrangement of the force, the determination of the operational reach and approach, the assessment of force balance, as well as a slew of logistical considerations, all rely on a detailed understanding of the capabilities of the military personnel and the ways they can be employed. At the operational level, the human elements of a military help determine operational parameters.

In this sense, weighing the number of human casualties within a framework of operational success has played a role in the way warfare has historically been conducted. Some scholars have argued that casualty aversion by the public impact when and how democracies become involved in conflicts. Arguments along these lines have been made about the United States in particular, and examples include "Vietnam syndrome," the "Dover test," and the "CNN effect." Each of these refers to the ways in which visual depictions of human casualties have affected public support for a conflict at a particular point in time that may have also had implications for others in the future. Not all scholars share the assumption that casualty aversion consistently affects a country's decision to enter into a conflict. In his discussion on the casualty-aversion myth, Richard Laquement references studies based on polling data that show that the "American public is willing to accept casualties when the need and likely consequences are explained to them by national leaders."[21] However, the importance of this debate is not whether casualty aversion matters for when a country becomes involved in a conflict. It has broader implications for the value societies place on human life and further highlights the central role humans play in conflict.

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[20] For examples of the roots to the concept of operational art, and its origin with the rise of mass armies, one may consult Bruce W. Menning, "Operational Art's Origins," in *Historical Perspectives of the Operational Art*, ed. Michael D. Krause and R. Cody Phillips (Washington, D.C.: Center of Military History, 2005), 3-18.

[21] Richard A. Lacquement, Jr., "The Casualty-Aversion Myth," *Naval War College Review* LVII (Winter 2004): 42. See also Christopher Gelpi, Peter D. Feaver, and Jason Reifler, *Paying the Human Costs of War: American Public Opinion & Casualties in Military Conflicts* (Princeton, NJ: Princeton University Press, 2009).

The RMA literature in particular can benefit from additional examination of the changing ways in which humans must adapt to conflict situations. The development of increasingly advanced military technologies has resulted in the removal of humans from scenarios in which they would normally be in direct harm's way. However, this does not mean that humans are completely detached from the military organizational structure or that they have somehow become less useful in ensuring operational success. As RMA scholars would argue, the military organization has to adapt to technological changes. These adaptations have altered the ways in which humans engage in conflict. Individuals still need to be present to operate the technologies and make sure they remain operational. These realities have implications for broader military strategy: although technology is a pivotal part of strategy, other factors such as the human dimension of war may be more influential in deciding success or failure of an operation.[22]

It is perhaps for this reason that much of today's technological developments in the military concern this human element of conflict more so than previous technological breakthroughs. The emerging scientific research and technologies that have become pervasive in today's military discourses and that are the objects of analysis in this paper, such as information technology, unmanned vehicles, and cognitive science and neuroscience research, all concern aspects of the human dimension of the military either explicitly or implicitly.

For instance, developments in information technology have been widely referred to as the main drivers behind the contemporary revolution in military affairs. In the context of its impact on the notion of war and conflict, information technology has produced at a minimum three sets of impacts on modern war: [23] the reliance on networked computing systems have allowed for the use of cyber attacks as a form of disruptive technology; the widened availability of networked communications devices have allowed information warfare to be more critical component of warfare strategies; and the as stated before, the increased speed of information gathering and dissemination has produced a networked model of warfare. Yet, regardless which impact is under discussion, considerations for the human element is necessary: in the most obvious sense, cyberwarfare creates demands for new capabilities that help produce new types of military personnel, information warfare targets the human population, and success of network-centric warfare hinges on combatants capable of processing and using the ever-growing amount of information enabled by networks.

In a different vein, the advancements in robotics, artificial intelligence, and automation that facilitated the creation of unmanned systems also carry with them implicit assumptions about the human role in the military, particular in the sense of substituting human combatants with machines. At least within the United States, the arrival of unmanned systems has raised so much interest and excitement. President George W. Bush mentioned its use to a group of Citadel graduates in 1999. President Barack Obama signed into law a deadline for the Federal Aviation

[22] David J. Lonsdale, *The Nature of War in the Information Age: Clausewitzian Future* (New York, NY: Frank Cass, 2004), 53.

[23] Although slightly dated, one may want to refer to John Arquilla and David Ronfeldt, eds., *In Athena's Camp: Preparing for Conflict in the Information Age* (Santa Monica, CA: RAND Corporation, 1997) for some basic insights on the implications of information technology on war.

Administration (FAA) to authorize the flight of unmanned aerial vehicles (UAVs) in manned vehicle airspace. Even the congress has mandated its incorporation into the U.S. military force by 2015.[24] Although the motivation behind this congressional mandate is unspecified in the bill, the notion that unmanned vehicles have become an indispensable part of today's military structure due to its ability to change the need to deploy actual human warriors has been consistently referenced by policymakers.

The human considerations embedded in the cognitive science and neuroscience research are perhaps the easiest to observe. Whether it is the discussion on the potentials of pharmaceuticals designed to enhance cognitive capabilities, or the advancements in brain-computer interface in producing intelligent prosthetics, the benefits that can be generated by pursuing cognitive neuroscience research are directly relevant to the operational effectiveness or the possibility of rehabilitation of human warriors.[25] Of course, in comparison to the unmanned vehicles and information technology, the availability of the cognitive neuroscience research to today's military is rather limited. Nevertheless, the pursuit of neuroscience by at least the U.S. military in recent years shows that the relevance of human warriors as part of the military operational capacity is garnering more attention in military circles.

As revealed above, many of today's emerging technologies pursued by the military have deliberately or inadvertently taken certain aspects of the human dimension under consideration. It is the intention of this paper to illustrate the discussion of the human role in conflict through the aforementioned emerging technologies that the military has researched, developed, and, in some cases, deployed. Historically, humans have had a particular role to play in combat and have been accounted for when policymakers and military leaders had to calculate the potential costs of a specific mission and the broader war. Developments over the past few decades are altering these realities. Therefore, reasserting the human role has implications for the theories of war and peace, providing further insight into the mechanisms behind military operations and technological revolutions. This next section outlines how these emerging military technologies are altering the role of humans by examining the concepts of distance, perception, and ethics.

Distance, Perception, and Ethics

Distance

One of the mechanisms through which emerging technologies impact the way that human warriors are configured into a military technical system is the concept of distance. In the most basic sense, distance as concept is taken into consideration by commanders deciding where to

[24] National Defense Authorization Act for Fiscal Year 2001 (S.2549, Sec. 217).

[25] One may consult, for instance, National Research Council, Committee on Opportunities in Neuroscience for Future Army Applications, *Opportunities in Neuroscience for Future Army Applications* (Washington, D.C.: The National Academies Press, 2009). For further applications in the intelligence community, see National Research Council, Committee on Military and Intelligence Methodology for Emergent Neurophysiological and Cognitive/Neural Research in the Next Two Decades, *Emerging Cognitive Neuroscience and Related Technologies* (Washington, D.C.: The National Academies Press, 2008).

position their soldiers in relation to the enemy. The type of weaponry available to a fighting force will also have implications for how close soldiers on both sides will have to be to one another for their weapons to be most effective. This idea can be applied to any killing instrument throughout history. Clubs, knives, and swords typically require the attacker to be physically close to the defender for a blow to be fatal. On the other hand, the longbow, cannon, and rifle each played a role in revolutionizing warfare by expanding the kill radius. These weapons and many more like them have altered how distance configures into military operations. In this section, two types of distancing in conflict will be discussed: physical and emotional.

First, physical distance has been a critical element of how wars have been fought over the centuries. In order to kill the enemy, soldiers were forced to be within a certain distance of each other. This limitation placed on combatants can be attributed to the military technologies of the period. For example, during the Civil War, soldiers with rifles had to be within a certain distance of their enemy for their weapons to be effective. While a battle is being fought, soldiers are oftentimes experiencing a wide range of emotions. One of the most commonly cited emotions is fear, which has led soldiers to have difficulty firing their weapons at the enemy. David Grossman highlights this aspect of war by referencing the battle of Gettysburg in which several thousand rifles were left on the battlefield, representing the number of soldiers who had been "unable or unwilling to fire their weapons in the midst of conflict."[26] Although scholars have contested this assertion, it points out that even if not all of the rifles were left behind by soldiers overcome by fear, at least some of them were.

The proximity between soldiers on the battlefield has a profound effect on how they engage in conflict. The way soldiers reacted during the battle of Gettysburg is not unique to battles fought during the Civil War. Grossman also discusses events that occurred during later wars in which soldiers were unwilling to kill their fellow man. The problems associated with close combat between soldiers are being ameliorated through existing trends in military technology development and deployment. Emerging technologies as they are discussed here represent a fundamental change to the role distance plays in current and future conflicts. Individuals conducting information operations or controlling unmanned vehicles are no longer necessarily on the frontlines of combat. They are able to make decisions without having the additional stresses associated with operations on a battlefield. This is not to say that their mode of operation is free from stress. However, their engagement with the enemy is fundamentally different than what the average soldier experienced even just a few decades ago.[27] Soldiers trained to use these emerging technologies can attack the enemy from thousands of miles away. Physical distance is widening, and the attention given to the effects it has on humans in conflict has been minimal.

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[26] David Grossman, *On Killing: The Psychological Cost of Learning to Kill in War and Society* (New York, NY: E-Rights/E-Reads Ltd., 2009), 26. The findings of Grossman's work have been considered controversial, but some of the ideas presented are relevant for the work here.

[27] In fact, it is the disengagement that largely defines the impact of today's emerging technologies. See, for instance, D. Keith Shurtleff, "The Effects of Technology on Humanity," *Parameters* 32 (Summer 2002): 100-12.

The second type of distance altered by the incorporation of emerging technologies into the military is the concept of emotional distance. Closely related to physical distance, emotional distance refers to the ways in which a given conflict affects a warfighter's emotions, whether it be an increased level of fear or an enhanced sense of guilt. The emotions associated with encounters between combatants is unique to the environment in which they meet and their proximity to one another. Grossman addresses the topic of emotional distance by focusing on four different factors: cultural distance, moral distance, social distance, and mechanical distance. Each of these is as effective as physical distance in "permitting the killer to deny that he is killing a human being."[28] The ability of a combatant to view the enemy in this way is oftentimes the result of societal and organizational influences.

Emotional distance deals with how one side is trained to view the other. The process most commonly associated with this approach is that of desensitization. Armies have proved to be more effective after removing soldiers emotionally from a battlefield situation. Scholars often attribute the skewed kill ratio in favor of the Nazis during World War II to their ideological beliefs in racial and cultural superiority.[29] The ability to kill another human being in combat thus involves significant internalization on the part of individual soldiers. Being able to envision the enemy as being culturally different, inhuman, or immoral influences the way combatants conceptualize the enemy. It can be a "racial, religious or ideological element" that makes an abstract image of the enemy seems even more inhuman.[30] However, emotional distancing does not always have to take the form of desensitization on the part of individual soldiers and their superiors.

Technology and the physical distance it facilitates have implications for how emotional distancing may become more relevant in future conflicts. Emerging technologies are thus particularly relevant to the prospect of being able to physically and emotionally distance soldiers from conflict situations. The idea of mechanical distance in particular refers specifically to the impact technologies have had on combatants and their emotional state. According to Grossman, military devices like night-vision "provide a superb form of psychological distance by converting the target into an inhuman green blob."[31] Newer technologies associated with unmanned vehicles and information operations facilitate similar distancing for those operating those weapons systems. Combatants can become more emotionally detached from their actions without fear of reprisal. A soldier's expectation of harm and loss are altered by newer technologies being increasingly incorporated into militaries worldwide. Along these lines, emerging military technologies have implications for how soldiers will be physically and emotionally distanced in future conflicts.

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[28] Grossman, 158.

[29] Ibid., 161.

[30] Richard Holmes, *Acts of War: The Behavior of Men in Battle* (New York, NY: The Free Press, 1985), 368.

[31] Grossman, 169.

Perception

Perception is a perennial issue in the study of war and peace. In particular, as Robert Jervis argues, "[d]iffering perceptions of the other state's intentions often underlie policy debates."[32] Perception is, however, not only a consideration at the level of strategic decision-making. In fact, in the acts of conflict, issues of perception are pervasive concerns that matter for policy-makers and foot soldiers alike. It constitutes a key element in being able to further understand the role of distance and its effects on humans in conflict.

Emerging military technologies have impacted the perceptual ability of warfighters in several ways. First, emerging technologies carry the potential to shift the understanding of "fog and friction of war," which contributes to the perceptual concerns with a warrior's situational awareness. Second, emerging technologies alter the perception of the relative capabilities that the combatants may hold for one another. Since the perception of enemy capabilities plays a significant role in determining the choice of strategy and battlefield tactics, these emerging technologies are likely to impact the function of the warrior in military operations as a consequence of perceived relative capability. Finally, emerging technologies can impact the perception one may have of the opponent's intentions, which can produce different incentives for battlefield behavior. In sum, technologies can alter battlefield perceptions by influencing an individual's assessment and judgment of information, capability, and incentives.

One of the persistent concerns of any military engaged in conflict is the availability of information about the battlefield. Clausewitzian "fog and friction of war," or general battlefield uncertainties, can undermine the efficiency of decision-making. In contemporary settings, this concept can be translated into the idea of situational awareness, which, in the simplest sense, speaks to one's capability to perceive certain elements of his environment, such as space and time, that needs to be comprehended in order for informed decisions to be made. For the most part, the availability of information is the root to resolving the fog and friction of war and enhancing situational awareness. It is also this aspect of information availability that today's emerging technologies may be able to help address. Emerging technologies facilitate new ways in which information can be gathered, transferred, and processed. As a result, they can produce significant changes in a warrior's perceptual capability on the battlefield that enhances the possibility for them to make autonomous assessments and decisions.

In addition to enhancing a warrior's battlefield perception capability, emerging technologies can also impact the perception of the relative capabilities that combatants hold for one another. The assessment of an opponent's capabilities is a critical element in waging war and engaging in conflict due to the strategic and interactive nature of such actions. Strategic interaction denotes that an actor's move is dependent on the choice of action of his opponent.[33] In order to choose the proper actions and reactions, the actors, in this case, need to make

[32] Robert Jervis, *Perception and Misperception in International Politics* (Princeton, NJ: Princeton University Press, 1976), 58.

[33] David A. Lake and Robert Powell, "A Strategic-Choice Approach," in *Strategic Choice and International Relations*, ed. David A. Lake and Robert Powell (Princeton, NJ: Princeton University Press, 1999), 8.

subjective evaluations of the possible behavior of others, part of which relies on a perceived relative capability. Of course, perception and misperception of capabilities is an age-old consideration in the study of state behavior. Simple misperception of the offensive versus defensive capability of states have been attributed to the prolonging of World War I.[34] Nevertheless, emerging technologies have provided the possibility for a military to acquire certain capabilities that are difficult to discern, which can complicate the ways that force is deployed in anticipation of or reaction to an opponent's behavior. Emerging technologies have also provided avenues through which the opponent's capabilities can be better monitored and evaluated, adding intelligence advantage to the wielder of the technology.

Similar to capability, an actor's intention is also frequently an aspect of interaction that is difficult to perceive with accuracy. In fact, some scholars have ventured to argue that intention cannot be accurately predicted *a priori* – the intention of an actor can only be known based upon his or her exhibited behavior. Although it is possible to base one's judgment of the other's intention upon the latter's previous behavior, such judgments are prone to problems, especially when the internal processes of the other produce an expected behavior.[35] The intention of an actor is so difficult to determine that some have suggested that in state to state relations, one will always have to assume the worst possible scenario in order not to be blindsided by the uncertain nature of intentions.[36] When translating this perceptual issue of intentions to the battlefield, one of the main concerns becomes whether an individual warrior can perceive with ease and clarity the behavioral cues that may be suggestive of its opponents' intention. The technologies that can provide greater and timelier intelligence or help the evaluation and processing of such intelligence, in this case, can drastically alter the incentive for an individual to perform certain actions on the battlefield based on the perceived intention of his or her opponent.

In short, perception is a critical element in determining one's ability to act and react. The capacity to perceive, and in particular, the ability to perceive a "signal" separated from the environmental "noise" is a necessary precursor to any meaningful goal-oriented behavior or problem-solving endeavors by individuals. Emerging military technologies carry the potential to change an individual warfighter's ability to perceive and process such signals. This is due to their increased ability to acquire and process intelligence. In military lingo, some of the technologies discussed in this paper can help with the early stages of the OODA loop: they can enhance the ability for an individual to observe (perceive) an opponent's behavior, which can produce information on the opponent's capability and intention that help to orient that person to make a decision and act accordingly. Such capabilities can become crucial in determining the decision-making tempo of a combat operation.

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[34] For instance, see Scott D. Sagan, "1914 Revisited: Allies, Offense, and Instability," in *Offense, Defense, and War*, ed. Michael E. Brown, Owen R. Coté Jr., Sean M. Lynn-Jones, and Steven E. Miller (Cambridge, MA; The MIT Press, 2004), 158-82.

[35] Jervis, *Perception and Misperception*, 35.

[36] As argued by the offensive realists. See John J. Mearsheimer, *The Tragedy of Great Power Politics* (New York, NY: W. W. Norton & Company, Inc., 2001).

Ethics/Legality

At their core, ethical considerations are inherently human. Ethical behavior has been the topic of discussion among scholars for centuries. Many theologians and philosophers did not limit themselves to human actions within societies: they also attempted to explain ethical behavior associated with human involvement in conflicts and wars. While their writings did not present "full-blown" theories about the ethics of war, they did provide the building blocks for such theories.[37] The theory most relevant to discussions here is Just War Theory (JWT). Discussing ethics and war lends itself to considerations for soldiers in particular and the way they are used in conflicts. There is a variety of international rules and norms intended to outline appropriate courses of action for soldiers on the battlefield. By examining the Just War Theory articulated in particular by Michael Walzer, one is able to contextualize how these rules and norms have shaped the ways humans operate in conflicts and provide insight into how emerging technologies may impact traditional ethical assumptions of how humans engage in combat.

Wars are started, fought, and ended by human beings. The process leading up to the declaration of war is oftentimes a formal, political one. The decisions made by politicians regarding war affect those individuals sent to fight it. Walzer asserts that "the war itself isn't a relation between persons but between political entities and their human instruments."[38] Soldiers, in this sense, are political instruments in that they obey orders given to them by their superiors. They are trained to identify and defeat the enemy. It is when soldiers fight freely that their war is not a crime; they were able to choose their enemies and design their own battles.[39] This type of engagement remains a critical component of war ethics, even with the incorporation of emerging technologies into military operations. However, the process by which an enemy is defeated is often restricted through the existence of codified norms and rules.

Existing codes of behavior on right and wrong conducts in conflict have played a pivotal role in the way wars have historically been fought. The four Geneva Conventions are an example of how international law can dictate how the wounded and sick, prisoners of war (POWs), and civilians should be treated during times of war. Each of these rules applies to how humans should engage with one another, further highlighting the central role humans play in the ethical considerations of war. Consequently, one of the primary human concerns in a conflict is knowing and being able to distinguish between those who can be killed and those who cannot.[40] The ability of individuals to distinguish combatant from non-combatant has been easier in some conflicts than in others, and these difficulties have in general been a result of certain types of conflict (i.e. insurgency) and whether one side made the distinction clear for the other. Emerging technologies and current conflicts involving insurgencies and state-building pose challenges to these traditional ways of viewing ethical and moral behavior during conflict.

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[37] Nicholas Fotion, *War & Ethics: A New Just War Theory* (New York, NY: Continuum, 2007), 9.

[38] Michael Walzer, *Just and Unjust Wars: A Moral Argument with Historical Illustrations* (New York, NY: Basic Books, 1977), 36.

[39] Ibid., 37.

[40] Ibid., 41.

There are ethical concerns raised by the fact that soldiers are being "removed" from the battlefield through the incorporation of emerging technologies into the military organization. Soldiers fighting in traditional wars have experienced conflict primarily through physical interaction between themselves and the designated enemy. During a conflict, soldiers often share a mutual threat to their lives and well-being, which helps them view each other with moral equity. The environment of war and the emotional duress caused by it lead warfighters to make particular decisions that are unique to the battlefield. However, advances in cognitive neuroscience, unmanned vehicles, and information operations are altering how soldiers operate in conflicts. The assumptions made by international laws underpinned by ethical considerations on war such as the Geneva Conventions risk being undermined by the changing role humans play within military organizations.

In this sense, ethics should be a prominent component of military doctrine. As discussed in the section on RMA, emerging technologies have a significant impact on both military doctrine and organization. The incorporation of emerging technologies into both of these also has stark implications for the individuals using them. Since humans are at the center of conflict, their actions are often bound by ethical considerations. It is argued here that these traditional considerations are not entirely applicable to the way conflicts are currently being fought or will be fought in the future. Military doctrines should therefore reassess the ethical implications these technologies pose for the individuals using them as well as those affected by them.

This discussion on ethics highlights how ethical concerns are a necessary part of any analysis on warfare. Analyses of events in history that involve human life are not devoid of moral and ethical considerations. Human involvement in war has led to the creation of legal codes on appropriate behavior during conflicts. These codified rules assume that those individuals involved share a mutual status in a given conflict. They are cognizant of how to engage with each other and oftentimes share the emotions of fear and vulnerability. Nevertheless, these rules have been most relevant to large-scale conflicts, and, much like ODT, Just War Theory risks being biased toward analysis of large-scale conflicts that characterized much of the twentieth century. The changing nature of conflict and the emergence of new military technologies are having a profound impact on the ethics surrounding how humans engage in conflict. Thus, it is prudent that military doctrines begin incorporating and reflecting these changes to how humans interact with the enemy as well as the technologies they are using.

Conclusion

The discussions above focused on the concepts of distance, perception, and ethics. Each applies differently to the ways in which humans configure into military organizations. This configuration is oftentimes contingent upon the technologies they are using. The emerging technologies discussed in the subsequent section were chosen with the intention of demonstrating how these concepts are affecting humans engaging in conflict. All three concepts discussed above are interrelated and are equally affected by current technological developments. The human role in conflict is becoming fundamentally altered by emerging technical changes, which

has direct implications for a combatant's physical proximity to, perception of, and ethical considerations for an opponent. Humans are no longer facing each other on the battlefield, experiencing the exact same emotions, or being constrained by the same moral codes that have to-date dictated the proper action on the battlefield. Re-examining the concepts of distance, perception, and ethics will shed light on the ways in which military force is organized and deployed, providing further insight into the deficiencies of ODT and RMA discussed earlier.

Illustrative Cases

Information Operations

Military capabilities in cyberspace have become increasingly discussed in both military and policy circles in countries around the world. Advancements that have taken place in the information technology sectors, both public and private, have facilitated countries being able to use such capabilities to augment their military operations during conflict situations.[41] In particular, countries have raised concerns about the potential for cyber attacks targeting critical infrastructure sectors, which often includes threats to water, electricity, and transportation, to name a few. Along with cyber warfare, information warfare has been revolutionized by technological developments, leading information to be a "strategic asset worthy of conquest or destruction."[42] These realistic dangers compounded with the indistinguishable nature (offensive versus defensive) of cyber capabilities, contributes to further uncertainty in the international system. From a level of analysis perspective, information operations also have direct implications for human elements in the military. Specifically, changes to the conceptions of distance, perception, and ethics by the incorporation of information technologies into the military organization have a profound impact on those individuals using them.

A distinction must first be made between the two different types of information operations: cyber warfare and information warfare. This paper adopts the broad distinction between the two provided by Neil Rowe. He claims cyberwarfare involves cyberweapons and cyberattacks (attacks using cyberweapons), whereas information warfare includes propaganda, electronic surveillance, cyber-espionage, and defensive information operations.[43] This distinction becomes important for analyzing the contrasting impact the two types of warfare have on the humans involved in using information technologies and those on the receiving end of a particular operation. The division between these two types of "warfare" therefore highlights that they are most starkly different regarding the concept of perception. Sharing similarities in the

[41] For dissent, one may consult Peter D. Feaver, "Blowback: Information Warfare and the Dynamics of Coercion," *Security Studies* 7 (Summer 1998): 88-120.

[42] Winn Schwartau, "An Introduction to Information Warfare," in *War in the Information Age: New Challenges for U.S. Security Policy*, ed. Robert L. Pfaltzgraff, Jr. and Richard H. Shultz, Jr. (Washington, D.C.: Brassey's, 1997), 49.

[43] Qtd. in Neil C. Rowe, "The Ethics of Cyberweapons in Warfare," *International Journal of Cyberethics* 1 (January-March 2010): 20.

areas of distance and ethics, they diverge in the area of perception because of the potential impact they have on their targets.

Distance is particularly relevant to both cyber and information warfare. Since they are often carried out from afar and across networks, soldiers and civilians responsible for the attacks can be as far away as the technology allows. Known for its cyber espionage against the US government and American companies, China conducts the majority of its operations from within its own borders. In recent years, Russia has been known to utilize its hacker community to target neighboring countries. Examples include the incidents involving Estonia in 2007 and Georgia in 2008. The United States also has network operation centers across the country with most of the foreign-focused intelligence gathering and cyber research located in Fort Meade, Maryland, home to the National Security Agency (NSA). Although operations there are strictly classified, the NSA has been known to be heavily involved in network centric warfare. These examples show how far the "warfighters" can physically be from their enemies when engaging in cyber and information warfare.

The lack of close distance required to implement network-based attacks influences how humans view their situation relative to their perceived enemies. Each of the examples provided above displays a trend for countries beyond just the United States to be interested in exploiting foreign networks to their advantage, whether for military or economic reasons. The significance of these developments applies to the individuals carrying out these operations. The physical distance from their intended targets has implications for their ability to conceptualize the enemy. No longer front-line combatants, these soldiers are able to emotionally distance themselves from a given "combat" situation. By being thousands of miles away from their targets, they do not share many of the same traditional experiences of those individuals who had to physically encounter the enemy and feel emotions associated with threats to survival. If they do feel those emotions, it cannot be readily equated to the same emotions experienced by front-line combatants. Distancing associated with information operations affects the individuals involved and the way they see their intended targets.

In this sense, the ideas of physical and emotional distance tie into the concept of perception. The enemy is no longer necessarily a human standing in front of another human with both of them sharing certain emotions facilitated by their close proximity to one another. Information operations can be pursued from locations far from any physical battlefield. Information warfare in particular has the unique potential to lessen the uncertainty surrounding state interactions by clarifying a state's internal decisions relative to other states. Through the use of propaganda, information warfare also has the potential to alter the perception held by the enemy. This is most often accomplished through the dissemination of misinformation and information portraying the other side in a favorable light. The individuals responsible for gathering this information through cyber means are able to do this from a place where they can remain anonymous and physically safe. The technologies they use therefore alter their situational awareness relative to the enemy.

Information operations also have implications for ethical considerations related to the conduct of just war. The concept of "combatant" in this case is particularly relevant. For situations involving information operations, the defining characteristics of the individual responsible for a given operation does not necessarily fit the traditional conception of what a combatant constitutes. In instances where information operations are being undertaken, the individuals involved are not on even ground, and the tides shift in favor of the attacking side. As Michael Walzer states, "The war convention rests first on a certain view of combatants, which stipulates their battlefield equality."[44] This equality rests with the idea that combatants face equal threats to their survival. The shift toward the inequality of combatants is directly associated with the idea that these individuals are detached from more physically-oriented conflict situations. This is particularly the case for information operations. As stated before, they can complete their missions without having to leave a room or travel far from their homes. It is with this reality that one can conclude that the way in which individuals configure within Just War Theory may be outdated, simply because wars are no longer fought the same way they were even just twenty years ago.

The effects of cyber related attacks diverge from what is associated with traditional modes of attack that can and often do result in physical destruction and death. Some scholars such as Randall Dipert argue, "Because of the traditional emphasis on damage to human lives and material objects, there are not even clear restrictions on 'soft- or cyber-' damage that would leave wholly civilian targets, necessary for the well-being of the population, inoperable for long periods of time but not, in the strictest sense, damage them as objects."[45] Just War Theory is heavily grounded in the traditional ways in which wars have been fought. In this sense, technological advancements in the past few decades in the area of information operations pose potential challenges to existing ethical frameworks, specifically as they relate to humans and how they configure into these new operational settings.

In conclusion, information operations are becoming increasingly effective as countries around the world expand their use of information technologies. Since the critical infrastructures of several countries worldwide are run by computer programs, they are vulnerable to attack by other states, hacker groups, and even individuals. Along these lines, it is the human element of information operations that matters most for this discussion. Humans using information systems configure into conflict in a fundamentally different way than before. The physical and emotional distance facilitated by these technologies have an influence on the concepts of perception and ethics. Represented primarily in Just War Theory, the ethics of war in particular has been altered by the proliferated use of information technologies. Thus, information operations are associated with some of the many military spheres in which emerging technologies are having an impact on humans in conflict.

[44] Walzer, 137.

[45] Randall R. Dipert, "The Ethics of Cyberwarfare," *Journal of Military Ethics* 9(4) (2010): 405.

Unmanned Vehicles

In the past decade, the use of unmanned vehicles by the military has become increasingly pervasive. The use of unmanned aerial vehicles (UAVs) has become so well known as a result of U.S. operations in Iraq and Afghanistan that Congress has mandated the acquisition and use of unmanned platforms as a part of the ongoing military transformation. Whether it is for the purpose of surveillance and intelligence gathering, such as the Global Hawk, or for combat and the delivery of Hellfire and other precision-guided missiles, such as the Predator and the Reaper, unmanned vehicles have been frequently covered in the news, providing insight into current U.S. military operations abroad.

The incorporation of unmanned vehicles into the military provides several significant advantages.[46] For one, the use of drones and other remote-controlled robots help reduce the potential for casualties, especially when the operational environment is uncertain or highly dangerous. This not only applies to the situations in which an aerial strike deep into the enemy territory is necessary, but it is also relevant for the dismantling of bombs on the ground as well as for performing other high-risk tasks. By sending in a remote-controlled robot, the warfighter gets to sit at a distance from the source of danger, and the potential threat to life becomes minimized. As stated earlier, it is perhaps for this reason that the U.S. Congress has mandated the military to transform its force so that at least one thirds of its ground combat forces will be operated under unmanned platform by 2015. By removing the warfighters from the battlefield, the risks to human life for military operations is managed and minimized.

Additionally, unmanned vehicles, at least the aerial ones, facilitate the process of surveillance and information gathering. Most drones flown today for the purpose of surveillance can stay airborne for long periods of time, and in the case of Predators, upwards to a full-day. This capacity to maintain continuous surveillance with minimal expenditure of armed personnel provides significant information advantage to wielders of UAVs. At least for U.S. forces, it is possible today to have ground forces never step onto a battlefield without complete intelligence coverage from the air. This kind of surveillance capacity not only provides the necessary information regarding the opponent's force, but it also helps reduce the operational risks and dangers to ground forces. It is thus no surprise that a great majority of the UAV missions today are conducted for the purpose of surveillance and intelligence.

Of course, the use of unmanned vehicles, by its very definition, symbolizes the type of long-distance military operations that are conducted on today's battlefields. While the Predators and Reapers themselves may still take off from the military bases in Afghanistan, the pilot that controls them sit in the control rooms at the Creech Air Force base in Nevada, more than 7,000 miles away. As a result, unmanned vehicles have drastically shifted the definition of operational space - similar the cyber operations, the attacker and the target in a UAV operation does not require direct line-of-sight within a shared space, and the concept of engagement becomes

[46] For some metrics to evaluate UAV performances and advantages, for instance, one may consult Peter Dombrowski and Eugene Gholz, *Buying Military Transformation: Technology Innovation and Defense Industry* (New York, NY: Columbia University Press, 2006), 59-83.

meaningless. The very fact that the physical distance has made the concept of combat irrelevant suggests that today's warfighters using UAVs acquire a different identity according to their involvement in a given military operation.

The very existence of this physical distance that render the combat obsolete has significant implications for the ways in which the military operates, particularly regarding the doctrines concerning the training of pilots. At a minimum, the capabilities required of a UAV pilot and the skills necessary to conduct an air strike are different from what would be expected in traditional air-to-air or ground-to-air combat: instead of reflexes, modern-day UAV pilots may require dexterity; and instead of knowledge of air maneuvers, a UAV pilot may need understanding of computing and simulated realities. As a result, in order to equip today's UAV pilots, the existing doctrines of training need to be reconsidered and adjusted. This adjustment in the expected capability of pilots can consequently lead to divisions within the force structure that require reevaluation of the ways in which the military is organized.

The impact that UAVs have on the concept of distance extends beyond the physical dimension. As with information and cyber operations, the physical distance afforded by remotely controlling a robot by definition removes a warfighter from emotional turmoil and stress that is an inherent part of close-quarters combat. This is not to say that the emotional distance created has allowed individuals using UAVs to be emotionally devoid from the combat. To the contrary, reports have suggested that drone pilots can suffer serious post-traumatic stress disorder (PTSD) symptoms[47] due to the fact that they cannot redress their guilty conscience by rationalizing their acts of violence under the context of necessity, or "kill or be killed," as those who engage in close combats can. This phenomenon, of course, creates a new dimension to the idea of rehabilitation for the military services.

Similar to the discussion earlier on information operations, changes in perception as a result of the use of UAVs are intricately tied to the physical distance that is facilitated by the technology. In particular, despite its potential emotional repercussions, this physical distance from the battlefield allows warfighters not to feel the immediate stress, fear, exhaustion, and confusion that typically defines the battlefield environment. As a result, UAV pilots can maintain a high level of situational awareness that enhances their ability to process the information they are exposed to. They can observe, orient, decide, and act without the extant pressure from the battlefield. As Lt. Col. Gough testifies, "I'm not going 400 miles an hour, which means when I pull the stick, I don't get 5 G's on my body. I have much more ability to process and to comprehend what's going on the battlefield and the information just conveyed to me, and better relay that information to who needs it."[48] This ability to maintain perceptual clarity without the encumbrances of battlefield realities allows UAV pilots to wield significant advantages in the operational tempo of information-processing and decision-making.

[47] See, for instance, Rachel Martin, "Report: High-Levels of 'Burnout' in U.S. Drone Pilots," *NPR* (December 19, 2011); Elisabeth Bumiller, "Air Force Drone Operators Report High Levels of Stress," *New York Times* (December 18, 2011).

[48] CBS News, "Drones: America's New Air Force" (May 10, 2009).

In addition to the changing notions of operational space and perceptual capability as allowed by the UAVs, the use of UAVs also presents unique ethical and legal challenges to the military. Similar to the discussions concerning information operations, UAVs create ambiguity concerning the proper role of their user. As elucidated before, much of the existing understanding of ethical behavior during times of war, particularly framed under Walzer's Just War Theory, defines the moral equality between combatants as resting upon mutuality and consent, understood in the simplest form as "[t]hey can try to kill me, and I can try to kill them."[49] This mutual recognition of being subject to harm and having threats to life defines the relationship between combatants and give them the moral equality to resort to violence. However, this notion of mutual consent is challenged when one side involved in the engagement is not subject to harm, such as the case of the UAV pilots. Consequently, the definition of UAV pilots as combatants that warrant the status of moral equal in war becomes a difficult notion to sustain in relation to their opponents.

The issues associated with defining UAV pilots as combatants have come into the media spotlight in recent years as the U.S. continues to conduct drone attacks in Pakistan and Afghanistan. This becomes a problem, in particular, when the personnel behind the drone attacks cannot be considered as a combatant in any way. This is the case for drone operators who belong to the Central Intelligence Agency (CIA). Since they are not uniformed service members, it becomes even more difficult to describe their precision air strikes in the Afghanistan-Pakistan as acts of war. As David Glazier, law school professor at Loyola University suggests, since the CIA drone pilots are not combatants in a legal sense, they are "liable to prosecution under the law of any jurisdiction where attacks occur for any injuries, deaths[,] or property damages they cause."[50] From this perspective, the use of UAVs by personnel outside the services can complicate the boundaries of warfare, and such acts create new categories of users that can potentially fall outside the framework for the rules of war, which creates unique challenges to the legality of drone operations.

Finally, as the technology for autonomous robotics continues to mature, the notion of "automatic killer robots" and the ethical ramifications associated with their potential use becomes a policy area in need of further discourse. As evidenced by the burgeoning literature on robotic ethics, scholars have long noticed potential problems of robotics and the boundaries of their ethical behavior.[51] However, to what extent would the ethical concerns associated with a force relying on autonomous platforms influence the organization and operational doctrines of the said military largely remains under-discussed. Of course, to date, the drones that conduct

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[49] Walzer, 36.

[50] Nathan Hodge, "Drone Pilots Could Be Tried for 'War Crimes,' Law Prof Says," *Wired* (April 28, 2010).

[51] Ronald C. Arkin, "The Case of Ethical Autonomy in Unmanned Systems," *Journal of Military Ethics* 9(4) (2010): 332-41. The literature on the ethics of robotic military systems is rather abundant. For a select set of examples, one may also consult Daniel Brunstetter and Megan Braun, "The Implications of Drones on the Just War Tradition," *Ethics & International Affairs* 25(3) (2011): 337-58; Marcus Schulzke, "Robots as Weapons in Just Wars," *Philosophy and Technology* 24(3) (2011): 293-306; and Armin Krishnan, *Killer Robots: Legality and Ethicality of Autonomous Weapons* (Burlington, VT: Ashgate Publishing Company, 2009).

offensive operations are remotely-piloted rather than autonomous, which means that moral attribution of criminal behavior is still possible, despite the varying degrees of ambiguity that have arisen regarding the combatant status of drone users. Nevertheless, as the military force becomes more automated, the question attribution regarding moral responsibility becomes more complex. The issues raised by unmanned vehicles will need to be addressed within military organizations and internationally as they become increasingly used by other countries besides the United States.

Cognitive Science and Neuroscience Research

Research that taps into and elucidates the biological basis of the human brain and cognition has been particularly active in the past decade. Recognizing that the capability of the human mind is vast, scholars from different disciplines have begun unraveling its complexities. Multiple U.S. government agencies also have growing interests in the research and development of neuroscience applications. In particular, through the Defense Advanced Research Projects Agency (DARPA) and the individual service branch's research arm, the Department of Defense has invested billions of dollars in the cognitive sciences-related research over the last few years. The advances in the cognitive sciences and technologies and their military-relevant applications create an emerging area of potentially novel capabilities in security and defense.

Yet, despite this potential, current literature on the security implications of cognitive sciences research is rather scant. Although several scholars have become interested in using the findings of cognitive sciences and psychological research to challenge existing assumptions made about human behavior and human decision-making,[52] few have taken seriously how emerging military applications of cognitive science and neuroscience research can influence or alter the landscape of human warfare. Indeed, applications from cognitive sciences research deserve more attention from scholars in the analysis of their impact on military operations because they can help create emotional distance, enhance perceptual capabilities, and generate significant ethical considerations regarding the rules and laws of war as they relate to humans.

Current research and other historical accounts of war have suggested that emotions can play a large role in the determining an individual soldier's wartime behavior and can, at times, become a hindrance to a soldier's effectiveness on the battlefield. For instance, one such emotion is fear. The uncertainties of the battlefield and the constant threats to life create a highly stressful environment in which a soldier operates. Consequently, a soldier's subjective combat experience is deeply connected to the stressful battlefield environment. The human fear response

[52] For an enduring work using psychological findings in explaining interstate behaviors, see Jervis, *Perception and Misperception*; for examples concerning the positive impact of emotion on decision-making, see Rose McDermott, "The Feeling of Rationality: The Meaning of Neuroscientific Advances for Political Science," *Perspectives on Politics* 2 (December 2004): 691-706; for rationality and irrationality underlying deterrence logic, see Janice Gross Stein, "Rational Deterrence Against 'Irrational' Adversaries? No Common Knowledge," in *Complex Deterrence: Strategy in the Global Age*, ed. T.V. Paul, Patrick M. Morgan, and James J. Wirtz (Chicago, IL: University of Chicago Press, 2009), 58-84; and for neuropsychological explanations of certain war behaviors, see Stephen Peter Rosen, *War and Human Nature* (Princeton, NJ: Princeton University Press, 2005).

plays a critical role for a combatant, for it is understood that under the condition of fear and stress, particularly in a "fight-or-flight" situation, a person often experiences a higher level of cortisol and adrenaline. Yet, fear can also undermine the effectiveness of combatant's performance. The psychological impacts of the battlefield in its variant forms of "shell shock" are serious issues in military operations. As research in post-traumatic stress disorder (PTSD) has shown, however, the use of blockers for alpha and beta-adrenergic receptors (such as propranolol) could effectively decrease the possibility of fear conditioning, and it is becoming increasingly possible to control fear responses.[53]

This research on controlling conditioned fear, to the extent that it is possible to make such fear non-existent, carries serious implications for a soldier's battlefield experience. Indeed, the possibility for a soldier to become desensitized to fear stimulus disconnects the soldier from his or her subjective experience of the battlefield environment. By preventing soldiers from internalizing the fear embedded in battle experience, it is possible to envision future soldiers becoming incapable in feeling the emotions that help define their battlefield behavior. In other words, combatants can be "made" to become resilient to the emotional aspects of war, thus creating a sense of detachment between them, their opponents, and the battlefield.

Of course, the controlling of fear and the potential to emotionally distance oneself can carry significant advantages for military operations, for a soldier that does not fear (or experience shell shock or other types of psychological impact from the horrors of war) is more likely to be able to perform his tasks more efficiently and rationally. This capacity to "emotionally" distance a soldier, making him/her less prone to the psychological stress involved in combat, can also impact deployment – a warfighter may be able to stay deployed longer and more frequently because the combat experience may become less emotionally and psychologically taxing. Finally, the removal of fear and the detachment from other kinds of emotion can create perverse incentives for a combatant. If highly emboldened, individual warfighters can become reckless, and the emotional void can undermine their sense of guilt, remorse, or other moral considerations.[54] For these reasons, emotionally distancing warfighters from their subjective combat experience can potentially change the parameters and scope of possible military operations and produce complications for the existing command structure.

In addition to the potential of creating emotional distance and detachment, cognitive sciences research has also produced significant results concerning the issues of perception. In particular, an individual's ability to perceive and assess the battlefield reality even under distress is critical to a military operation. Therefore, the maintenance of a warfighter's mental alacrity has long been a concern for the military. The military interest in cognitive sciences research on perception is perhaps nowhere more profound than the mitigation of battle fatigue. Whether it is the physical exertion or the mental duress that a warfighter experiences, fatigue plays a crucial role in determining a soldier's ability to not only conduct but also to sustain an operation.

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[53] National Research Council, *Opportunities*, 57-8.

[54] Jonathan D. Moreno, *Mind Wars: Brain Research and National Defense* (New York, NY: Dana Press, 2006), 128-32.

Through today's research, the roots to fatigue and the sensation of fatigue are becoming clearer and the effects of fatigue more manageable than ever before. Research has shown that fatigue to the central nervous system (CNS), which impairs an individual's cognitive and perceptual capability, could be a result of an inadequate supply of glucose[55] as well as the imbalance among several neurotransmitters, including a decrease in brain dopamine and an increase in brain adenosine and ammonia.[56] Despite the fact that underlying causes to such a change in the balance of neurotransmitters are not yet entirely apparent, existing research has at least provided ways in which fatigue can be addressed using neurochemicals.

Of course, the use of some common chemicals in fighting fatigue, like caffeine, is well-studied, understood, and employed, and its use in the military has been explored extensively.[57] Other neurochemical measures of maintaining mental awareness and clarity, such as the use of ephedrine or tyrosine, have also been explored. As an interest to the defense community, the DARPA program on Preventing Sleep Deprivation (PSD) has also invested millions towards pharmaceuticals to "prevent the harmful effects of sleep deprivation...[and] greatly increase...soldiers' ability to function more safely and effectively despite the prolonged wakefulness inherent in current operations." Interest in PSD has kindled further research in drugs that help counter sleep deprivation, such as Ampakine CX717 and other improvements from modafinil.

Situational awareness, mental clarity, and perceptual capacity are not only impacted by the issues of fatigue – other cognitive enhancement measures can also help their maintenance. While certain brain-computer interface (BCI) measures have been proposed to enhance human cognitive capacity,[58] investments have also been made in the development of pharmaceuticals targeted to remedy the decline of cognitive capability.[59] The effectiveness of these cognitive enhancements varies between subjects, and the potential enhancement in one area of cognition often carries the risks to reduce the cognitive ability in another. Nevertheless, the recent pursuits of cognitive enhancers provide yet another avenue through which an individual, or in this case, a warfighter can enhance his/her mental and perceptual capacity.

The increased understanding of how to combat fatigue and enhance cognitive capability has significant implications for a warfighter and the ways they can be used. Should the issue of battle and operation fatigue become effectively manageable, it is possible to envision military

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[55] Lars Nybo, "CNS Fatigue and Prolonged Exercise: Effect of Glucose Supplementation," *Medicine and Science in Sports and Exercise* 35 (April 2003): 589-94.

[56] National Research Council, *Opportunities*, 47.

[57] For instance, see J. Mark Davis and others, "Central Nervous System Effects of Caffeine and Adenosine on Fatigue," *American Journal of Physiology: Regulatory, Integrative and Comparative Physiology* 284 (February 2003): R399-404; Bertil B. Fredholm and others, "Actions of Caffeine in the Brain with Special Reference to Factors that Contribute to Its Widespread Use," *Pharmacological Reviews* 51 (March 1999): 83-133; Bridgette E. Garrett and Roland R. Griffiths, "The Role of Dopamine in the Behavioral Effects of Caffeine in Animals and Humans," *Pharmacology Biochemistry and Behavior* 57 (July 1997): 533-41; National Research Council, Committee on Military Nutrition Research, *Caffeine for the Sustainment of Mental Task Performance: Formulations for Military Operations* (Washington, D.C.: National Academy Press, 2001).

[58] Moreno, 122-3.

[59] National Research Council, *Opportunities*, 45-6.

mission carried out in a manner in which the cycles of deployment can be lengthened, the duration of the operation can be extended, and the scope of the mission can be expanded. In other words, when warfighters do not need to sleep, or their cognitive and perceptual capacities are not compromised due to fatigue, the operations can be manned continuously, be it assault, search and rescue, intelligence gathering, or peacekeeping, all while maintaining a force sufficiently alert and vigilant in the battlefield situations.

On the other hand, the various cognitive enhancement measures can also become meaningful for military operations. If an individual warfighter becomes capable of processing and reacting to a significantly greater volume of information, then this increased sense of situational awareness allows an individual warfighter to perceive and assess the battlefield and to take appropriate action to advance mission objectives. In this sense, the military command and control can become much "flatter," reducing the possibility of information and communication errors while enhancing the operational tempo.

Finally, the advancements in cognitive sciences research also impact the understanding of the moral and legal institutions that govern an individual warfighter's battlefield behavior. In particular, advancements in pharmaceuticals and brain-computer interfaces that can impede an individual's autonomous thought process present significant challenges to the existing understandings of moral agency in just war. As a result, it is possible for cognitive sciences research to bring forth a vision of a military force in which the attribution of moral responsibility becomes highly difficult and problematic.

As the previous discussions have shown, the advancements in neuropharmaceuticals carry the potential of augmenting an individual's cognitive capabilities as well mitigating certain cognitive deficits. It is possible for these neuropharmaceuticals to directly impact an individual's cognitive process. For instance, the use of beta blocker such as propranolol may reduce fear reactions, but it also impedes an individual's subjective experience with fear - the fact that the subject is not experiencing fear in this case is a result of the neurochemicals interfering with his/her neurological processes underlying the emotion of fear.

Another area in which the study of cognition today has revealed challenges to the assumption of human autonomy is the pursuit of brain-computer interfaces (BCI). Cutting-edge BCI applications have sought to establish a complete feedback loop between human brain and machines. This complete feedback loop is necessary in order to produce realistic and natural feeling prosthetics and is highly desired by those engaged in prosthetics research. Some examples of this type of feedback loop exist. For instance, by stimulating the somatosensory cortical and medial forebrain bundles, researchers have become able to "control" rats to navigate complicated terrains as directed.[60] However, such a feedback mechanisms through direct injection of neuroelectric stimulation is not without problems – it points to the possibility that the brain can be made to feel "certain things" or be made to accept signals that are not generated by regular human neural processes, thusly disrupt the cognitive autonomy of the brain.

[60] Sanjiv K. Talwar and others, "Rat Navigation Guided by Remote Control," *Nature* 417 (May 2002); 37-8.

These types of advancements in neuroscience, when applied to the military setting, become highly problematic for ethical consideration of wartime behavior. In particular, the possibility to intervening in one's cognition challenges the assumption of autonomy in Michael Walzer's formation of *jus in bello*. In order for *jus in bello* to operate, the concepts discrimination and proportionality, the two central principles of just war, would require the combatants to be considered as autonomous and conscious moral agents. In other words, when one considers an individual's status as a combatant and his choice of action, the moral basis that belies discrimination and proportionality depends on the assumption that this individual is capable of making his own decisions, and he is aware of the decisions being made. For Walzer, this assumption of autonomy and consciousness serves as the basis for soldiers' conduct toward each other. It is also this based on these assumptions that soldiers can establish each other as moral equals while distinguishing themselves from non-combatants.

The problem, then, that can exist for the ethical doctrines in the military as a result of potential advancements in cognitive neuroscience research is that the attribution of moral responsibility becomes difficult when a combatant's thought process is altered. If a soldier is incapable of making independent judgments and be consciously responsible for his choices of action, can he be held accountable to the principles of *jus in bello*? In this case, should a soldier commit a war crime, it would become impossible to determine the moral responsibility. Furthermore, if a soldier is not considered as a morally autonomous and conscious agent, can he still be held in a status of moral equality as his opponent? Of course, at the present, these questions seem to be merely exercises in the theoretical. Nevertheless, today's cognitive science and neuroscience research is suggesting that this type of question concerning the moral and ethical doctrines for the military will require further consideration in the future.

Conclusion

These illustrative cases were chosen with the intention of displaying the impact specific emerging technologies are having on individuals in conflict. It is the human element that is at the center of understanding military organizations, and any changes to their role by technologies has implications for those organizations and their doctrines. Information operations, unmanned vehicles, and developments in cognitive sciences research are all becoming military pursuits. Countries and the militaries will pursue those technologies that will provide them the advantage. However, the effects of researching and developing such technologies are not limited to the scientists and engineers who develop them. These technologies affect the military organization and the way humans configure within it. These cases are chosen to highlight the ways in which the concepts of distance, perception, and ethics are at play in current developments of military technologies. The emergence of technologies with such implications thus has broader meaning for how future conflicts will be fought, with special emphasis on humans.

Conclusion: Implications for Military Operations and Stability

Military technology is an important determinant of a state's security. International relations and military scholars have, for a very long time, evaluated the impact technology has on international stability, a state's foreign policy, and its military operations. However, the emergence of the military technologies discussed above, namely information technology, unmanned vehicles, and certain applications of cognitive sciences research, has shown the inability of explaining the technological impact through existing theoretical and policy discussions. It is argued in this paper that such inability is a result of a lack of consideration for the human element in conflict. The offense-defense theory overlooks humans as part the determination of the offense-defense balance, the RMA arguments do not provide sufficient granularity in their framework to analyze the impact these emerging military technologies have on humans, and the discussions on military innovations lack specific mechanisms through which the nature of future warfare can be interpreted and the linkages between technology, organization, and doctrine understood.

An examination of the historical role humans have played in conflicts would show, however, that humans are the key agents of change, and they are a necessary component of any military organizational structure. The very experience of conflict and war is a human one. In addition to the human role in determining the course of doctrine and the composition of the organization, it is the human involvements in a conflict, be it as combatants or noncombatants, that determine the costs of war, and it is frequently the utility of the humans that defines the boundaries of military operations. Furthermore, since information technology, unmanned vehicles, and cognitive sciences research all directly impact humans, any attempt to understand their impact on the military and security in today's world, where the definition of conflicts is constantly shifted and redefined, requires an evaluation of how the human capabilities are configured into military operations in conflict situations.

As proposed above, distance, perception, and ethics are three mechanisms through which emerging technologies can impact the military operations. They fundamentally alter traditional understandings of what human capabilities are as well as their possible configuration in military doctrine and structure. In particular, the emerging military technologies discussed above help create distance between warfighters as well as the battlefields on which they are engaged. Increased distance between actors redefines the kinds of the capabilities that are yielded in today's military operations (remote air-strikes, cyber operations, etc.), changes the understanding of battlefield space and time, and signals the potential of disengagement that challenges the self-identity of the combatants.

These technologies have also created new perceptual capabilities through which the acquisition and the processing of information are becoming at once both easier and more critical to military operations. Information technology yields new capabilities regarding intelligence acquisition; unmanned aerial vehicles provide increased battlefield situational awareness through their surveillance capabilities; and cognitive neuroscience research in pharmaceuticals hints at

the potential for enhancing human perceptual and other cognitive capabilities. The technologies, thus, provide avenues through which an opponent's capabilities, intentions, or even decision processes can be better understood, analyzed, and managed.

Finally, these emerging technologies also create unique challenges to the existing understandings of the military ethics that govern and guide a warfighter's behavior on the battlefield. In particular, they challenge certain principles of the Just War Theory as articulated by Michael Walzer. Not only do these technologies present legal conundrums since few, if any, norms have been established regarding their use, but they also challenge the extant understanding of the identity of a combatant, which in turn impact the kinds of moral obligations and responsibility (such as *jus in bello*) that can be expected. These changes are likely to challenge the existing military doctrines concerning the definition of combatants and their moral duties, which can lead to novel visions of the ways that military missions are defined and the organizations structured.

The illustrative analyses above show that emerging military technologies are altering or have the potential to alter the ways in which war is conducted, and they are doing so by adjusting the kinds of capabilities that can be expected from the human elements of war (namely the warfighters themselves) as well as the ways that humans are incorporated into the military organization and operational doctrines. By analyzing the technologies' impact on the human warriors through the lenses of distance, perception, and ethics, there is a clearer picture of what armed conflicts could look like in the future, permitting the analysis of military technology can be extended beyond the simple dichotomy of offense and defense. A human-centered approach to understanding the security impacts of an emerging technology, thus, can show with more specificity the types of changes that are occurring in human warfare and the kinds of utility that can be expected out of a human warrior. It can provide the contexts in which states evaluate the technology's impact on the costs and benefits of conflict engagements. Finally, this approach clarifies the changes occurring in the international security landscape and can help states and their respective militaries meet the ever-changing security demands.

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