Introduction

The comparison of manned and unmanned methods employed by the United States in counterinsurgency is a crucial, if seldom-discussed, issue. There can be few topics, however, more deserving of debate and consideration in the annals of political science. Notable here is the success of manpower and unmanned technology as it has been used in counterinsurgency in Iraq. The War in Iraq has been a crossroads of these methods. At once, there are numerous examples of tactics using great military manpower. Other situations have seen the military employ cutting edge technology that takes soldiers off the battlefield and seemingly out of harm’s way. Such technology has been increasingly touted as the future of warfare, reducing casualties and giving American troops an unprecedented advantage over the enemy. These methods must be analyzed for their effectiveness in counterinsurgency, primarily because this is the future of American warfare. Whether or not new technology becomes commonplace in all American military endeavors or not, it is particularly important to gauge its effectiveness vis a vis manpower in unconventional warfare. Currently, the United States is engaged in two unconventional wars characterized by brutal counterinsurgency. The Iraq War has certainly been, to date, the more cost, troop, and technology-intensive of the two conflicts, and has been further politically complicated by the inability of Iraqi governmental factions to reconcile as well as the need for the US military to win the “hearts and minds” of Iraqi civilians while defeating an insurgency. Wars of such an unconventional nature between the United States and non-state actors are likely to be the norm in warfare for the near future. Given the implications for the unconventional wars

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1 I would like to thank Jennifer Lucas, Jonathan Acuff, and Brother Isaac Murphy, OSB, for their review of these case studies and for their helpful criticisms as well as their encouragement of my further writing in the political sciences.
that are presently being fought by the United States as well as future military action that may come, discerning the most effective method is a venture that deserves consideration here.

**Literature Review**

A significant portion or the relevant literature deals with the state of American warfare in the time period surrounding the Iraq War and its guiding doctrine. Of note is a seeming doctrinal struggle between the concepts of technologically-based tactics (Rumsfeld Doctrine), which would likely include heavy use of unmanned technology, and overwhelming force (Powell Doctrine), which would emphasize the heavy emphasis on manpower. It is the general consensus that the United States maintains a technologically advanced force that can easily succeed in conventional, state-to-state conflict. Academics, however, note that, while conventional warfare may have characterized the initial 2003 invasion, this was not the case with subsequent occupation and counterinsurgency effort. This is plain to see given the fact that the United States now faces enemies in the forms of non-state actors after having deposed the Saddam Hussein regime in Iraq. Some authors are critical of a general lack of preparedness on the part of the United States for unconventional warfare or the incompatibility of the invading force with the impending stability operations and counterinsurgency that would mark its mission. This, as well as how costly it has been for the United States to maintain an overwhelming advantage in warfare technology, has caused some to question whether it is even worthwhile for such a commitment to continue. Essentially, they posit that such a force orientation should not

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continue if such tactics have not prevailed in recent instances of asymmetric warfare, which appears to be the present trend in warfare.\textsuperscript{4}

Within this matter of how to structure and orient the American military force are various issues of how to use military manpower. From the outset, it is clear that the United States military does not rely on, nor can it rely on, the overwhelming manpower that characterized previous conflicts such as the Vietnam War. Academics generally note that there is an overall lack of effective manpower in the military. Chief among the critics of military manpower is Frederick Kagan, author of “The US Military’s Manpower Crisis.” He asserts that the lack of adequate manpower has existed since the early 1990s, but the issue has been downplayed by the defense establishment.\textsuperscript{5} This problem, he claims, has been obscured as well as compounded by the federal government’s overinvestment in warfare technology that either unmans the battlefield or decreases reliance on manpower.\textsuperscript{6} In other works, Kagan continues to argue in favor of greater military manpower.\textsuperscript{7} Other academics agree that a manpower crunch has existed since the 1990s and are generally pessimistic about a commitment by the Defense Department to significantly enlarge the armed forces.\textsuperscript{8}

Of further concern beyond the immediate issue of levels of manpower is how the military’s existing manpower should be oriented and how much should be committed to a given situation like Iraq. Several authors note the failure of coalition forces to police liberated Iraqi cities immediately following the 2003 invasion and that the need to initiate stability operations

\textsuperscript{4} Ibid.
\textsuperscript{6} Ibid.
was not properly taken into account in planning for the war.\textsuperscript{9} The ultimate result of these mistakes, these authors posit, was a force size and composition that did not match the mission that would arise in Iraq. Furthermore, the orientation or preparedness of troops was one of invasion and conquering, not policing and counterinsurgency. This is significant, but also hints at a broader theme in Iraq and in the following analysis. The military, not matter how well equipped, must be properly oriented to the mission at hand. Technology may be a significant aid, but in numerous cases humans must have a certain proficiency in operating such technology for it to be effective. This is an issue worth noting in advance of the case studies, as it may be a concern in assessing the superiority of manned and unmanned tactics.

Manpower, though relatively low in the modern military, may very well need to be increased in the combat theatre in order for an effective counterinsurgency campaign to take place. With this comes an academic debate as to the appropriate troop levels that counterinsurgency entails. It is commonplace for authors to criticize the planners of the Iraq War for the perceived failure to employ overwhelming levels of ground troops.\textsuperscript{10} The commonly accepted ratio of ground troops to members of the occupied population of a nation is 20 soldiers per 1,000 inhabitants in a counterinsurgency campaign. Given the US force size as well as the population of Iraq, it is clear the United States military does not maintain an occupying force that meets the 20 to 1,000 ratio. The fact that counterinsurgency operations have taken place in both Iraq and Afghanistan without a force size in either nation that meets such a ratio has led some academics to call for the standard’s reexamination.\textsuperscript{11} In a similar fashion, others have taken these


circumstances to mean that there are clearly different levels of policing and counterinsurgency that call for different ratios of soldiers to inhabitants.\textsuperscript{12} In such a tiered system, generally peaceful nations may require as little as one soldier to every 1,000 members of the occupied population.\textsuperscript{13} The opposite end of such a system would constitute considerably more violent nations and volatile stability operations, most notably Malaya and Northern Ireland, which would require at least 10 ground troops for every 1,000 members or the native population.\textsuperscript{14} This issue of troop levels is still subject to much discussion and should be noted in a discussion of manpower’s overall value in counterinsurgency.

In addition to the debate on manpower, there is also an ongoing academic debate with regard to technology’s incorporation into modern warfare, which makes up the second half of the following case studies. Some authors note the fact that reliance on technology-based warfare has been a hallmark of American military strategy for some time. Steven Metz states that American post-Cold War strategy has been to:

\begin{quote}
\ldots\text{capitalize on qualitative advantages on the part of the American military—both technological and human—to prevent or thwart aggression and attain a significant, preferably decisive victory, within a short period of time and with minimum blood cost.}\textsuperscript{15}
\end{quote}

Of note here is the emphasis on “qualitative advantages” as opposed to numerical or other advantages, meaning that there has been an emphasis on a lighter, less manpower-intensive, more technologically advanced fighting force in the post-Cold War period. It was this strategy, according to Metz, that had been employed throughout the 1990s, but did not succeed in Iraq.

\textsuperscript{13} Ibid.
\textsuperscript{14} Ibid.
The US, as a result, was forced to rethink its military strategy to adapt to an unanticipated unconventional and asymmetric war.16

Within this subject, there are authors who endorse technologically advanced “small footprint” military operations. Some see Iraq as proof that light, swift, technological warfare that deemphasizes troop levels is effective in military operations.17 Numerous academics support the use of technological, and primarily unmanned, warfare as a means to saving American lives by keeping them out of immediate danger on the battlefield.18 Still others support unmanned warfare tactics as a means to solve, or at the very least temporarily mitigate, the effects of the seemingly unsolvable manpower crisis in the armed forces that is discussed above. To this extent, unmanned technology is viewed as excellent way to perform tasks in the place of large numbers of troops and advance the armed forces amid manpower shortages, make effective use of lower manpower, and minimize the effects of lower manpower.19

These supporters of unmanned warfare are undoubtedly accompanied by cautious detractors of this strategy. Numerous scholars note the attractiveness of such technology, but are also weary that these systems may not always be a good substitute for troops on the ground in a contested region. Frequent criticism surrounds unmanned systems such as the lethal unmanned aerial vehicle (UAV), which can conduct highly destructive air strikes. Skeptics posit that such a system may not be effective for its destructiveness and capacity to cause excessive civilian casualties, which may actually hinder an overall mission.20 Perhaps the most notable cautionary figure in the debate on unmanned warfare, however, has been P.W. Singer, who chronicles the

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16 Ibid.
issue in *Wired for War*. He notes the immense technological capacity of the US military in unmanned technology, but sees a potential for a dangerous shift in American conduct with these unprecedented developments. Singer ultimately posits that such unmanned technology could tear down the psychological and moral barriers to starting wars and that in discriminant military strikes will become more routine.²¹ It is concerns such as these that go beyond basic security goals that are most notable in the skeptical view of unmanned warfare.

In sum, academic literature presents great variance on the issues of manpower and unmanned technology in modern warfare. There is little disagreement that lighter, technologically advanced fighting forces have become commonplace in American military combat, especially in the face of commonly accepted manpower shortages in the last two decades. Some, however, believe that this has had disastrous consequences for the United States in Iraq and that it would be worthwhile to reinvest in military manpower. Others see this shortage as surmountable through technology, specifically unmanned technology. Furthermore, some academics see technology as a valuable asset that prevents excessive loss of American life on the battlefield. Still, these astounding technological advances have their detractors, who worry that emphasis on preventing American military casualties will compromise the security goals at hand and will further embolden the United States to conduct unmanned military operations without properly considering their consequences.

Claims and Sub-claims

Main Claim

In American counterinsurgency activity in Iraq, unmanned, technologically advanced tactics have been more effective in achieving military progress than manned methods.

Sub-claims

1. Unmanned Explosive Ordnance Disposal (EOD) technology is more effective than manpower-oriented EOD methods.
   - (A) Unmanned EOD technology can more effectively perform the task of Explosive Ordnance Disposal than manpower.
   - (B) Unmanned EOD technology entails fewer military (US) and civilian (Iraqi) casualties than manpower.
   - (C) Unmanned EOD technology is more effective in achieving clear and hold security goals of the US military than manpower.

2. Unmanned technology is more effective than manpower in executing Intelligence, Surveillance, and Reconnaissance (ISR).
   - (A) Unmanned ISR technology can more effectively perform Intelligence, Surveillance, and Reconnaissance than manpower.
   - (B) Unmanned ISR technology leads to fewer American military and Iraqi civilian casualties than manpower.
   - (C) Unmanned ISR technology is more effective in achieving clear and hold security goals of the US military than manpower.

3. Unmanned technology is more effective than manpower in executing Military Operations on Urban Terrain (MOUT).
• (A) Unmanned MOUT technology can more effectively execute Military Operations on Urban Terrain than manpower.

• (B) Unmanned MOUT technology leads to fewer American military and Iraqi civilian casualties than manpower.

• (C) Unmanned MOUT technology is more effective in achieving clear and hold security goals of the US military than manpower.

Data and Research Methods

Conceptualization/Operationalization

Unmanned technology/Unmanned warfare/Unmanned methods. (Conceptualization) This term refers to a recent trend in the United States military and emphasizes the use of cutting edge technology that requires no human component in the immediate area. Its primary purpose is to reduce the loss of human lives in battle. An example of this would be the use of an unmanned drone, where a small aerial vehicle is remotely operated by a pilot who is potentially miles away, to achieve an offensive military objective instead of putting troops on the ground. Essentially, the technology used reduces the amount of manpower needed due to its effectiveness.

(Operationalization) This concept is present through several indicators. An unmanned force is indicated by technological systems that do not require the constant presence of soldiers alongside the machine. For example, unmanned technologically-based warfare is present in remotely controlled aerial vehicles or robotics as well as other advanced weaponry that takes away the necessity for large amounts of troops or significantly reduces the instance of casualties.

Manpower/Manned warfare/Manned methods. (Conceptualization) This term refers to a form of warfare that emphasizes the role of troops on the ground. It is, in effect, the opposite of the
previous term. Where technology may be the key to the success of a method according to the previous concept, the presence of soldiers in large numbers is the hallmark of this concept. (Operationalization) This concept can be measured by observing military operations that necessitate the presence of soldiers on the ground.

Effectiveness. (Conceptualization) The concept of effectiveness refers to how well a method, manned or unmanned, accomplishes a particular task or goal. (Operationalization) The concept of effectiveness is measured in several ways. It is measured in terms of Explosive Ordnance Disposal (EOD), Intelligence, Surveillance, and Reconnaissance (ISR), and Military Operations on Urban Terrain (MOUT). For each task, manned and unmanned methods will be judged against the official military standards set forth in their respective field manuals. Within this, manned and unmanned methods will be judged on which is best able to reduce casualties, achieve clear and hold objectives, and achieve its assigned task in general.

Clear Operations/Objectives. (Conceptualization) The concept of clear operations or clear objectives is part of the security portion of the overall National Strategy for Victory in Iraq, promulgated by the National Security Council in 2005. The strategy consists of goals on the political, security, and economic tracks; the security track, however, will be the only set of goals dealt with in this study. To clear, in this study, essentially means to root out insurgent activity in a given area. According to the strategy, clear objectives refer to clearing “areas of enemy control by remaining on the offensive, killing and capturing enemy fighters and denying them safe haven.” It is part of the larger security track of clear, hold, build, of which only the objectives clear and hold will be employed here. (Operationalization) This concept is measured primarily

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23 The National Strategy for Victory in Iraq defines build objectives as building “Iraqi Security Forces and the capacity of local institutions to deliver services, advance the rule of law, and nurture civil society.” Of the clear, hold, build security track laid out in NSC’s 2005 strategy, build objectives are excluded from this analysis. This is
qualitatively and comparatively. To best determine how well a military tactic, manned or unmanned, accomplishes clear goals, one must assess the tactic’s function and how well it allows the military to eliminate insurgent activity in a given area vis a vis another tactic.

Hold Operations/Objectives. (Conceptualization) The concept of hold operations or hold objectives is part of the security track of the National Strategy for Victory in Iraq and is part of the larger clear, hold, build set of goals. To hold, in this study, means to keep selected areas free of insurgent activity after having been subject to successful clear operations. The National Security Council’s strategy refers to this as holding “areas freed from enemy control by ensuring that they remain under the control of a peaceful Iraqi government.” Naturally, hold objectives are applied only in the event that an area has been successfully cleared of insurgent activity.

(Operationalization) This concept is largely measured qualitatively and comparatively. To assess the effectiveness of a tactic, be it manned or unmanned, vis a vis another tactic in hold objectives, one must appraise the function of a tactic and how well it prevents insurgent infiltration, reentry, or other renewed activity in a given area.

Explosive Ordnance Disposal (EOD). (Conceptualization) The concept of Explosive Ordnance Disposal (EOD) refers to the detection of explosives and their neutralization via disarmament or controlled detonation. Explosives relevant to EOD include anti-tank or anti-personnel mines in addition to improvised explosive devises (IEDs). There are both manned and unmanned tactics that allow the military to effectively execute EOD. (Operationalization) This concept is present in the use of manpower or robotic technology to disarm explosive ordnance or destroy it in a

due to the fact that the focus of the following case studies will be in American tactics in Iraq related to combat. While clear and hold objectives are relevant to military operations that include both manned and unmanned components, the same is not necessarily true for build objectives. The goals of forming Iraqi Security Forces, delivering local services, and ensuring the sustainability of a civil, legalistic society in the country are linked to security operations, but are not synonymous the combat operations that are central to this strategy. Effectiveness of manned and unmanned warfare tactics will, therefore, be assessed by their capacity to fulfill clear and hold objectives.

controlled fashion. For example, the manned defusing of an IED or the use of a remote controlled robot to detonate IED would constitute a successful exercise in EOD.

**Intelligence, Surveillance, and Reconnaissance (ISR).** (Conceptualization) The concept of Intelligence, Surveillance, and Reconnaissance (ISR) refers to the gathering of battlefield information for use in combat operations. (Operationalization) This concept is present in the use of both manpower and unmanned technology to gather knowledge as to enemy positions, numbers, and other relevant factors that would allow military commanders to appropriately formulate and direct military operations. For example, the use of scout or reconnaissance platoons or unmanned aerial vehicles (UAVs) to observe insurgent activity in order to obtain information relative to enemy force location, size, and possibly intent, would constitute ISR.

**Military Operations on Urban Terrain (MOUT).** (Conceptualization) The concept of Military Operations on Urban Terrain (MOUT) refers to military combat in cities, which is largely prevalent in counterinsurgency operations in urbanized nations such as Iraq. (Operationalization) MOUT is present in the use of manpower or unmanned technology to neutralize enemy activity in a given city, effectively clearing it of insurgent presence (*clear*) and preventing their reentry or reestablishment as a major armed presence in the area (*hold*). For example, the use of infantry in a progressive block by block effort to root out insurgents who have gained tactical and strategic footing in an urban area would constitute MOUT. Additionally, the use of the lethal UAV to conduct air strikes of urban areas to kill insurgents would also constitute MOUT.

**Method**

The primary method employed in this thesis will be the case study. In the instance of assessing unmanned technology and manpower, case studies will be of great importance. Several issues (EOD, ISR, and MOUT) will be observed in these case studies. These issues have been chosen
for their particular importance in the counterinsurgency struggle. EOD is of particular importance for the amount of American casualties caused by improvised explosive devices. IED attacks constitute the single most prevalent cause of casualties in Iraq, taking troops out of the field, damaging or destroying American military equipment, and, as a result, hindering the overall American security mission. ISR is of particular interest because it is a common military practice with real implications. ISR is necessary in military operations so unit commanders are aware of how to act based on information received on the enemy force, especially with the limited line of sight that an urban setting entails. MOUT is also of great importance because of its prevalence in Iraq. Combat in urban settings has characterized the vast majority of America counterinsurgency efforts in Iraq. Furthermore, all three of these issues, their strategic relevance aside, have manned and unmanned tactics that make for straightforward comparisons in each case study. These issues will be described in terms of relevant military resources (notably official field manuals). Manned and unmanned methods will then be assessed, with attention paid to specificities of each method and how well each fits as a solution to a particular issue. Of particular importance is not only the ability of either a manned or unmanned method to solve an issue, but also to achieve other related goals that are particularly thematic to the counterinsurgency. In this case, each method will be further assessed in terms of their ability to reduce both US military and Iraqi civilian casualties and achieve clear and hold security objectives. Here, both qualitative and quantitative data will be employed to show the effectiveness, or lack thereof, of a particular warfare method. Examples of quantitative data would include, if available, casualty rates, success/failure rates, numbers of a weapons system or of troops deployed to the combat theatre, and numbers of insurgent attacks. The qualitative aspect of this study will include resources such as accounts of the effectiveness, or lack thereof,
of tactics and weapons systems. It will also include an extrapolation of features of issues (EOD, ISR, and MOUT) and specifications of corresponding solutions (manned and unmanned EOD, ISR, and MOUT methods) to determine how effectively they accomplish their intended tasks. These methods are ultimately the best suited to discover the information desired.

Population and Sample

Ultimately, it is the goal of this thesis to draw conclusions about the two aforementioned methods of warfare: manned and unmanned. These overall methods are the population about which generalizations will be made. From these two broad methods of waging war, case studies will be conducted on three issues that have both a manned and unmanned component: EOD, ISR, and MOUT. These case studies have been derived not only for their manned and unmanned components, but fore their aforementioned relevance to the overall security strategy of the US military in Iraq. It must be noted that a comparison of warfare tactics requires the selection of warfare issues that have distinct manned and unmanned tactics to solve them. As a result, this will not necessarily be reflective of all aspects of warfare in Iraq, as there are certainly issues that have strictly manned or strictly unmanned solutions.

Results

Explosive Ordnance Disposal (EOD)

The detection, disarmament, and disposal of explosives, especially improvised explosive devices (IEDs), is a critical component to achieving security goals in Iraq. To begin with, Iraq was likely one of the most heavily mined nations in the world at the time of the 2003 invasion, having had roughly 2 million anti-tank mines and 8 million anti-personnel mines leftover in the ground from both the Gulf War and the earlier Iran-Iraq War. Unexploded conventional

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ordnance is complemented in Iraq by unconventional IEDs, which are essentially homemade explosives. IEDs are a particular challenge because of their unconventional nature and, hence, their considerable variance. Bomb casings can come in numerous forms, including automobiles, metal containers, propane tanks, and unused military ordnance such as artillery shells. Any type of battery could potentially be used to power the explosive in addition to numerous household items as methods of circuitry and timing. Homemade weapons such as these have been responsible for between 40% and 50% of military casualties in Iraq and the additional destruction of American vehicles such as the Humvee; as a result, IEDs have hindered American clear and hold security operations in Iraq.

The unmanned component here involves the use of robotic technology to disarm or destroy an improvised explosive device, which is the prevalent practice for American troops in Iraq. Two of the most prolific robot systems in this field are the TALON EOD robot and the PackBot 510. The TALON, which was used previously for live grenade disposal in Bosnia, is portable at 115 pounds and is swift, “easily keeping pace with a running soldier.” The PackBot is similarly portable at 68 pounds when fitted for EOD. Beyond these discrepancies, both have similar specifications, including: battery power; treaded propulsion allowing both systems to negotiate rough terrain; joystick control that allows EOD teams to easily control robots from afar (in the case of the TALON, EOD specialists can operate the system at a maximum distance of

4,000 feet); and four mounted cameras that allow the operator to clearly visualize the area of concern. Additionally, and perhaps most importantly, both of these robotic systems have single manipulator arms with reaching and grasping capability as well as a mechanical cable cutter.

These specifications are particularly useful in the given situation of IED disposal. Battery power, remote control, cameras, and the ability to manage desert terrain all give the robot operator the ability to manage the situation without approaching the bomb at an unsafe distance. The arm, as previously stated, is key in the disposal of an IED. To properly dispose of an IED, a robot will generally use the arm to place an explosive charge at the site to detonate the bomb in a controlled manner. If possible, the cable cutter adaptation can be used to disconnect the relevant wiring of an IED, effectively disarming the bomb. Robotic systems like the PackBot 510 and the TALON perform this task with regularity in Iraq, allowing for EOD specialists to mitigate the fatal and counterproductive effects of IEDs without placing themselves in immediate danger of being killed by a detonated bomb.

There is also a manned component in the disposal of IEDs. Though the use of remote-controlled robots has become the norm in Iraq, both American military and Iraqi police forces are trained to manually disarm bombs if the need arises. In lieu of an EOD robot, a person would need to approach the site and place a charge next to the bomb. In the same way a robot would place the charge next to an IED, a human could do the same thing and remotely detonate

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31 In the case of the PackBot 510, it does not appear to be a coincidence that its joystick controls bear resemblance to the controls of a modern video game system; QinetiQ North America—Foster-Miller, Inc., “TALON Family of Military, Tactical, EOD, MAARS, CBRNE, Hazmat, SWAT, and Dragon Runner Robots.”
it to clear the area. In the event that this does not work, troops are trained to hook a rope to the
IED and move beyond the projected blast radius. Troops will then pull on the rope to either
detonate the bomb from a safe distance or move it to expose a potential secondary device, an
additional explosive that could potentially detonate after the initial IED explosion or
demolition.

The danger of manually disarming an IED is clear, hence the reliance on unmanned
robotic technology and leaving manned explosive ordnance disposal as a last resort. It remains
unclear, however, whether unmanned EOD technology truly performs better in the grand scheme
of counterinsurgency operations than does manual EOD. The unmanned EOD method certainly
is more effective than manual operations in reducing casualties given the simple fact that soldiers
are taken out of immediate danger by allowing them to use the robot to destroy ordnance from
hundreds of yards away. In the event of a detonation through the failed disarmament of an IED, a
piece of equipment costing in excess of $100,000 will have been destroyed, but there will likely
have been no loss of human life in the process. Still, this does not mean that EOD soldiers are
not at risk of losing their lives. Mistakes, decoys, and the aforementioned secondary device can
easily kill soldiers in the EOD process. Additionally, EOD soldiers must worry about becoming
targets of insurgents. In the case of the Army’s 717th Explosive Ordnance Disposal Company, a
rumor was circulating in Baghdad in late 2005 that insurgent group had placed a price of $50,000
on each soldier. The possibility of soldiers losing their lives is reduced, but not completely
removed, with unmanned EOD technology.

35 The 34th Red Bull Infantry Division, “Iraqi Police Become Certified Bomb Squad,” Theredbulls.org [home page
on-line; available from http://www.theredbulls.org/tiki-view_blog_post.php?blogId=30&postId=409; Internet;
accessed 18 October 2009.
36 Ibid.
With regard to the *clear* and *hold* security goals of the counterinsurgency, it is unclear if either method maintains a clear advantage over another at clearing an area of insurgent activity and preventing them from reestablishing strength there. Certainly a great danger has been averted each time an EOD team is able to disarm or destroy and IED, either manually or robotically. By eliminating an IED or other explosive without loss of life, loss of equipment, and further hindrance to the American military mission, insurgent activity has effectively been cleared from a given area or prevented from reintroducing itself into an area. Success in EOD has always been measured in terms of a bomb being discovered and disposed of, and, in turn, loss of life being averted. Given the similar functions and effects of manned and unmanned EOD tactics (which will be discussed below), it can only be assumed that there will also be a similar capacity to *clear* and *hold* a given area. In terms of the manned and unmanned EOD methods, there is no clear advantage on the part of either manned or unmanned tactics; therefore, neither is truly superior with regard to the *clear* and *hold* security goals, though both are capable of accomplishing them.

The effectiveness of one method relative to the other is also important. As previously stated, the effectiveness of unmanned technology has been judged in its effectiveness to keep soldiers out of harm’s way. In that sense, unmanned technology like the PackBot 510 and the TALON is highly effective. Ultimately, though dangerous, EOD soldiers are trained to be able to manually disarm an IED if the need arises. Casualties aside, both manned and unmanned methods will likely provide a similar outcome. In a certain sense, one method cannot be divorced from the other. Despite the ability of robotic technology to disarm or destroy and IED with its operator at a safe distance, the soldier operating the machine must be able to correctly discern the nature of the explosive and how best to disarm it. Robotic technology, advanced as it is, cannot truly examine ordnance and determine how best to go about disposing of it. Whether manned or
unmanned technology is employed, the knowledge of the person examining the bomb is truly the deciding factor in EOD. The homemade construction of bombs increases their variance, as does the fact that insurgent cells often share ideas for bombs on the internet.38 Advances in American anti-IED technology have also been accompanied by adaptations on the part of insurgents. Anti-IED advances include not only unmanned EOD robots, but also additional armor to humvees that will protect from blasts below the vehicle as well as radio jammers that can disrupt a remote controlled signal to detonate an IED.39 The success of robotic technology and protective armor has caused makers of bombs to become more inventive by planting IEDs in elevated areas where a vehicle can still be damaged, including highway overpasses, bridges, trees, and road signs.40 These altered conditions may not only negate technological advances and require manual methods, but also require soldiers to adjust their thought process. Ultimately, “[t]he ever-shifting conflict is forcing bomb squads to develop new, more improvisational tactics.”41 In the field of ordnance disposal, manpower and technology are not mutually exclusive. Manned and unmanned methods both rely heavily on human ingenuity and ability to adapt to the given situation to perform the same task. In the final analysis, though the unmanned method clearly saves lives, the fact that it relies heavily on human knowledge while maintaining no decisive clear and hold superiority does not give it a true advantage over manned EOD methods.

*Intelligence, Surveillance, and Reconnaissance (ISR)*

Also crucial in terms of security in Iraq is proper intelligence, surveillance, and reconnaissance (ISR) on the ground. ISR is comprised of the gathering of battlefield intelligence. It involves observing an enemy force ahead of the main portion of combat forces and reporting

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back on its location, size, armament, and other relevant information. This information gathered in ISR is used to determine how to properly engage the enemy force. Thus, proper ISR is central to successfully engaging an enemy force and is central to successful security operations in Iraq, including minimizing overall casualties and achieving clear and hold goals successfully.

There are both manned and unmanned components to ISR. The manned component involves reconnaissance and scout platoons. With reconnaissance in light infantry, such a platoon consists of approximately 20 soldiers with weaponry similar to its parent battalion and outfitted with night vision and communication equipment.\(^4^2\) Platoons may also be armored or mechanized, including CFV (Cavalry Fighting Vehicle) scout platoons, which use six M3 Bradley tanks, or HMMWV scout platoons, which use ten humvees.\(^4^3\) Both armored and mechanized platoons consist of 30 soldiers, as opposed to 20 in infantry.\(^4^4\) As previously stated, scouts act as the “eyes and ears” of the parent unit, gathering information on enemy size, movement, and likely intentions so a unit leader may properly assess the situation and take appropriate military action.\(^4^5\) Units such as these can operate with considerable speed and stealth to survey enemy forces and do so without directly engaging them in combat.

Certainly manned reconnaissance operations have their advantages. Combat units must have proper intelligence before engaging the enemy. Improper intelligence or lack of intelligence could result in unnecessary or excessive casualties or failure to achieve mission objectives. To this end, scout platoons are “one of the tactical commander’s most valued assets…on the forward edge of the battle.”\(^4^6\) There are, however, significant challenges and limitations to manned

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\(^{4^3}\) US Army. FM 17-98: Scout Platoon. (Department of the Army, Washington, D.C., 1999), 5; Ibid.

\(^{4^4}\) Global Security, “Platoon.”


\(^{4^6}\) Ibid.: 3.
reconnaissance in general and in military operations in urban territory (MO\-UT). In general, 
scouts on the ground are at great risk in the event they are spotted, as the enemy force would 
prefere to push back or neutralize the platoon that is gathering information on them for a possible 
ofensive. Sgt. 1st Class David Bowman of the Task Force Olympia Scout Platoon, which 
previously operated in Mosul, noted of the firepower of such a group, “We’re not going out 
looking for a fight, but we are ready to take the fight to the enemy if they engage us.” If 
engaged by an enemy force, a scout force can certainly fight back, but, as the Army field manual 
notes, not with the same kind of force as its parent unit. Among the most significant limitations 
of manned reconnaissance, as enumerated by *FM 17-98*, is that platoons are dependent upon 
their parent unit for combat support.\(^48\) It is further states that, “Except when it is operating as part 
of a larger force, the platoon is not organized and equipped to undertake operations that entail a 
significant offensive component.”\(^49\) Furthermore, armored and mechanized scout platoons have 
restricted mobility in urban areas and are vulnerable “to antiarmor weapons in built up areas.”\(^50\) 
As previously discussed, mounted forces face the grave threat of mines and improvised explosive 
devices in urban areas, which, if well placed, scouts may not spot. CFVs also require daily 
resupply and maintenance based on their frequent use of petroleum, ammunition, and 
replacement vehicle parts.\(^51\)

The unmanned alternative to scout and reconnaissance platoons is a non-lethal unmanned 
aerial vehicle (UAV). The UAV is part of the US Army’s Future Combat System (FCS). Begun

\(^{47}\) Fort Drum Blizzard Online, “New Task Force Scout Platoon in Iraq Exemplifies Army’s Motto,” *Drum.army.mil* [home page on-line]; available from 
\(^{49}\) Ibid.: 14. 
\(^{50}\) Ibid.: 264-265. 
\(^{51}\) University of California Santa Barbara Military Science, “OPORD Skeleton,” *Milsci.ucsb.edu* [home page on-line]; available from 
\[http://www.milsci.ucsb.edu/links/gopord.htm; Internet; accessed 23 October 2009.\]
in October, 1999, FCS was a program intended to “make the Army lighter, more modular, and—most importantly—more deployable.”\(^{52}\) FCS includes some of the most innovative military technology, manned and unmanned, tied together by an advanced communications network.\(^{53}\) Though designed primarily for conventional warfare, FCS is intended to be a system that can be applied to a full spectrum of military operations.\(^{54}\) Though the program was cancelled by Secretary of Defense Robert Gates in May, 2009, several programs and weapons systems, including the UAV, remained as part of the Defense Department’s long term vision.\(^{55}\) The non-lethal UAV outlined in FCS is the XM156 Class I UAV, which provides “Reconnaissance, Surveillance, and Target Acquisition (RSTA) at the platoon level,” and is particularly relevant to counterinsurgency in Iraq.\(^{56}\) The Class I is designed to function in an urban setting with the capacity for vertical takeoff and landing.\(^{57}\) The Class I, like other robotic technology discussed above, is portable at only 40 pounds; it can be quickly deployed in the air and controlled by dismounted soldiers; it has a vertical ceiling of 10,500 feet and a range of 8 kilometers; it can also stay aloft for up to one hour.\(^{58}\)

Another relevant system is the RQ-7 Shadow Tactical UAV, which provides surveillance, reconnaissance, and target acquisition similar to the Class I. The Shadow is built for larger-scale, brigade operations, as opposed to the Class I, which was build for lower-echelon, platoon operations. This can be seen in the Shadow’s winged design which requires room for takeoff, as


\(^{53}\) FCS is often described as an 18+1+1 system. FCS consists of (18) individual systems, (1) the soldier, and (1) the network.


opposed to the barrel shape of the Class I, which is conducive to vertical takeoff and landing. Furthermore, the Shadow complements a larger force with a larger range of 50 kilometers and a longer flying duration of four hours.59

Non-lethal UAVs such as the Shadow and the Class I are particularly useful in the counterinsurgent effort by the United States in Iraq. There are several aspects to this. One facet of unmanned ISR systems is that they negate the line of sight limitation of manned reconnaissance units. Both the Shadow and the Class I are mounted with cameras that can give soldiers an unprecedented view of the battlefield. Scouts on the ground are clearly limited by their immediate surroundings in an urban setting. A scout would not likely be aware of insurgents located behind a building, effectively out of his line of sight. A UAV such as the Class I or the Shadow, on the other hand, would be able to loiter thousands of feet above a city and monitor a large area. Meanwhile, soldiers on the ground would be able to monitor this area via the vehicle’s camera, observing insurgent activity from above without their knowledge. Soldiers using the Class I UAV attested to the fact that it, “gives an individual soldier a view around corners and on roofs of buildings without having to call back to headquarters for help.”60

The UAV has been particularly useful in pursuing and capturing insurgents. Among the groups using UAVs to this end is the 25th Infantry Division’s 2nd Stryker Brigade Combat Team, which operates the Shadow vehicle in the neighborhoods surrounding Baghdad. In an account of the effectiveness of the Shadow, Major Jonathan Shaffner of the combat team noted an operation in the northern suburbs of Baghdad. Soldiers raided a home searching for a man suspected of insurgent activity against both American and Iraqi troops, soon discovering that he was not at the

At this time, a Shadow in use by the 2nd Stryker Brigade observed a suspicious vehicle nearby and, noting this, the operator notified troops on the ground. Two people fled the vehicle, but, unbeknownst to them, the Shadow was still tracking them and its operator informed ground troops of their location, leading to the arrest of the two men, one of which was the suspected insurgent. This account is the general narrative of the non-lethal UAV for ISR. UAVs such as the XM156 Class I and the Shadow provide unmanned ISR capabilities with regularity in Iraq. The number of UAVs has steadily increased, with only several hundred operating in Iraq at the beginning of the war compared to over 6,000 unmanned aircraft in use by 2008. The increased activity of UAVs is also apparent, with the number of total flight hours for all unmanned aerial vehicles surpassing 500,000 hours in early 2008. The implication is clear: non-lethal UAVs give soldiers an unprecedented view of the battlefield, allowing them to see the enemy without their knowledge. Scouts on the ground simply do not have this ability. In such a comparison of manned and unmanned systems, there can be little doubt that the unmanned aerial vehicle performs the function of intelligence, surveillance, and reconnaissance in a superior fashion to the manned alternative of scout platoons.

The UAV also maintains clear superiority vis a vis manned reconnaissance in reducing casualties. Given military accounts and by the admission of the Army’s field manual on reconnaissance, scouts are at particular risk on the front edge of the unit. As previously stated, dismounted scouts are at risk as are mechanized and armored reconnaissance units, which are still susceptible to anti-armor weapons and IEDs. A UAV equipped for ISR allows soldiers to

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62 Ibid.
63 Ibid.
observe an area from distances as great as 50 kilometers, where no one is in immediate danger. The advantage of seeing the entire area of interest, which would not ordinarily be seen on foot, allows for a better understanding of insurgent activity, which, in turn, permits for better planning and, as a result, a better executed military operation with the least possible amount of American and civilian casualties. Sergeant 1st Class David Norsworthy of the 2nd Stryker Brigade Combat Team notes, with regard to the Shadow UAV, that, “The Shadow provides coverage for a lot of raids…When the infantry are going into a certain area to clear buildings, we’ll go in ahead of time and scan the area, and we’ll be able to report to them exact grids of potential enemies in the area.” Norsworthy also notes other casualty reducing qualities of the UAV, particularly its ability to scan routes for obstacles and threats, particularly the presence of IEDs. This tactical advantage ultimately saves lives, which cannot be as firmly stated with manned reconnaissance.

Both manned and unmanned ISR methods are certainly crucial to the clear and hold strategy in Iraq. In general, the ISR objective of identifying the enemy is crucial to clear and hold because it allows military commanders to determine how best to engage insurgents. ISR can have a profound impact on clear and hold because it has proactive, rather than reactive, quality. Reconnaissance seeks out the enemy prior to military engagement to determine force size, composition, and intent. Appropriate ISR will allow military units to engage insurgents in manner that most effectively limits their activity within a given area (clear) or prevents them from reconstituting (hold). It has been asserted above that unmanned technology is superior to manned reconnaissance in providing ISR. If it is the case that better ISR capability equates to greater clear and hold capabilities, then there can be little doubt that non-lethal UAVs have a better ability to effect clear and hold security goals than traditional manned reconnaissance.

66 Jason Dangel, “UAVs Role Key Ingredient to Success in Iraq.”
67 Ibid.
Military Operations on Urban Terrain (MOUT) is also a crucial part of American security goals in Iraq. The ability to neutralize targets upon acquiring them, whether by manned reconnaissance or UAV, is undoubtedly a large aspect of securing urban areas in Iraq as well as a distinct portion of the clear and hold strategy. On the whole, “Urban areas are expected to be the future battlefield and combat in urban areas cannot be avoided.”68 Properly executed urban warfare is particularly vital in Iraq, which is a highly urbanized nation that has experienced its most deadly fighting in its cities. As of 2008, approximately 67% of the total Iraqi population resided in an urban area.69 The trend of urbanization will only continue in Iraq, with an annual 1.7% rate of urbanization.70 Generally, MOUT assumes that enemy forces maintain certain advantages by holding urban terrain. “Major urban areas represent the power and wealth of a particular country in the form of industrial bases, transportation complexes, economic institutions, and political and cultural centers.”71 MOUT is also conducted to root out an enemy that has blended in with the civilian population. As a result, MOUT is particularly difficult in any method it may be conducted.

The manned method of MOUT generally “requires the military force to control the vast horizontal and vertical spaces of a city.”72 Much of this includes securing a city building by building and city block by city block. This incremental process of securing an urban area, as has occurred throughout Iraq at various stages of the counterinsurgency, is a prime example of clear and hold strategy. Invading or launching an offensive in an urban area will push insurgents out, if

70 Ibid.
not leading to the outright death or arrest of many of them, effectively clearing the city.

Occupying an urban area and repelling future attacks will effectively prevent insurgents from returning, successfully holding the area.

Certainly, using manpower to *clear* and *hold* is, and has been, the standard method of armies in MOUT. There are, however, many constraints that make MOUT particularly difficult using sheer manpower. Ground operations in cities require substantial manpower, especially infantry. Additionally, urban warfare is significantly time consuming, meaning that the time it will take to clear a city of insurgent activity will likely be longer than originally anticipated by the forces that launched the assault. Urban areas also place constraints on logistics and weapons use. It is implicit here that, though relied upon in urban warfare, manpower has numerous constraints.

The unmanned alternative to manpower in MOUT is airpower in the form of the offensive unmanned aerial vehicle, namely the MQ-1 Predator drone. A significantly more substantial aircraft than the XM156 Class I or the Shadow, the Predator has a wingspan of 48.7 feet, can weigh up to 10,000 pounds, and requires a 2,000 foot runway for takeoff and landing. The Predator also maintains a higher ceiling, with a maximum altitude ranging from 25,000 feet to 50,000 feet and a range of roughly 460 miles. For offensive capabilities, the MQ-1 Predator is fitted with two laser-guided, antiarmor AGM-114 Hellfire missiles. Predator drones, like other UAVs, are remote controlled and can be flown by a pilot in the United States.

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73 Ibid.
74 Ibid.: 20.
75 Ibid.
77 Ibid.
Unmanned operations with regard to MOUT would use vehicles like the Predator to destroy targets that would normally have been engaged by infantry. In fact, with troop levels in Iraq falling throughout 2008 to their pre-Surge levels, the offensive use of unmanned drones has risen.\(^7^9\) Predators have been employed in Basra and areas of Baghdad such as Sadr City, where insurgents often fire rockets into the capital’s Green Zone, the seat of the Iraqi government. Manned MOUT would require sending in infantry to ensure the combatants were either killed or apprehended. In unmanned MOUT using the Predator drone, the operator can simply locate the area of insurgent activity and strike the area with Hellfire missiles. The Predator’s missiles are touted as having precision that can kill groups of insurgents by striking their firing positions, destroying automobiles, and destroying buildings where suspected insurgents are located.

Certainly, the Predator drone has the capability to kill terrorists without placing any American troops in danger. Central Command head Gen. David Petraeus attested during the Surge that, “The Predator teams have just been doing unbelievable work down there (in Basra) and in Baghdad as well.”\(^8^0\) Though there is a tremendous capacity for inflicting enemy casualties without the possibility of American casualties, there are numerous drawbacks to the use of lethal UAVs. The Predator has a high failure rate, with the New York Times reporting that one third of the drones flying in Afghanistan and Iraq have crashed.\(^8^1\) The Hellfire missile maintains a low failure rate due to firing anomalies, having dropped from 25% at the beginning of the Iraq War to roughly 2% in late 2007.\(^8^2\) Despite a low rate of unexplained firing failures, there is still the


\(^8^0\) Ibid.


capacity for failure of the Hellfire’s laser guidance system. For the Hellfire, “[p]ositive and precise laser guidance of the…missile until impact is absolutely essential to the probability of hit and target destruction.” Laser guidance may be obscured in various circumstances, including inclement weather such as rain, fog, or snow. Smoke and dust may also obscure the target on the ground and cause the missile to lock on to the incorrect target. Though accurate, these issues remain a concern for the close-quarters combat associated with MOUT.

These issues hint at a greater concern of which method performs its task better and, as a result, which method is better equipped to achieve the goals of clear and hold. Manned methods, under the admission of the field manual on MOUT, require considerable commitments of ground forces and time. This was certainly the case with Operation Phantom Fury, which regained control of the city of Fallujah from insurgents. The assault, occurring in November 2004, required 10,000 to 15,000 American troops to clear Fallujah of 2,000 to 3,000 insurgents and took roughly a month and a half to officially complete. Despite this, military officials declared that Fallujah had been secured in little more than a week after the start of military operations. Unmanned aerial vehicles can be effective in MOUT. The Predator drone, much like the XM156 Class I or the Shadow, gives its operator an unprecedented view of the battlefield a real time view of insurgent activity. It has the ability to eliminate targets with much less effort or commitment than manned operations, but it is not as comprehensive as manned MOUT. Clearly, unmanned vehicles such as the Predator cannot see all insurgent activity, nor is it guaranteed that using the Predator to bomb areas of insurgent activity will effectively clear the area and help

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84 Ibid.: 29.
85 Ibid.
keep it free of future insurgent activity. While moving through a city in a methodical, often
dangerous, door-to-door fashion is more of a commitment is basically every aspect, this is
undoubtedly a more effective method of clearing and holding relative to the unmanned
alternative.

Also of concern is the amount of casualties incurred by each method. Certainly the use of
the Predator minimizes casualties for American troops, especially when compared to the
casualties sustained by ground troops in MOUT. This disparity in American military casualties
should be expected in MOUT; rather, the more concerning aspect of urban warfare is civilian
casualties. A study in the New England Journal of Medicine comparing the causes of death of
Iraqi non-combatants through the first five years of the war showed that “small-arms gunfire,” a
category most closely related to the potential loss of life in MOUT, was among the single largest
killers of Iraqi civilians. Instances of “small-arms gunfire” have resulted in 11,877 civilian
deaths from 20 March, 2003, to 19 March, 2008.87 Despite a high overall number of casualties,
“small-arms gunfire” also accounts for the highest number of attacks that result in a civilian
death, 5,943, which averages only two civilians killed per attack.88 The category that most
closely approximates the death of civilians by UAV fire is “air attack without ground fire.” This
category constitutes a low number of attacks, 253, but a relatively high number of civilian
casualties, 2,363.89 The average number of civilians killed per attack in this case is nine, which is
much higher than the average number of civilians killed per attack in “small-arms gunfire.”90 By
this standard, a single Predator attack would likely cause more unnecessary civilian casualties
than a single manned raid in an urban setting. Furthermore, by this standard and the

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87 Madelyn Hsiao-Rei Hicks et al., “The Weapons That Kill Civilians—Deaths of Children and Non-Combatants in
88 Ibid.
89 Ibid.
90 Ibid.
indiscriminate nature of UAV missile attacks, the Predator cannot be judged more effective in avoiding civilian casualties. Ultimately, only manned MOUT can properly discern between enemy and civilian activity on the ground to such an extent that insurgents can be apprehended or killed and unnecessary loss of civilian life can be avoided. Given this superiority in avoiding civilian casualties as well as a greater capacity to accomplish clear and hold objectives in an urban setting, manpower clearly is a superior method in military operations on urban terrain.

**Conclusion**

In the final analysis, it appears as though there is no decisively superior method, be it manned or unmanned, in these three fields, rendering the original claim invalid. Based on the findings above, unmanned technology is superior only in the field of Intelligence, Surveillance, and Reconnaissance (ISR). This was due to the unparalleled ability to view the entire battlefield given by UAVs such as the XM156 Class I and the Shadow, which could not possibly be matched by manned reconnaissance. In the fields of Explosive Ordnance Disposal (EOD) and Military Operations on Urban Terrain (MOUT), manpower can be considered superior, but only marginally. In both cases, an advantage for unmanned technology was offset by a weakness elsewhere, and vice-versa. To state that, in these two cases, manpower is superior should not be taken to mean that the technology presented here is unworthy of military use or is wasteful. To the contrary, much of this technology is highly useful and has the ability to promote counterinsurgency operations and save lives. The advantage, however, was a marginal edge for manpower with EOD and MOUT because it can accomplish much of what the technology in these two fields also does.

There are certainly numerous unexplored or underexplored variables that could have lead to a change in these findings. Cost is certainly an aspect of both the manpower and weapons
procurement processes that is not taken lightly. One system may be slightly less effective than another, but it may very well be worth producing for use in counterinsurgency in Iraq because it does not cost as much money. This is a very simple consideration that was not treated here.

Additionally, the political ramifications of military campaigns were not explicitly dealt with in this analysis. Counterinsurgency methods are used as an aid to political progress in a state, as was the case in Iraq where the military campaigns of the Surge were meant to ultimately bring about security to give politicians space to compromise in the Iraqi Parliament. Force alone, however, will not bring about reconciliation in the Iraqi government; ultimately, it will take political will and hard compromises to stabilize the Iraqi state. The political situation is even more pertinent in the sense that excessive force on the part of the American counterinsurgency could anger Iraqi civilians and cause them to join the insurgency. It is for this reason that the Army’s field manual on counterinsurgency places such a great emphasis on sparing the lives of civilians. The appearance that the US military does not have any concern for the lives of Iraqi civilians can only lead to greater insurgent activity. Eventually, the American military and political establishment will need to determine what combination of manpower and unmanned use of force will be acceptable to the Iraqi people to deter insurgent recruitment. If it does not, then recruitment to insurgent and militia movements in Iraq will likely continue and a swift solution to both Iraq’s security and political problems will be little more than a distant thought.

Perhaps most important, though not examined here, is domestic support for the American mission in Iraq. It is possible that greater manpower could have been used if military and political leaders had gauged there to be appropriate political capital and support to allow for that. Public support for the war progressively evaporated, however, and it is unlikely that any resurgence in manpower will occur, especially with the American commitment to withdraw from
Iraq by the end of 2011. In the final analysis, though manpower may be more useful and more
effective in some cases than unmanned technology, domestic support is always necessary to
commit overwhelming numbers of ground troops. As described in the Joint Services guide to
MOUT, offensive operations similar to those that occur in Iraq require large numbers of soldiers,
many of whom may die, and a large time commitment. If domestic support is not present for a
long and potentially bloody battle, then there is no real advantage for manpower. Essentially, a
potential weapon has no effect when it cannot be used.

The debate between manpower and unmanned technology will undoubtedly continue, as
it certainly should. Based on this analysis, both appear to have great value in counterinsurgency
operations and, in general, unconventional wars. The probability of state-to-state conventional
war is limited for the United States. The future of American warfare is unconventional war with
non-state actors, if the present situations in Iraq and Afghanistan are any indicator. For this
purpose, the United States must maintain effective tactics to fight these wars. Part of this will be
to decide whether unmanned technology or manpower is the best investment for a potential war.
Only time will tell what these wars will tell policy makers about manned and unmanned methods
and which will be more effective and more worthy of American investment should the future
need arise.
Bibliography


Federation of American Scientists, “AGM-114 Hellfire,” FAS.org [home page on-line]; available

Fort Drum Blizzard Online, “New Task Force Scout Platoon in Iraq Exemplifies Army’s Motto,”
Drum.army.mil [home page on-line]; available from
uedate=5-13-2004; Internet; accessed 22 October 2009.

on-line]; available from http://www.globalsecurity.org/military/intro/ied-iraq.htm;
Internet; accessed 20 October 2009.

on-line]; available from http://www.globalsecurity.org/military/ops/mout.htm; Internet;
accessed 23 October 2009.

page on-line]; available from http://www.globalsecurity.org/military/ops/oif-phantom-
fury-fallujah.htm; Internet; accessed 24 October 2009.

Global Security, “Platoon,” GlobalSecurity.org [home page on-line]; available from
http://www.globalsecurity.org/military/agency/army/platoon.htm; Internet; accessed 22
October 2009.

available from http://www.globalsecurity.org/intell/systems/shadow.htm; Internet;
accessed 20 October 2009.


Internet; accessed 20 October 2009.


