STRATEGY FOR THE LONG HAUL

CSBA

US Combat Training, Operational Art, and Strategic Competence

Problems and Opportunities

BY BARRY D. WATTS

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2008

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A REPORT
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EXECUTIVE SUMMARY

US COMBAT TRAINING, OPERATIONAL ART, AND STRATEGIC COMPETENCE

Starting with the establishment of the US Navy's Fighter Weapons School (Topgun) in late 1968, the American military Services began committing themselves to long-term, sustained investments in realistic combat training despite the considerable costs and risks. The idea was to train fighter crews and, later, members of armored or mechanized units and other combatants in environments that closely replicated the challenges and stresses of actual combat. The insight behind this American "revolution in training affairs" was that, in the past, most individual losses had occurred during early missions or engagements when combatants were inexperienced novices prone to costly mistakes. The hope was that realistic training could enable most individuals to acquire the proficiency that only the survivors of early combat encounters had previously gained, whether by luck or innate talent. The US Air Force's Red Flag exercises, the US Army's National Training Center, and the US Marine Corps Air Ground Combat Center are concrete manifestations of this commitment to tactical proficiency.

Free-play tactical training in which large numbers of opposing combat aircraft or armored fighting vehicles maneuver against one another in mock engagements and battles initially increased the risks of "avoidable" training accidents. At the same time, building and sustaining large, instrumented range complexes in which such training could be conducted, live ordnance expended, and individual performance objectively evaluated was also expensive. Nevertheless, after the Vietnam War the US military Services accepted these risks and infrastructure costs.

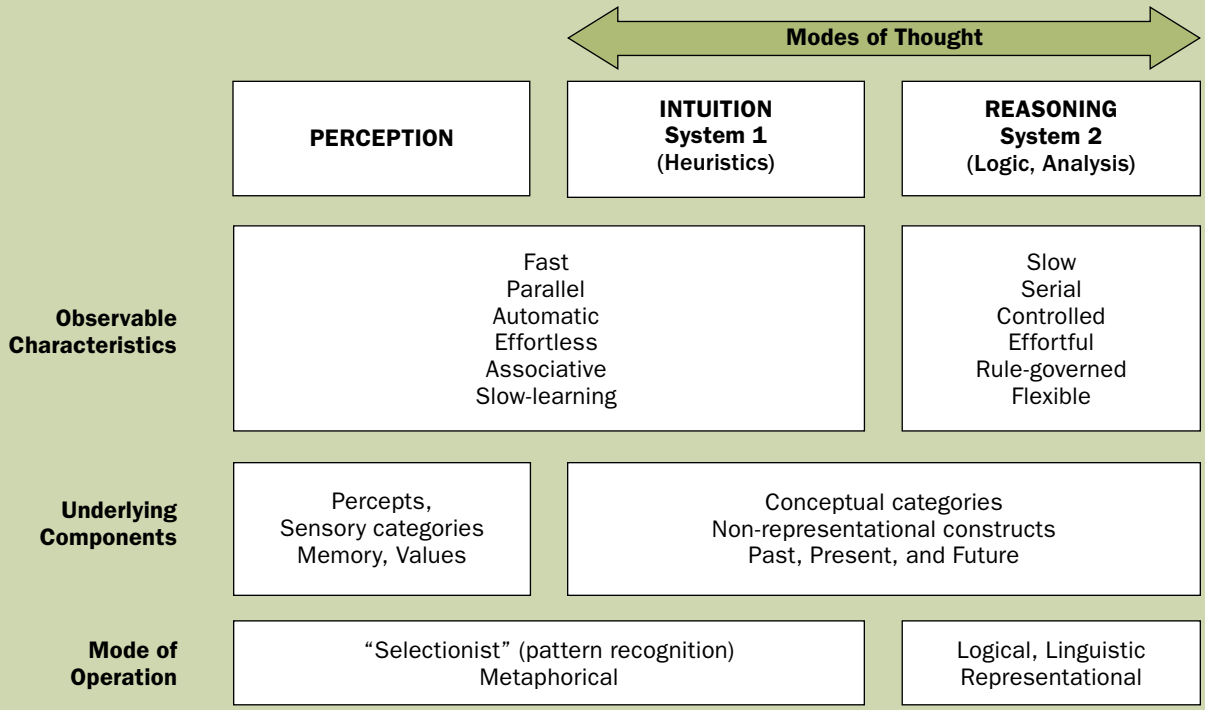
By the mid-1980s, this American renaissance in tactical training had largely reversed the longstanding tendency of the American military, going back as far as 1776, to send its soldiers, sailors, marines, and airmen into first battles relatively untrained. Starting with Operation Desert Storm in 1991, US combat experience has consistently confirmed that the Services' sustained commitment to realistic tactical training paid off in largely unprecedented levels of first-battle competence. In fact, the US revolution in training affairs may well have been one of the most

The US revolution in training affairs may well have been one of the most consequential improvements in the fighting power of American military forces during the final decades of the 20th century.

consequential improvements in the fighting power of American military forces during the final decades of the 20th century.

Since the 1970s, our understanding of the cognitive processes underlying skilled performance in a wide variety of domains involving intense time pressures and the stresses of making "do-or-die" decisions has grown considerably. Besides tactical combat interactions, these domains include fire fighting, nursing, emergency medical response teams, sports, and chess. Decisions about what to do next in these sorts of critical situations are largely the result of intuition rather than deliberate reasoning or analysis (see Figure 1). What realistic combat training provides to individuals is the experience to recognize the similarity of the current problem with a past one, and choose the first option likely to work without much, if any, deliberation or reasoning. However, this sort of fast decision-making based on pattern recognition is by no means infallible. Indeed, there is extensive empirical research showing that it is subject to persistent biases and errors. Nonetheless, intuitive responses have a firm basis in evolutionary biology even though the oversight of intuition by deliberate reasoning tends to be lax. The evidence is compelling, though, that tactical outcomes are driven by situation awareness, that superior situation awareness has been central to the first-battle competence of US forces in recent conflicts, and that realistic combat training enhances situation awareness.

FIGURE 1. **A MAP OF HUMAN COGNITION**



Adapted from Daniel Kahneman, Maps of Bounded Rationality," in Tore Frängsmyr (ed.), The Nobel Prizes 2002 (Stockholm: 2003).

Unfortunately, a number of trends argue that realistic tactical training is unlikely to provide American military forces with as much margin of advantage in the future as it has in the past. The technological trends underlying this judgment include: the increasing automation of combat tasks that previously demanded highly skilled human operators to be performed competently under combat conditions; the ongoing proliferation of relatively inexpensive guided munitions able to home on targets or aim points without further human assistance once fired or launched; and, looking further ahead, the prospect of fielding lethal, battlefield robots able to locate, identify, and attack targets on their own. In addition, adversaries need not make the same choices the US military has made in selecting weaponry, designing forces, and developing employment doctrines. Guided missiles, both ballistic and cruise, require far less operator skill to employ effectively against targets in defended airspace than sending in a composite strike package of attack aircraft supported by air superiority fighters, defense suppression assets, and air refueling tankers. Indeed, the very same technological trends likely to erode the tactical efficacy of highly trained combatants make the choice of alternative ways of operating all the more attractive for potential military adversaries to adopt.

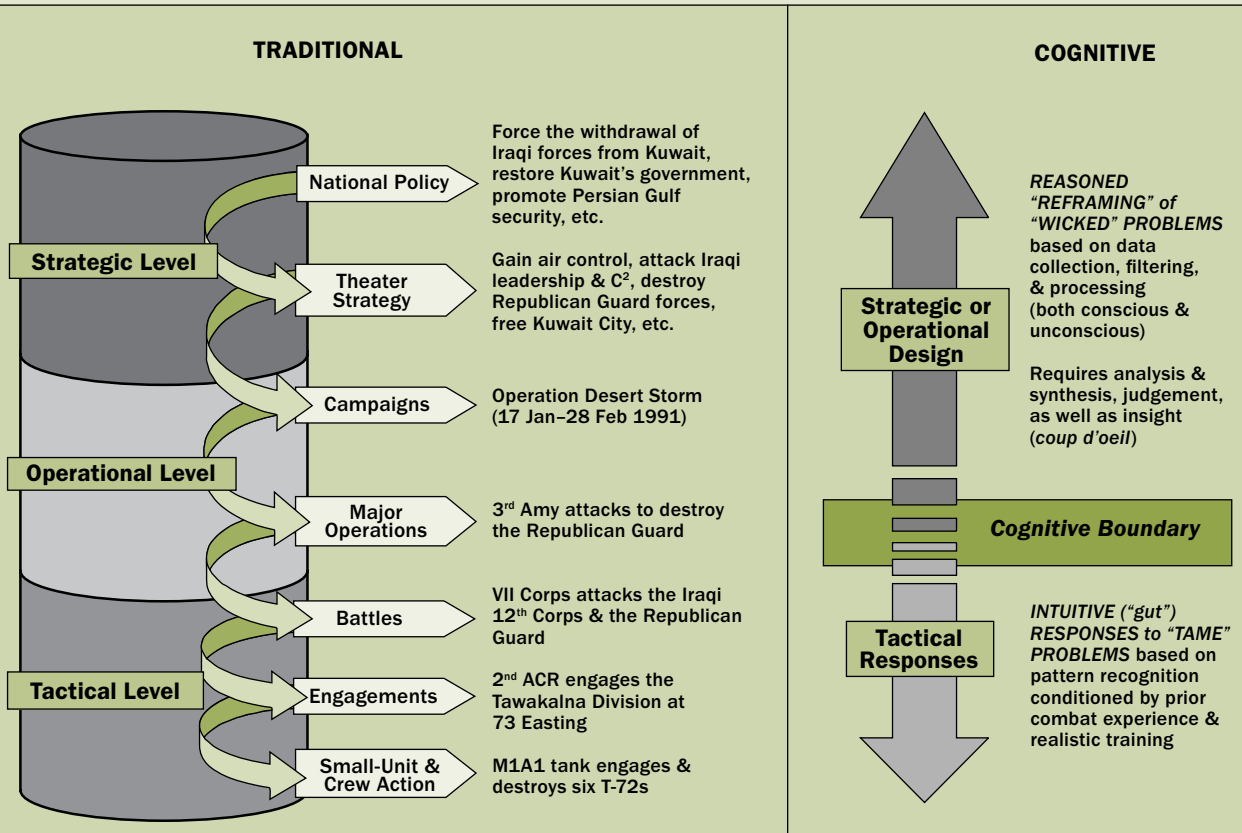
Operational and strategic problems appear to lie within the realm of wicked or messy problems.

How might the US military offset the foreseeable decline in the margins of tactical advantage derived from the post-1968 revolution in training affairs? One possibility lies in noticing the differences in the cognitive skills demanded of tactical decision makers from those required of more senior officers tasked with designing effective operations or military strategies. Tactical problems are "tame" in that they generally have definite solutions in an engineering sense. So-called "wicked" problems are fundamentally social ones. They are ill-structured, open-ended, and not amenable to closed, engineering solutions. Operational and strategic problems appear to lie within the realm of wicked or messy problems. Such problems give every indication of requiring hard thinking and careful analysis rather than quick, intuitive responses. Because human brains exhibit only two fundamental cognitive modes—intuition based on pattern recognition, and the deliberate reasoning associated mostly closely with the cerebral cortex—the logical place to locate a cognitive boundary between the intuitive and reasoned responses in terms of the traditional levels of war—tactics, operational art, strategy—is between tactics and operational art (see Figure 2). On this view, the cognitive skills underlying tactical expertise differ fundamentally from those demanded of operational artists and competent strategists. This conclusion is reinforced by US Joint Forces Command's assessment that, during the major-operations phase of Operation Iraqi Freedom in March–April 2003, realistic training had provided American forces with an insurmountable warfighting edge whereas critical operational capabilities had been essentially untrained.

The prospect that tactical expertise may not provide American forces with as much advantage in the future as it has in the past is not, of course, an argument for neglecting realistic combat training. To do so would be irresponsible, if not criminally negligent. It does suggest, though, that developing genuine competence at the "essentially

untrained" level of operational art may be able to compensate for diminishing leverage from tactical expertise, or even give the US military access to an area of relatively enduring advantage that does not seem to have been a major source of US advantage for some time. Here it is relevant to note that, as American capabilities for precision attack have expanded, there has been a tendency to reduce operational art (or even military strategy) to target serving. Key to overcoming this sort of "tacticization" will be finding ways to identify officers with the distinct cognitive skills demanded of operational artists, properly nurture these individuals, and ensure their selection to senior command positions. Institutionalizing operational art in this sense would undoubtedly face much bureaucratic resistance from the military Services, and would not be an easy thing to accomplish. A plausible first step, however, might be to create an American equivalent to the British military's Higher Command and Staff Course. The British armed forces use this four-month course to determine which officers with the potential for higher rank also have the mindset needed to make the transition from tactics to operational art.

FIGURE 2. **A COGNITIVE VIEW OF THE TRADITIONAL LEVELS OF WAR**



Source: Barry Watts, CSBA.

What about better preparing senior military officers to design military strategy? British experience suggests that the critical transition for serving military officers is from tactics to operational art. In addition, ever since George Washington, American military strategy has been subordinated to and constrained by national strategy, and national strategy is, or should be, set by political authorities starting with the president. For these reasons, it seems best for American professional military education to concentrate on producing competence at the operational level of war and dealing with national security strategy as a separate issue pertaining to elected officials in the executive branch and their political appointees.

As for American strategic competence at the national level, US performance in Iraq provides ample evidence that it has been declining for some time. Indeed, with a few exceptions, it appears that overall US strategic performance has been deteriorating since the late 1960s or early 1970s. Especially at the national level, American strategists have been prone to mistake desirable strategic goals for the concrete strategies necessary to achieve those goals within existing resource and other constraints despite the active, opposing efforts of our adversaries to achieve their own ends. Also, particularly in the case of Iraq since 2003, the costs and difficulties of creating a somewhat democratic, Western-oriented, economically viable nation in the aftermath of regime change have proven far greater than most people imagined. To begin addressing these sorts of long-term problems connecting ends and means, one of the first steps will be to decide where in the government to locate a small group of individuals with the cognitive skills required of competent, national-level strategists. One possibility would create such a group in the Office of Management and Budget (OMB). A second would be to integrate the efforts of the strategy and policy planning organizations that currently exist in the Departments of State and Defense, the National Security Council, the Joint Staff, and the intelligence community by resurrecting something along the lines of the Eisenhower-era Planning Board. In either case, the emphasis should be on institutionalizing strategic competence rather than on bureaucratic process. After all, for either the OMB or "Planning Board" suggestion to be effective in the long term, the new locus for the development of national security policy would need a small number of talented individuals with the right cognitive skills and few, if any, line responsibilities. They would also need to be able to command the attention and direct involvement of the president of the United States.

American strategists have been prone to mistake desirable strategic goals for the concrete strategies necessary to achieve those goals.


A REPORT
TO THE
Vom Kriege.

INTRODUCTION

> Decision makers usually look for the first workable option they can find, not the best solution.... The emphasis is on being poised to act rather than being paralyzed until all the evaluations have been completed.
>
> — Gary Klein, 1998[1]

> ...people are not accustomed to thinking hard, and are often content to trust a plausible judgment that quickly comes to mind.
>
> — Daniel Kahneman, 2002[2]

> The US government has lost the capacity to conduct serious, sustained national strategic planning.... Worse still, to judge by the lack of any real effort in recent years to correct this shortcoming, there appears to be very little concern about what it may mean for the nation's security.
>
> — Aaron Friedberg, 2007[3]

Heretofore, members of the US military Services and the Congress, American defense analysts, foreign policy experts, and others involved in national-security affairs have tended to treat realistic combat training and professional military education (PME) as relatively separate subjects. This report aims to bring combat training and military education together—into the same conversation, so to speak—by exploring the cognitive skills involved in tactical performance as opposed to the design of operations, military strategies, and national security policy.[4] This approach is quite different from

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1 Gary Klein, *Sources of Power: How People Make Decisions* (Cambridge, MA: MIT Press, 1998), p. 30.

2 Daniel Kahneman, "Maps of Bounded Rationality: A Perspective on Intuitive Judgment and Choice," Nobel Prize lecture, December 8, 2002, in Tore Frängsmyr (ed.), *The Nobel Prizes 2002* (Stockholm: Nobel Foundation, 2003), pp. 451–452.

3 Aaron L. Friedberg, "Strengthening U.S. Strategic Planning," *The Washington Quarterly*, winter 2007–2008, p. 47.

4 See the left side of Figure 2 for examples of tactics, operational art, and military strategy as these notions are generally understood today within the US military.

concentrating on organizational "wiring diagrams" and bureaucratic processes. The underlying motivation is the sense that two of the greatest long-term challenges now facing the American national security establishment have to do with competence at designing effective operations and formulating national security strategy. These two problems, however, are not only one and the same from a cognitive perspective. They also represent major opportunities.

In the US Army's case, the post-Vietnam "revolution in training affairs" reversed a record of first-battle incompetence that extends from the Continental Army's defeat at the Battle of Long Island in 1776 to the mauling of the 7th Cavalry in the Ia Drang Valley in 1965.

The story behind these observations starts with combat training. Since the late-1960s, the American military Services have made great progress toward being able to field combat forces during peacetime with high levels of first-battle competence. In the US Army's case, the post-Vietnam "revolution in training affairs" reversed a record of first-battle *in*competence that extends from the Continental Army's defeat at the Battle of Long Island in 1776 to the mauling of the 7th Cavalry in the Ia Drang Valley in 1965. The fruits of this transformation first became evident in the superior tactical performance of the US military during the 1991 Persian Gulf War (Operation Desert Storm). Arguably, the American revolution in training affairs of the 1970s and 1980s produced a greater improvement in the fighting power of American forces than did any other development between the Vietnam War and Operation Desert Storm, including the 1986 Goldwater-Nichols Department of Defense (DoD) Reorganization Act.[5]

Unfortunately, trends suggest that tactical superiority based on realistic combat training is likely to be of declining value relative to prospective adversaries in coming decades. Increasing automation, progress in robotics, and other technological advances promise to reduce the importance of human skills in tactical interactions. Indeed, the very lethality of current US guided munitions and targeting networks supports the judgment that far less skill is required for such tactical tasks as bombing accuracy in high-threat air defense environments than was required before the advent of laser-guided bombs. In addition, prospective adversaries are free to make different force-structure and doctrinal choices than those long preferred by the US military. For these reasons it seems probable that the tactical proficiency of US soldiers, marines, sailors, and airmen may not confer as much advantage in the future as it has in the recent past.

At the same time, there is growing evidence that American competence above the level of tactics has been declining for some time. Here one need look no further than to the "long, hard slog" that the American military has endured in Iraq since Saddam Hussein's regime was overthrown in March–April 2003.[6] First of all, American ground forces appear to have been wholly unprepared for dealing with the

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[5] The aims of Goldwater-Nichols included: strengthening civilian authority in the Defense Department; improving military advice to the President, National Security Council, and the Secretary of Defense; clarifying the responsibilities of unified and specified combatant commands; providing for more efficient use of defense resources; and making joint assignments a prerequisite for promotion to general or flag officer rank (Public Law 99-433, October 1, 1986).

[6] Donald Rumsfeld, "Global War on Terrorism," memorandum to General Dick Myers, Paul Wolfowitz, General Pete Pace, and Doug Feith, October 16, 2003.

civil unrest, looting, insurgency, and sectarian violence that emerged in Iraq in the aftermath of regime change. Second, until General David H. Petraeus assumed command of the Multi-National Force-Iraq in February 2007, the US Army's approach emphasized finding and killing terrorists and insurgents rather than providing security for the Iraqi population. Third, the mounting costs in blood and treasure of the ongoing US involvement in Iraq, together with the difficulties of creating a stable, economically viable, Western-oriented, somewhat democratic regime in Iraq, argue that America's strategic ambitions have far exceeded the country's strategic reach since the terrorist attacks of September 11, 2001 (9/11). Granted, it would be premature to judge American policy and strategy in Iraq to have failed. We do not yet know the ultimate outcome of Operation Iraqi Freedom. Nevertheless, the costs in blood and treasure to date have proven vastly greater than anticipated when the decision to use military force to bring about regime change was made. Thus, there are grounds for questioning not only the recent effectiveness of the American military at the operational and strategic levels of warfare, but also the performance of American political leaders responsible for the country's national security policy.

The foremost challenge is to find ways to help promising officers make the difficult transition from tactical expertise to operational expertise.

Regarding the uniformed military, the view advanced in this report is that the foremost challenge is to find ways to help promising officers make the difficult transition from tactical expertise to operational expertise. This view is based on the insight that the cognitive skills for the design of effective operations are fundamentally the same as those for the design of effective strategies. Moreover, institutionalizing operational competence within the American military in the sense of identifying and nurturing officers who can make this transition also offers the most plausible route toward offsetting the foreseeable loss of advantage stemming from the declining efficacy of tactical proficiency. The immediate problem, of course, is that the US military's existing PME schools and colleges currently lack any institutional apparatus for identifying, educating, and utilizing officers with the intellectual skills to excel at operational art, much less at military strategy.

Presumably progress towards institutionalizing operational competence would, in the long run, benefit American competence at military strategy as well. Here, however, real progress may not be possible without improved performance at the level of national security strategy. Ever since General George Washington chose to accede to civilian control of the Continental Army, the design of US military operations and, especially, military strategies have been constrained by the national security strategy of the country's political leaders and their appointees.[7] Consequently, the problem of improving the performance of civilian political leaders in designing effective national security strategies appears to be a separate one from that of improving the operational and strategic performance of uniformed military officers. One reason is that two distinct groups of people are involved—politicians and military

[7] Joseph J. Ellis, *American Creation: Triumphs and Tragedies at the Founding of the Republic* (New York: Alfred A. Knopf, 2007), pp. 36–37.

officers. The other reason is the intimate, critical dependence of military strategy in particular on the policy and strategic choices of America's political leaders and their appointed advisors.

As with the American military's PME structures, however, the executive branch of the US government—including the National Security Council (NSC), the Department of State, and the DoD—currently lacks the organizations or structures for generating a national security strategy capable of achieving some balance between ends and means while taking into account possible unintended consequences. Today, there is no home anywhere in the federal government for the formulation of national-level, long-term strategies or their effective pursuit from one administration to the next. Finding ways to institutionalize operational competence within the US military is important. Doing something about poor performance at the level of national security strategy appears to be even more urgent.

The fundamental questions this report will explore are, therefore, two. (1) How can strategic competence be institutionalized at the highest levels of the US government? (2) How can competence at the operational level of 21st century warfare be institutionalized within the US military? To answer these overarching questions, seven subordinate ones will be explored:

- How important to US first-battle competence was the revolution in training affairs in which the US Navy's aviation community took the lead midway through the Vietnam War?
- What cognitive processes underlie tactical virtuosity and how do they relate to situation awareness?
- What trends or other developments may diminish the leverage US forces will be able derive from tactical proficiency in the future?
- Are the cognitive skills underlying tactical proficiency different from those demanded of operational artists or competent strategists?
- How might competence at the operational level of war be institutionalized in the Department of Defense?
- What is strategy and why has American strategic competence declined since the early 1960s?
- Where might strategic competence be institutionalized at the top of the US government's executive branch?

These subordinate questions provide the structure of this report as well as the basis for answering the two primary questions about institutionalizing strategic competence in the executive branch and operational competence within the military.

Much has been said and written over the years about the US military's PME institutions. Among others, Congressman Ike Skelton (Dem., MO), who currently chairs the House Armed Services Committee, has long been a leading voice for improvements in the curricula and course content of the Services' intermediate and senior-level PME schools and colleges. In the late 1980s, Skelton chaired a House panel on military education that stressed the need to introduce a more joint perspective and the serious study of military history into the education of the nation's military officers. More recently, he has stressed the importance of cross-cultural understanding, language skills, and a deeper appreciation of operational art.[8] Insofar as this report touches on traditional military education, it concentrates on improving operational and strategic performance rather than on such well-studied topics as the curricula, course content, or "jointness" of the Services' intermediate and senior-level PME institutions. These are all legitimate concerns about professional education within the US military Services. Nevertheless, it is not at all evident that revising course contents and curricula, or pushing jointness, can do much to solve the more pressing problems of operational and strategic competence.[9] Improved PME will do little to educate America's political leaders, and there are good reasons for suspecting that only a minority of serving military officers will retain the mental agility to make the transition to operational art by the time they are eligible for flag rank.

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[8] Colonel Randy Pullen, "Congressman Skelton Calls for Improved Professional Military Education," September 30, 2005, Army News Service, available at http://www.globalsecurity.org/military/library/news/2005/09/mil-050930-arnews01.htm.

[9] For a recent assessment of PME at the US war colleges, see Dr. Jeffrey D. McCausland, *Educating Leaders in an Age of Uncertainty: The Future of Military War Colleges*, (2004–2005 Report to the Smith-Richardson Foundation).


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CHAPTER 1 > **THE POST-1968 AMERICAN "REVOLUTION IN TRAINING AFFAIRS"**

Before turning to the proximate causes of the "revolution in training affairs" that began transforming the tactical proficiency of the US military in the 1970s, mention should be made of the preceding pattern of American first-battle *in*competence. The experience of the US Army in first battles prior to Operation Desert Storm in 1991 offers a series of case studies than spans nearly two centuries. The question of how the American army fared in opening battles during these years constituted the focus of Charles Heller and William Stofft's *America's First Battles 1776–1965*. The research in this volume explored US performance in ten first battles (Table 1) that, in Heller

TABLE 1. **SHY'S ASSESSMENT OF ARMY PERFORMANCE IN TEN FIRST BATTLES**

Battle	Win	Pyrrhic Victory	Loss
Long Island, New York, August 27, 1776			◇
Queenston Heights, Canada, October 13, 1812			◇
Palo Alto and Resaca de la Palma, May 8–9, 1846	◆		
First Battle of Bull Run, Manassas, VA, July 19, 1861			◇
Battles of San Juan Hill and El Caney, Cuba, July 1–2, 1898		◆	
Cantigny, France, May 28–31, 1918		◆	
Buna, New Guinea, November 19, 1942 to January 2, 1943		◆	
Kasserine Pass, January 30, 1943 to February 22, 1943			◇
Osan to the Naktong River, South Korea, July 5–19, 1950			◇
La Drang Valley, South Vietnam, Oct. 18 to Nov. 24, 1965		◆	

Source: Barry Watts, CSBA.

and Stofft's judgment, best matched the US Army's doctrinal concerns in the early 1980s "without sacrificing the first-battle concept" underlying their project.[10]

John Shy wrote the final chapter that assessed how the US Army had performed in these ten battles. His conclusions were, to say the least, sobering:

> Of the ten first battles, the U.S. Army suffered five defeats (Long Island, Queenston, Bull Run, Kasserine, and Osan/Naktong) and won five victories. Four of those victories were very costly (San Juan, Cantigny, Buna, Ia Drang)—some might say too costly for the gains achieved. Only the two-day battle of the Rio Grande in 1846 was relatively cheap, although even there losses approached 10 percent of the force engaged.... How far... [the] costly inexperience [evident in most of these battles] would have been remediable by more and better training is an important and difficult question... But here it can be said with some confidence that in only a few instances did inadequately prepared troops seem to fall apart *before* undergoing severe combat stress; most troops at Queenston in 1812 (certainly), some units at Kasserine in 1943 and from Osan to the Naktong in 1950 (probably), simply could not or would not fight effectively. But a closer look at Long Island in 1776, Bull Run in 1861, Volunteer units in Cuba in 1898, National Guardsmen at Buna in 1942 and at Kasserine in 1943, and most occupation troops rushed to Korea in 1950 shows soldiers fighting perhaps better than might be expected, giving way only under heavy enemy pressure, and learning quickly under fire what they had not been taught before the first battle.[11]

Shy's tally, then, is one clear victory, four costly Pyrrhic victories in which American losses were excessive, and five outright defeats. Moreover, at least one historian has argued that the fighting at Landing Zone Albany in the Ia Drang Valley in 1965 was "nothing other than a defeat that came close to being the twentieth century's Battle of the Little Big Horn."[12] So a case could be made that Shy's assessment was, if anything, generous.

The point, of course, is not to pick on the US Army's historical pattern of failing, far more often than not, to provide its soldiers with the realistic training needed to go into first battles with high levels of tactical proficiency. At various times all of America's military Services have been guilty of this failing—particularly if judged by contemporary American standards for tactical training. The Army's performance from 1776 to 1965 is merely the best-documented set of cases as well as the one that exhibits a consistent pattern over the longest period of time.

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[10] Charles E. Heller and William A. Stofft (eds.), *America's First Battles 1776–1965* (Lawrence, KS: University Press of Kansas, 1986), p. x. There was debate among the historians involved in this project over which first battles to choose. In the case of the American revolutionary war, for example, the Battle of Long Island was chosen over Concord-Lexington and Bunker Hill because it was "the first general engagement involving an army of the United States" commanded by George Washington (Ira D. Gruber, "America's First Battle: Long Island, 27 August 1776," *America's First Battles 1776–1965*, pp. 1, 2).

[11] John Shy, "First Battles in Retrospect," in *America's First Battles 1776–1965*, p. 329.

[12] Williamson Murray, *Military History: A Selected Bibliography* (Alexandria, VA: Institute for Defense Analyses, March 2003), D-2877, p. 8.

The experience that began the American revolution in training affairs occurred in the skies over Southeast Asia during US air operations against North Vietnam, and it was the US Navy's fighter community that led the way. By late 1967 Navy fighter crews found themselves having less and less success in air-to-air combat against North Vietnamese "MiGs" (Mikoyan-Gurevich-17s, MiG-19s, and MiG-21s). The Navy's two principal fighters during this period were the aging F-8 Crusader and the new, more advanced F-4 Phantom II, with its powerful Westinghouse radar. For air-to-air combat, the F-8 was armed with four 20-mm cannons and short-range, heat-seeking Sidewinder Air Intercept Missiles (designated the AIM-9), while the F-4s carried Sidewinders and the longer-range, radar-guided AIM-7 Sparrow III missiles. Because the F-4 was then the Navy's premier fighter, its lack of an internal gun underscored a decision to rely exclusively on air-intercept missiles (AIMs) for aerial combat.

It was the US Navy's fighter community that led the way.

During the final 13 months of Operation Rolling Thunder (October 1967–October 1968), Navy F-8s and F-4s managed to shoot down only nine MiGs against six losses.[13] Even more distressing to the Navy's senior leaders was the fact that its frontline fighter (VF) units flying the F-4, which had a two-man crew and cost four times as much as a MiG-21, scored only three kills while sustaining all six of the losses.[14] By the spring of 1968, the declining success of Navy fighters against the North Vietnamese MiGs prompted senior Navy leaders to initiate a comprehensive investigation of the reasons behind this poor and deteriorating performance. Captain Frank Ault was given *carte blanche* to investigate every aspect of the situation, from the manufacturing of F-4s, their radars, and their armament to the pre-engagement preparation of Navy fighter crews operating in the Gulf of Tonkin. Not only was he tasked to find out why Navy fighters had not been downing more MiGs with Sidewinder and Sparrow missiles, but he was told to come up with fixes that would produce at least three times better air-to-air performance than the Navy had achieved in Southeast Asia to date.[15]

Ault published his findings in early 1969. His 480-page report, *Air-to-Air Missile System Capability Review*, contained 242 recommendations for changes and improvements whose implementation was estimated to require about one-half billion dollars (between $2.5 and $3 billion in today's dollars).[16] Ault and his team concluded that there had been no single reason for the sub-par performance of Navy fighters and

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[13] R. Frank Futrell, et al., *Aces and Aerial Victories: The United States Air Force in Southeast Asia 1965–1973* (Washington, DC: Albert F. Simpson Historical Research Center and the Office of Air Force History, 1976), pp. 118–122; Robert L. Young, "USAF/USN Air-to-Air Loss Chronology: Southeast Asia (1965–1972)," undated, US Air Force History Office; Roy A. Grossnick, et al, *United States Naval Aviation, 1910–1995* (Washington, DC: U.S. Government Printing Office, 1997), pp. 769–770; and Michael M. McCrea, *US Navy, Marine Corps, and Air Force Fixed-Wing Aircraft Losses and Damage in Southeast Asia (1962–1973) (U)* (Arlington, VA: Center for Naval Analyses, August 1976), including microfiche. The box score of nine MiGs downed against six Navy losses omits one A-1H from VA-25 lost to a Chinese J-6 (a copy of the MiG-19) in February 1968.

[14] "V" denotes fixed-wing and "F" fighter in the US Navy's squadron designation system.

[15] Frank W. Ault, "The Ault Report Revisited," *The Hook,* Spring 1989, p. 36.

[16] Ibid., pp. 37–38.

AIMs in 1968; instead the poor showing was the result of series of small items that, in conjunction with the others, seriously undermined overall combat performance. Among other things, quality control at the production facilities of the principal defense firms needed improvement, as did the handling of equipment enroute to the fleet by the Navy's shore establishment; once the AIM-9s and AIM-7s reached the fleet, they were being handled like bombs rather than the complex, smart munitions that they were; engagement opportunities with North Vietnamese MIGs were few and far between, which meant that the missiles were being subjected to repeated carrier launches and arrested recoveries prior to being fired, a situation that was especially hard on the AIM-7; the missiles themselves were unsuited to high-G, turning dogfights against adversaries as nimble as the MiG-17; and the F-4 crews in particular frequently lacked both the training and tactics to cope with the smaller, more agile North Vietnamese MiGs.

Of the many recommendations produced by Ault's team, the two most consequential for subsequent changes in American tactical training practices were those that led to the founding of the Navy's "Topgun" Fighter Weapons School and the development of instrumentation for air-to-air training (Air Combat Maneuvering Range or ACMR).[17] Because the Navy did not receive the first ACMR until the fall of 1972—too late to influence air-to-air performance over North Vietnam during the spring and summer of that year—only Topgun training can be plausibly put forward as a major cause of the improvement that occurred. The Navy stood up Topgun at Miramar Naval Air Station outside San Diego, California, in late 1968. The first class graduated in April 1969. By mid-1972, more than 200 naval aviators had been through Topgun's intense course in air-to-air combat and returned to their fleet squadrons, where they set about passing on what they had learned and establishing more realistic training practices.[18] During this period Topgun's syllabus consisted of 75 hours in the classroom and 45 hours in the air with emphasis on training against dissimilar aircraft whose size and performance approximated North Vietnamese MiG-17s and MiG-21s.

When the air war over North Vietnam resumed in response to Hanoi's invasion of South Vietnam on March 30, 1972, the Pacific Fleet VF squadrons—especially those flying missile-only F-4Bs and F-4Js—were ready. How did Navy VF units perform against North Vietnamese MiGs in the aftermath of Topgun's establishment? During the final 13 months of major American combat operations, January 1972–January 1973, Navy VF squadrons flying F-4s downed 24 MiGs against only two losses, for an

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[17] The long-term impact of instrumented training ranges like the ACMR was to make debriefings of what had taken place far more objective, although Topgun instructors began moving in this direction before the first ACMR became available. Instrumented ranges allowed tactical engagements to be replayed on computer screens and provided unassailable ground truth, especially on mistakes.

[18] Lieutenant Joseph H. Weisberger, "MiG Killers All," *Naval Aviation News,* September 1972, p. 15.

exchange rate of 12-to-1 in favor of the Americans.[19] Compared with the unfavorable 1-to-2 exchange rate (three F-4 kills versus six losses to MiGs) that Navy F-4s posted during the final 13 months of Operation Rolling Thunder while expending dozen of missiles, the improvement was a twenty-four-fold increase in effectiveness.

How much of this improvement can be attributed to Topgun's influence on the tactical proficiency of Navy F-4 crews? By and large, the comparison between the last 13 months of Rolling Thunder and January 1972–January 1973 is as close to a controlled experiment as can be found in actual combat experience. During both periods, Navy F-4s were operating against the same North Vietnamese MiGs while conducting strike operations into the same areas of North Vietnam. On the North Vietnamese side, the main difference was that the total MiG force had grown from 150 MiG-17s and MiG-21s to some 265 fighters, including 31 MiG-19s.[20] On the US Navy's side, an improved variant of the Navy's Sidewinder was available in 1972, and Topgun instructors had stressed that the F-4 community should eschew the unreliable AIM-7 in favor the AIM-9D and the new AIM-9G. In the aerial encounters that followed, only one of the 24 VF MiG kills during 1972–1973 was achieved with the Sparrow, and that engagement occurred at night. On the whole, then, it appears that the principal difference between Navy air-to-air performance during the final 13 months of Rolling Thunder and the comparable period in 1972–1973 was Topgun training. As explained in the next section, it dramatically improved the situation awareness of Navy F-4s, and deserves the lion's share of the credit for the 24-fold improvement in exchange ratios and box scores. True, during the fall of 1973 there was some controversy between Air Force and Navy pilots over the fact that the Air Force's kill ratio in the final year of the Vietnam air war had not been as good as the Navy's.[21] Nevertheless, as Marshall Michel observed in 1997, post-Vietnam interviews "with Air Force F-4 crews show that they thought *the first and most important reason for the Navy's higher kill ratio was its aggressive training program (Topgun) initiated in 1968*."[22]

The improvement was a twenty-four-fold increase in effectiveness.

The US Air Force (USAF) did not follow Topgun's lead soon enough to affect its air-to-air performance over North Vietnam. The USAF's first step in this direction took place in October 1972 when the first aggressor squadron was stood up at Nellis Air Force Base (AFB) north of Las Vegas. Initially flying T-38s that were similar in

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[19] Grossnick, *United States Naval Aviation, 1910–1995*, pp. 770–771; Young, "USAF/USN Air-to-Air Loss Chronology." Note that the 24-to-2 box score omits one kill in September 1972 by a Marine F-4 operating from the USS *America*.

[20] Marshall L. Michel, III, *Clashes: Air Combat over North Vietnam 1965–1972* (Annapolis, MD: Naval Institute Press, 1997), p. 188.

[21] For a representative Air Force view, see Captain Donald D. Carson, "Aircraft Kill Ratio," *Aviation Week & Space Technology*, October 29, 1973, p. 70. For a Navy response, see Lieutenant Commander Pete Pettigrew, "Aircraft Kill Ratios," *Aviation Week & Space Technology*, December 3, 1973, p. 62.

[22] Michel, *Clashes*, pp. 277–278 (emphasis in original).

size and performance to the Soviet MiG-21, the idea was to begin providing realistic, dissimilar training to Air Force fighter units.[23]

The next step was the initiation of Red Flag, which did not get underway until November 1975. By that time, the Vietnam veteran Richard "Moody" Suter, with the help of John Vickery, had managed to sell General Robert A. Dixon, then head of the Tactical Air Command (TAC), on the idea of capitalizing on the Aggressors and Nellis' vast range complexes to provide realistic composite force training for TAC's operational units.[24] Suter's insight was that in Southeast Asia and earlier air combat experience as far back as World War I, the majority of aircrew losses had occurred during the first ten missions.[25] The concept behind Red Flag was to provide a training environment that approximated actual combat conditions closely enough to enable aircrews to progress up the steep "learning curve" previously encountered during their first ten missions without the risk of being shot down or killed by early mistakes. Suter's estimate was that an intense, two-week exercise could provide most participants with the experience needed to survive those early missions. In the years since the first Red Flag, the scale and complexity of the tactical training Red Flag exercises have provided has expanded considerably. However, the fundamental objective of replicating the first ten days of major combat operations has persisted down to the present.

The majority of aircrew losses had occurred during the first ten missions.

For a variety of reasons, it took the US Army another six years to follow suit. The Army's National Training Center (NTC) at Fort Irwin, California, did not begin rotating battalion-size units through its two-week program, which included mock battles in an instrumented training environment against a dedicated opposing force (OPFOR), until 1981.[26] The underlying motivation, though, was the same as Red Flag's: to approximate actual ground combat closely enough in a peacetime training environment to provide soldiers and the commanders of tactical units as large as brigades with "a surrogate for combat experience."[27]

The driving personality behind the creation of the NTC was General William DePuy, who became the first commander of the Army's Training and Doctrine Command

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[23] Topgun initially used A-4s as a MiG-17 simulator.

[24] Walter J. Boyne, "Red Flag," *AIR FORCE Magazine,* November 2000, p. 52. This article marked the 25th anniversary of Red Flag.

[25] Ibid., p. 51. For air-to-air data bearing on Suter's insight, see Joe Braddock and Ralph Chatham, *Report of the Defense Science Board Task Force on Training Superiority & Training Surprise* (Washington, DC: Office of the Under Secretary of Defense for Acquisition, Technology & Logistics, January 2001), p. 6.

[26] Colonel Mark P. Hertling and Lieutenant Colonel James Boisselle, "Coming of Age in the Desert: The NTC at 20," *Military Review,* September–October 2001, p. 65. Both authors were assigned to Operations Group at the NTC when this article appeared, Hertling as the Operations Group commander.

[27] HQ, TRADOC, "National Training Centers," May 1977, p. 10. This concept paper was signed out by Major General Paul Gorman on May 23, 1977. Gorman's cover memo stated that the paper represented "the TRADOC positions on the establishment and implementation of three National Training Centers," and it explicitly cited the kind of air-to-air data that had motivated Suter's efforts to establish Red Flag.

(TRADOC) when it was established under Army chief of staff General Creighton Abrams, Jr., in July 1973.[28] DePuy's experience as an infantry officer with the 90th Division in Europe during the Second World War had driven home the high costs of throwing poorly trained, poorly led soldiers into combat, particularly against German soldiers whose fighting skill and cohesion DePuy still respected three decades later.[29] Although the 90th Division had trained two full years in the United States and England prior to landing in Normandy on June 8, 1944, during the unit's first six weeks of combat against the Germans it "lost 100 percent of its strength in infantry soldiers and 150 percent of its infantry officers."[30] Yet, as inadequate as the 90th Division's training had proven, DePuy also noticed that units like the 90th improved over time after they had been blooded by the harsh realities of actual combat. In the hedgerows of Normandy in the summer of 1944, a lieutenant's life expectancy in the 90th Division had been two weeks; five months later, during the Battle of the Bulge, it was 10 weeks.[31] DePuy's view, when he assumed command of TRADOC, was that the price in blood for this fivefold improvement had been too high, and he was "determined to steepen the seasoning curve, preferably without paying in blood."[32] DePuy committed TRADOC to realizing this goal, and his deputy for training, (then) Major General Paul Gorman, was given the task of establishing the NTC, which he did by 1981.

Topgun, Red Flag and the NTC constituted the institutional core of the American training revolution that began in 1968.

Topgun, Red Flag and the NTC constituted the institutional core of the American training revolution that began in 1968. Over time, as this internally driven transformation gained momentum, other institutions and combat training centers emerged. Besides the NTC, the US Army currently operates the Joint Readiness Training Center (JRTC) at Fort Polk, Louisiana. The JRTC was established in 1987 at Fort Chaffe, Arkansas, to provide NTC-like training for the Army's light infantry forces. It moved to Fort Polk in 1992 as a result of Base Realignment and Closure recommendations approved by Congress in 1991. The first training rotation at Fort Polk took place in September 1993. The JTRC, whose original headquarters was at Little Rock AFB in Arkansas, features "heavy integration of Air Force and other military Services, as well as host-nation and civilian personnel."[33] Especially since the rise of the terrorist insurgency in Iraq following the overthrow of Saddam Hussein's regime, the JRTC has

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[28] Robert H. Scales, Jr., *Certain Victory: The US Army in the Gulf War* (Washington, DC: US Army, Office of the Chief of Staff, 1993), p. 10.

[29] DePuy was initially the operations officer of the 1st Battalion, 357th Infantry Regiment, 90th Division. After the drive across France, he became commander of that battalion.

[30] Scales, *Certain Victory*, p. 11. For a good comparison of how the American and German armies prepared soldiers and leaders for the stresses of combat during World War II, see Martin van Creveld's *Fighting Power: German and US Army Performance, 1939–1945*.

[31] Paul F. Gorman, General (US Army retired), *The Secret of Future Victories* (Arlington, VA: Institute for Defense Analyses, February 1992), IDA P-2653, available online at http://www.cgsc.army.mil/carl/resources/csi/gorman/gorman.asp. This report contains a detailed account of DePuy's experiences with the 90th Division during World War II.

[32] Scales, *Certain Victory*, p. 11.

[33] See http://www.jrtc-polk.army.mil/aboutjrtc.htm.

focused increasingly on training US Army brigades preparing for deployments there to cope with such challenges as improvised explosive devices and suicide bombers in urban settings.[34]

In addition to these facilities, the US Marine Corps's main combat training center (CTC) is its Air Ground Combat Center located at Twentynine Palms, California, in the southern Mojave Desert. Twentynine Palms provides realistic training for marine units comparable to the NTC and JRTC. Twentynine Palms has also been the site of experiments such as the 1997 Hunter Warrior Advanced Warfighting Experiment, which explored the viability of small, light, dispersed infantry teams employing advanced command and control to provide the situation awareness and enhanced fires to defeat traditional mechanized and armor forces.[35]

Topgun and the NTC arose from the concerns of senior military leaders in the Navy and Army, respectively, and Red Flag was generated by a couple field-grade officers in the basement of the Pentagon.

In 2004 the US Navy established a Fleet Anti-Submarine Warfare Command headquartered in San Diego to provide realistic training against enemy submarines. The Navy even leased a Swedish *Gotland*-class diesel-electric submarine, complete with its crew, to provide a realistic adversary against which American naval forces with the anti-submarine warfare (ASW) mission could train. The main reason the Navy's ASW community did not establish a dissimilar adversary CTC any earlier was that, until the end of the Cold War, the US attack submarines and ASW aircraft had been able to train against real Soviet submarines. Soldiers, marines, and aviators during and after the Vietnam War did not have this luxury.

The various American CTCs are the concrete manifestations of the post-1968 revolution in training affairs within the US military. It is worth emphasizing that none of these initiatives were imposed from on high by any defense secretary, service secretary, or other DoD civilian political appointees. Instead, Topgun and the NTC arose from the concerns of senior military leaders in the Navy and Army, respectively, and Red Flag was generated by a couple field-grade officers in the basement of the Pentagon assigned to the Air Staff. Further, given the large annual costs of operating CTCs such as the Nellis range complex or the NTC at Fort Irwin, it is fair to say that the military Services have been willing, up to a point, to make the sustained investments over the years necessary to provide their warriors with the realistic combat training to achieve first-battle competence. Granted, given their many other competing priorities, the Services have had more difficulty in recent years finding all the needed funding to maintain and modernize their training ranges. In 2004, for example, the Government Accountability Office (GAO) visited eight active training ranges in the continental United States and concluded that each of them exhibited varying degrees of degradation or lacked necessary upgrades to meet current

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[34] "How To Do Better," *The Economist*, December 17, 2005, pp. 22–24. At the time this article appeared, the JRTC's opposing force was up to about 160 soldiers, augmented during brigade rotations by some 800 role-players.

[35] For an overview of this exploratory experiment, see Andrew May, Christine Grafton, and James Lasswell, "The U.S. Marine Corps and Hunter Warrior: A Case Study in Experimentation," Sciences Applications International Corporation, August 30, 2001.

training needs.[36] Part of the reason for this situation stems, of course, from the competing resource demands of the ongoing conflicts in Iraq and Afghanistan. These conflicts have also given the US military unprecedented levels of recent combat experience, although one could fairly criticize the ground forces of having been slow to adapt to the demands of counterinsurgency warfare, stability operations, and nation-building after 9/11. Nevertheless, in terms of achieving unprecedented levels of first-battle competence, the military Services are on solid ground in viewing the major-operations phases of Operation Desert Storm in 1991, Operation Enduring Freedom (OEF) in 2001, and Operation Iraqi Freedom (OIF) in 2003 as convincing evidence that they were right to invest in realistic combat training after 1968. As US Joint Forces Command's (USJFCOM's) summary of lessons learned from the major-operations phase of OIF concluded in March 2004: "Training provided an insurmountable warfighting edge at the tactical level . . ."[37]

[36] GAO, "Military Training: Better Planning and Funding Priority Needed to Improve Conditions of Military Training Ranges," GAO-05-534, June 2005, p. 3. Based on estimates provided to the National Defense Panel in 1997, setting up an equivalent of the NTC would probably cost $4–5 billion (in current dollars) and require another $1–2 billion a year thereafter to operate.

[37] US Joint Forces Command, *Joint Lessons Learned: Operation Iraqi Freedom: Major Combat Operations* (Norfolk, VA: coordinating draft March 1, 2004), p. 39.


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CHAPTER 2 > INTUITION, DELIBERATE THOUGHT (REASONING), AND SITUATION AWARENESS (SA)

The longstanding efficacy of realistic tactical training in combat performance is, on the evidence, impossible to gainsay. Less clear may be precisely how realistic training produces tactical competence, proficiency, or expertise.[38] What are the cognitive mechanisms or processes that underlie the virtuosity of highly skilled soldiers, marines, aviators, or sailors in tactical engagements? More specifically, how do more skilled combatants select adequate responses in do-or-die, high-stress tactical situations such as soldier-versus-soldier, tank-versus-tank or fighter-versus-fighter contests? In particular, do proficient or expert practitioners in a given mission area go through a conscious, step-by-step analysis aimed at finding the optimum solution, or are their responses more instinctive, more a matter of selecting a "good-enough" response based on past experience, education, and training?

Over the last several decades, advances in neurobiology and related sciences have revealed that the underlying cognitive processes involve the selection of a response pattern that worked in the past and appears likely to be good enough to deal with the current situation. At the heart of such intuitive responses is pattern recognition, and

[38] The progression from novice to expert below is derived from the five stages of skill acquisition in Hubert L. Dreyfus and Stuart E. Dreyfus, *Mind over Machine: The Power of Human Intuition and Expertise in the Era of the Computer* (New York: The Free Press, 1986), p. 50.

Skill Level	Components	Perspective	Decision	Emotional Commitment
Novice	Context-free	None	Analytical (rule-based)	Detached
Advanced Beginner	Mostly context-free	None	Analytical (rule-based)	Detached
Competent	Some situation awareness (SA)	Chosen	Analytical & Intuitive	Detached understanding & deciding; involved in outcome
Proficient	Substantial SA	Experienced	Intuitive & Analytical	Involved understanding; detached deciding
Expert	Expert SA	Experienced	Mostly intuitive	Involved

the aim of realistic combat training is to give combatants a repertoire of accessible response patterns sufficiently comprehensive and "battle tested" by prior experience to cover the majority of tactical situations they are likely to encounter in the future. Gary Klein's research into how skilled firemen, medical-response teams, tank platoon leaders, commanders of Aegis cruisers, intensive-care nurses, chess players, software programmers, and other skilled practitioners make good decisions in time-critical situations "without having to perform deliberate analyses" provides extensive empirical support for this understanding of how realistic training can produce competent performance.[39] His research into how people make decisions under time pressure began in the mid-1980s with firefighters. It led to a recognition-primed decision model that is the antithesis of the rational-choice models taught in business schools and most courses on cognitive development.[40]

Decisions about what to do next to stay alive in combat situations are not made in circumstances conducive to the careful analysis of a wide range of possible courses of action.

An essential point to be made about this view is that decisions about what to do next to stay alive in combat situations are not made in circumstances conducive to the careful analysis of a wide range of possible courses of action — and for good reason. As Christof Koch has written, the "organism that takes its time to figure out the optimal solution may be eaten by a faster competitor working with a so-so result."[41] Gerald Edelman, who has been developing a selectionist theory of how brains develop and work since the late 1970s, has made the same point:

> An animal that is hungry or being threatened has to select an object or action from many possible ones. It is obvious that the ability to choose quickly one action pattern to be carried out to the exclusion of others confers considerable selective advantage.[42]

In short, there is every reason to think that biological evolution has favored breeding populations of individuals capable of quick, intuitive, "good enough" responses—especially in life-or-death situations. Edleman and Giulio Tononi have also noted that the progression from novice to expert correlates with a decrease in the intensity and dispersion of activity across the cortex of the human brain, further reinforcing the view that the seemingly effortless responses of skilled practitioners, whether playing the piano or outmaneuvering an opposing fighter, are automatic and intuitive rather

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[39] Gary Klein, *The Power of Intuition: How to Use Your Gut Feelings to Make Better Decisions at Work* (NY: Random House, 2004), pp. v–vi, 4.

[40] Klein, *Sources of Power*, pp. 23–29, 99–102. Klein's research confirms that the recognition-primed decision model is what people use most of the time, even when they are not under time pressure and could employ a rational-choice strategy. It relies on intuition understood as "*the use of experience to recognize key patterns that indicate the dynamics of a situation*" (ibid., p. 31, *italics* in original).

[41] Christof Koch, *The Quest for Consciousness: A Neurobiological Approach* (Englewood, CO: Roberts and Company, 2004), p. 22.

[42] Gerald M. Edelman, *Bright Air, Brilliant Fire: On the Matter of Mind* (New York: Basic Books, 1992), pp. 141–142.

than the products of careful reasoning or analysis.[43] A related observation — one that harks back to Herbert Simon's work on bounded rationality in the 1950s — is that even in situations that permit careful analysis, there are always limits on the capacity of decision-makers to gather and analyze information.[44] Furthermore, in do-or-die tactical situations, the set of viable responses tends to be sharply constrained by the laws of physics, spatial and temporal relationships, platform and weapon characteristics, and similar factors. In the case of air-to-air combat few, if any, new basic fighter maneuvers have been added to the repertoire since 1964, when the USAF Fighter Weapons School published the revised version of John R. Boyd's *Aerial Attack Study*.

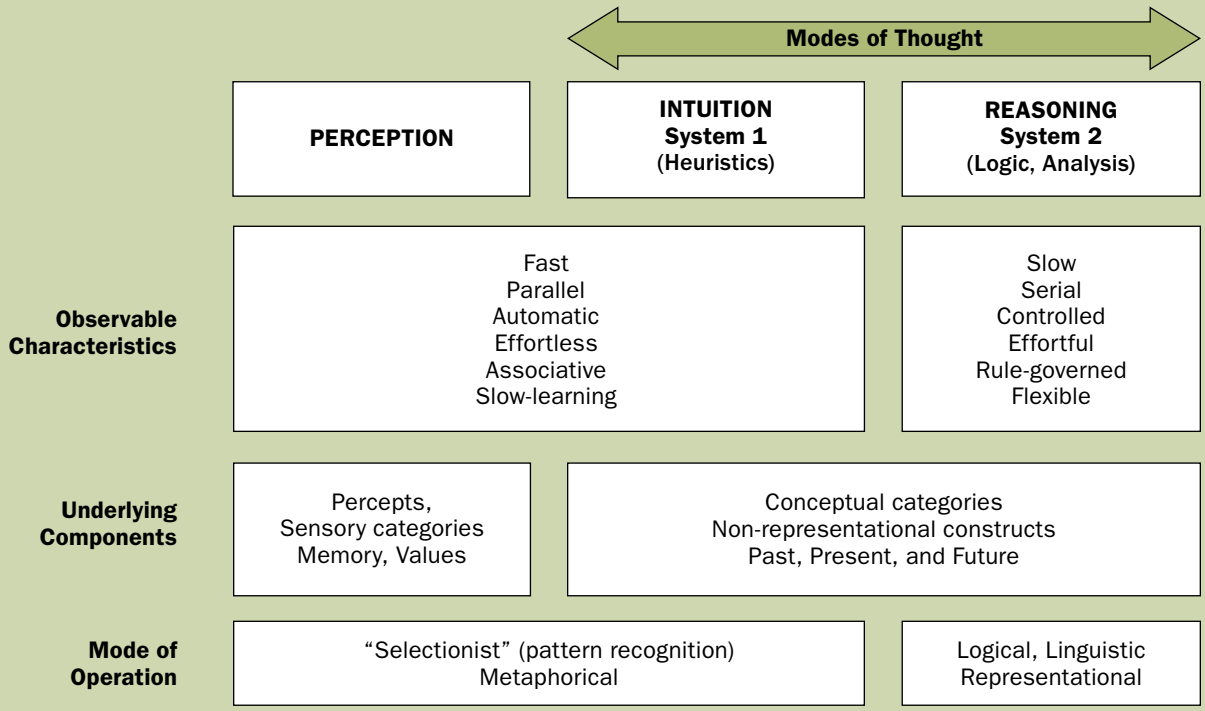
There are always limits on the capacity of decision-makers to gather and analyze information.

Underlying the preceding comments are some basic distinctions between human perception, intuition, and reason. Figure 1 depicts these three cognitive functions, including their observable characteristics, drawn from the research of the psychologist

[43] Gerald M. Edelman and Giulio Tononi, *A Universe of Consciousness: How Matter Becomes Imagination* (New York: Basic Books, 2000), pp. 60–61. For a recent but accessible summary of Edelman's theory of neuronal group selection, see Gerald M. Edelman, *Wider Than the Sky: The Phenomenal Gift of Consciousness* (New Haven, CT: Yale University Press, 2004), pp. 32–47.

[44] Herbert A. Simon, "A Behavioral Model of Rational Choice," *Quarterly Journal of Economics*, February 1955, pp. 99–100; also, Simon, "Rational Choice and the Structure of the Environment," *Psychological Review*, Vol. 63, No. 2, 1956, pp. 129, 137–138. Klein argues that Simon's notion of satisficing amounts to selecting the first option that works (*Sources of Power*, p. 20).

FIGURE 1. **KAHNEMAN AND TVERSKY'S MAP OF HUMAN COGNITION**



Adapted from Daniel Kahneman, "Maps of Bounded Rationality."

Daniel Kahneman and the economist Amos Tversky. This "map" of human cognition is based not on anything approaching a neuron-level understanding of how human brains work, but upon careful, physics-like experiments concerning the choices individuals make, especially decisions made under conditions of risk or involving judgments about probabilities.[45]

While intuition gives rise to fast, heuristic, often "good enough" responses, intuition is also prone to widespread, persistent biases and errors.

Kahneman and Tversky's research suggests two first-order conclusions about the intuitive versus reasoned modes of thought. First, while intuition gives rise to fast, heuristic, often "good enough" responses, intuition is also prone to widespread, persistent biases and errors. In this regard, the first article Kahneman and Tversky published together revealed that even statisticians who knew better were prone to systematic errors in "casual statistical judgments" when they responded intuitively.[46] Another bias deeply embedded in human intuition is the reluctance to cut one's losses. When things are going badly in a wartime situation, "the aversion to cutting one's losses, often compounded by wishful thinking, is likely to dominate the calculus of the losing side," thereby causing the conflict to endure long beyond the point where a reasonable observer would see the outcome as a near certainty.[47]

The other fundamental conclusion Kahneman and Tversky reached about human cognition is that reason's oversight of intuitive responses tends to be quite lax. An illustration of this laxness can be seen in the typical responses to the following puzzle Shane Frederick communicated to Kahneman in 2003:

> A bat and a ball cost $1.10 in total.
> The bat costs $1 more than the ball.
> How much does the ball cost?

As Kahneman has observed, almost everyone confronted with this puzzle reports an initial tendency to answer "10 cents" instead of the correct answer, "5 cents," and Frederick found that 50 percent or more of the university students he tested yielded to this intuitive impulse.[48] The reason for this seductive, but common, error appears to lie in the natural way in which the total of $1.10 separates into $1 and ten cents. Of course, it only takes a moment's focused thought to realize that $1 is only 90 cents greater than ten cents, not the $1 more given in the puzzle. The impulse of most people, confronted with this puzzle, to eschew so simple an analytic check shows how

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[45] In 2002, Kahneman was awarded half the Nobel Prize in economic sciences "for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty." If he had not died in 1996, Tversky would have shared this prize with his longtime collaborator. Klein notes that his view of intuition and reasoning "is very close" to Kahneman's (Klein, *The Power of Intuition*, p. 7).

[46] Kahneman, "Maps of Bounded Rationality," p. 450.

[47] Daniel Kahneman and Jonathan Renshon, "Why Hawks Win," *Foreign Policy*, January/February 2007.

[48] Kahneman, "Maps of Bounded Rationality," p. 451.

lax reason's oversight of intuitive responses tends to be unless a determined effort is made to analyze the situation.

How does this view of human cognition relate to the sort of advanced tactical training that began with the founding of Topgun and proved its worth during 1972–1973? The short answer is that realistic training improves the situation awareness (SA) of individual combatants. The evidence is fairly compelling that SA is the primary determinant of tactical outcomes the majority of the time. To return to the air war over Vietnam, during December 1971–January 1973 there were 112 engagements between US fighters and North Vietnamese MiGs in which at least one US or enemy fighter was shot down. All 112 of these "decisive" engagements were carefully reconstructed and analyzed by Project Red Baron III to determine the proximate causes of each loss. The data set includes 75 MiGs downed by American fighters and 37 US aircraft lost to MiGs. Red Baron III's analysis showed that 81.25 percent of the losses (91 of 112 engagements) were caused by a breakdown in situation awareness, meaning the ability of aircrews to develop and sustain accurate representations of where all the friendly and enemy aircraft in or near the combat arena were, what they were doing, and where they were likely to be in the immediate future.[49] As the Red Baron III report explained in 1974:

Red Baron III's analysis showed that 81.25 percent of the losses (91 of 112 engagements) were caused by a breakdown in situation awareness.

> About 60 percent (67 of 112) of all US and enemy aircraft lost in combat were apparently unaware of the attack [until enemy ordnance struck their aircraft]. An additional 21 percent (24 of 112) became aware of the attack too late to initiate adequate defensive action.[50]

The many ways in which realistic training—particularly on an instrumented air-to-air range—can enhance aircrew situation awareness is a fairly complex story that need not be told in detail here. Instead, one anecdote should suffice to convey the flavor. In the early 1970s, before solid-state electronics turned the AIM-7 into a lethal and reliable air-to-air missile that could be fired with some confidence from beyond visual range, gaining better SA than the adversary was often a matter of acquiring the enemy visually before he or they acquired you. So visual acquisition ranges were important. In this context, consider the following observations from 1974 by an Air Force F-4 pilot, (then Captain) Lee Harrell, on the benefits of the Navy's dissimilar air-to-air training during an exchange tour with the Navy's VF-154:

> . . . I can't say enough for dissimilar ACM, especially with varying—and unknown types and numbers—of bogies [opposing fighters]. When I first started I could not see a camouflaged A-4 past 3 miles and had trouble finding my wingie on a 2-v-1 [two F-4s versus

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[49] S. R. "Shad" Dvorchak, "On the Measurement of Fog," slide presentation to the Military Operations Research Society, Washington, DC, June 1986, slide 9.

[50] *Project Red Baron III: Air-to-Air Encounters in Southeast Asia (U)*, Vol. III, Part 1, *Tactics, Command and Control, and Training* (Nellis Air Force Base, NV: US Air Force Tactical Fighter Weapons Center, June 1974), p. 61.

> one adversary]. Now I can track A-4s and T-38s out to 8 miles, take notes, and thoroughly debrief 2-v-2 hops from start to finish.[51]

At the time, Harrell had been through Topgun and was flying 5-7 air-to-air training sorties a week with VF-. He stressed not only the quality of Navy training but its frequency. Flying nearly every day, he felt, was "necessary to make the patrol formations, switchology, radio transmissions, etc. automatic so that you" could "concentrate on the fight itself."[52]

Realistic training can improve the situation awareness of individual combatants and their chances of superior performance relative to less proficient, less well-trained opponents.

Harrell's comments cover more aspects of situation awareness than just the improvement in his visual acquisition distances against dissimilar aircraft smaller than the F-4. The striking point, however, is that ocular performance itself can be substantially improved by frequent exposure to the right environment. As sportsmen, especially hunters, know, within certain limits "the eye can be taught to get more meaning out of an image on its retina; or, more correctly, the brain can learn to make more sense of what the eye sees."[53] Such improvements reveal a strong, direct linkage between dissimilar air-to-air training and SA—at least for engagements within visual range. Presumably there are other areas, including airborne forward air controllers searching for targets on the ground and artillery spotters trying to detect enemy positions in advance of maneuver forces, in which the right kind of training could yield similar improvements. Realistic training, then, can improve the situation awareness of individual combatants and, as a result, their chances of superior performance relative to less proficient, less well-trained opponents. And, to reinforce Marshall Michel's earlier observation about the linkage between training and engagement outcomes, surveys by the Red Baron III staff of aircrews who had experienced air-to-air combat in Southeast Asia indicated that actual combat experience and dissimilar training "were the crews' choice as the most crucial means for achieving air superiority."[54]

While superior situation awareness is first and foremost a function of the training and experience of individual combatants, it should not be overlooked that technology can be exploited to enhance SA. The best recent case is the F-22, which was the first US fighter designed from the ground up with the overriding objective of maximizing

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51 Captain A. Lee Harrell, letter to Captain Barry D. Watts, June 20, 1974, p. 2.

52 Ibid., pp. 1–2. Harrell's personal experience tracks with the measurable and substantial gains in visual acquisition distances 64th FWS Aggressor pilots began seeing as early as 1974 (Mike Press, "Aggressively Speaking," *USAF Fighter Weapons Review*, Fall 1974, p. 3).

53 James R. Gregg, *The Sportsman's Eye: How To Make Better Use of Your Eyes in the Outdoors* (New York: Winchester Press, 1971), p. 35. Gregg's point is as true for forward air controllers looking for bulldozers on the Ho Chi Minh trail during the Vietnam conflict as it is for hunters trying to spot deer in dense forest. There are about ten million sensory cells in human eyes, as compared with a million in the skin and another one hundred thousand each in the nose and ears. Flying fighter aircraft, not surprisingly, has always been visually dominated.

54 Peter deLeon, *The Peacetime Evaluation of the Pilot Skill Factor in Air-to-Air Combat* (Santa Monica, CA: RAND, January 1977), R-2070-PR, p. 22.

the SA of its pilot relative to that of adversary pilots.[55] Features such as low observability (which, when coupled with sound tactics, results in stealth), the ability to cruise at Mach 1.5 or above without afterburners ("supercruise"), and advanced avionics (including an active electronically scanned array [AESA] radar and advanced sensor fusion) were all intended to give F-22 Raptor pilots an overwhelming SA advantage over their opponents. Starting with the Initial Operational Test and Evaluation (IOT&E) of the F-22 in both mock combat flown against F-15s and F-16, as well as in man-in-the-loop simulations that permitted far more complex scenarios, the F-22 has consistently been able to dominate engagement outcomes by making "lethal" missile shots before their opponents were even able to acquire the Raptor. To give an idea of just how lopsided results have been, during Exercise Northern Edge 2006 in Alaska, the F-22s posted an astonishing box score of 108-to-0.[56]

The final point to be underscored about SA is that it is not restricted to air-to-air combat but manifests itself in virtually all areas of modern combat. For example, the challenges the US military has encountered since 2003 in finding—or at least avoiding—improvised explosive devices (IEDs) in Iraq and Afghanistan can be understood as being fundamentally a function of situation awareness. Further evidence of SA's importance in all areas of warfare can be found in the US Army's 2003 evaluation of the Stryker Brigade Combat Team (BCT). The idea behind this medium-weight unit was to integrate digital communications networks and command systems with a wheeled infantry-carrier vehicle (Stryker) and a new organizational structure in order to "gain and exploit an information advantage" through a network-centric approach.[57] Organizationally, the Stryker BCT included a reconnaissance, surveillance, and target-acquisition (RSTA) squadron, a military intelligence company, and other features that made it capable of quickly fusing data in order to generate the situation awareness to be able "to act decisively" against enemy weapons before they could close to ranges at which the Stryker's light armor would be vulnerable.[58] The Army's premise was that shifting to battle networks would enhance both the lethality and survivability of the Stryker BCT.

The first empirical test of the Stryker concept came during a certification exercise (CERTEX) and Operational Evaluation (OPEVAL) at the Joint Readiness Training Center (JRTC) in May 2003.[59] Because no predecessor medium-weight unit existed in the Army force structure, RAND's analysis of the CERTEX elected to compare the Stryker BCT's performance at the JRTC in a small-scale contingency scenario

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55 S. R. Dvorchak, telephone conversation with Barry D. Watts, March 9, 2006.

56 Staff Sgt. C. Todd Lopez, "F-22 Excels at Establishing Air Dominance," Air Force Print News, June 23, 2006, available at http://www.af.mil/news/story.asp?storyID=123022371.

57 Daniel Gonzales, Michael Johnson, Jimmie McEver, Dennis Leedom, Gina Kingston, and Michael Tseng, *Network-Centric Operations Case Study: The Stryker Brigade Combat Team* (Santa Monica, CA: RAND, 2005), p. xiii.

58 Ibid., pp. xiii–xiv, xvii–xviii.

59 Ibid., p. 57.

At the tactical level, SA is central to the majority of decisions made in time-compressed, combat situations.

with that of a nondigitized light-infantry brigade.[60] Based on this comparison, RAND researchers concluded that the Stryker brigade was an order-of-magnitude more effective than the predecessor light infantry brigade as measured by Blue-Red casualty ratios.[61] This outcome, therefore, reinforces the view that SA is just as dominant a factor in ground engagements as it has been, and remains, in air-to-air combat. Since Klein's research also contains documented cases illustrating the importance of situation awareness in naval operations, it seems safe to conclude that, at the tactical level, SA is central to the majority of decisions made in time-compressed, combat situations.

[60] Ibid., p. xviii.

[61] Ibid., pp. 104–106.

CHAPTER 3 > TRENDS AFFECTING THE FUTURE EFFICACY OF TACTICAL EXPERTISE

Is realistic combat training likely to provide American military forces as much margin of advantage as it has in recent conflicts? Various trends suggest that the answer is probably "No." Some of these trends stem from technological developments that either are already rendering the effective employment of many weapon systems less dependent on the skills of their operators, or else promise to do so in the future. Other trends affecting the future efficacy of American combat training arise from the choices adversaries are free to make about the weapons they choose to emphasize and how they plan to employ them.

One technological trend bearing on the efficacy of tactical training is the increasing automation, through ever more powerful computers and software, of manual tasks that previously demanded both extensive introductory and constant refresher training for combatants to sustain competence, much less proficiency or expertise. Consider, for instance, the skill demanded of a pilot in a single-seat fighter to keep a laser designator on the desired impact point during the time of flight of a laser-guided bomb (LGB) while, simultaneously, flying the aircraft. The technology to automate this task has been available since the development of the Pave Tack system for the F-4 and F-111 in the late 1970s. Nonetheless, as recently as Operation Enduring Freedom in Afghanistan during 2001, Navy F/A-18 pilots were using LGB designator pods that required manual tracking of the aim point until impact. Needless to say, keeping the laser beam on the aim point manually while flying a single-seat F/A-18 demands considerably more skill and currency than employing LGBs from a two-seat F-15E equipped with LANTIRN (Low Altitude Navigation and Targeting Infrared for Night), whose targeting pod provides automated tracking once the weapon systems operator has designated the aim point on a cockpit display.

A more comprehensive and current example is the degree of cockpit automation achieved in the F-22. Whereas in the F-15 and F-16 the pilot has to cue or point various systems and sensors to acquire threat data and then sort through the inputs to

decide what they mean, in the F-22 the sensors are automatically tasked to search the entire volume of space above, below, and in front of the aircraft, and the displays fuse data from both on-board and off-board sensors. Data fusion includes the identification of airborne targets, enemy and friendly, as well as displaying to the pilot whether any threat systems detected can detect the F-22. These features not only reduce the pilot's workload and enhance situation awareness, but offload tasks such as sensor management that formerly required recent, realistic training to achieve and maintain proficiency.

Another technological trend that seems certain to diminish the margins of tactical advantage that US forces can wring from operator skill is the growing availability of precision weapons, meaning those that can home on their targets or aim points. Historically, accurate gunnery by tank crews and manual dive bombing by fighter crews were complex skills that required time, training, and constant practice to develop and maintain.[62] Atmospheric obscurations, night, and weather often provided further barriers to accuracy. Today, however, cheap, solid-state inertial guidance systems aided by Global Positioning System (GPS) satellite data allow accuracies for guided bombs, missiles, mortars, and even artillery shells of 10 meters or less, thereby greatly reducing the skill and training required to achieve accuracy against point targets. And while US forces have enjoyed a monopoly on these sorts of munitions in recent conflicts, their ongoing proliferation and affordability argue that even undeveloped nations and terrorist organizations will eventually gain access to them.

One additional technological trend that may erode American superiority based on the skill of its soldiers, airmen, marines, and sailors is the likelihood that synthetic training environments will enable adversaries to accomplish much of the training that heretofore required large, expensive CTCs like the Air Force's Nellis range complex or the Army's National Training Center. These are costly facilities occupying large swaths of land. Few countries can afford to develop and maintain such facilities. Live, virtual, constructive synthetic environments involve information technologies that are unlikely to remain strictly in the hands of the US military (or those of its close allies). The spread of such technologies — most likely driven by the global commercial gaming industry — may enable potential adversaries to acquire many tactical skills and levels of proficiency that have been hallmarks of American, British, and other Western militaries in recent decades without the expense or signatures associated with large CTC complexes. Already the US military is making increasing use of synthetic environments such as the USJFCOM's Joint Semi-Automated Forces (JSAF) for training, experimentation, and rehearsals of planned operations.[63] Indeed, a 2001 Defense Science Board on combat training highlighted such things

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[62] For data on how quickly tactical proficiency can be lost, see Braddock and Chatham, *Training Superiority & Training Surprise*, p. 5.

[63] For a description of Joint Forces Command's JSAF, see "Joint Semi-Automated Forces" at http://www.jfcom.mil/about/fact_jsaf.html.

as virtual learning environments like JSAF, just-in-time/just-right training devices, and advanced training capabilities embedded in existing weapon systems as the basis for a second revolution in training affairs.[64] Thus, there is every reason to expect that the future will see increased use of computer-based training devices and simulated environments by both the American military and potential US adversaries, and that virtual training environments will be substantially cheaper than CTCs like the NTC or the Nellis ranges.[65]

Next, a range of advances in the cognitive sciences, biotechnology, medicine, and nanotechnology appear to be converging toward giving humans heretofore unprecedented capabilities to modify or enhance the physical, cognitive, and socio-emotional performance of individuals. Possibilities range from giving combatants pharmaceuticals to resist fatigue or function longer without sleep to accelerating muscle growth or cell strength with temporary or permanent genetic modifications, to improved human-machines interfaces, to better predictive methods for assigning individuals to the combat roles for which they are best suited.[66] By way of illustrating that such things are already here, the drug Ritalin not only improves the academic performance of hyperactive children, it can also do the same for normal children. Ritalin is "commonly thought to boost SAT [scholastic aptitude test) scores by more than 100 points."[67] While genetically modifying soldiers to increase cognitive performance goes considerably beyond a high-school senior taking Ritalin to boost SAT scores, the basic technology has already been demonstrated. In 1999 researchers at Princeton University added the NR2B gene to a strain of genetically engineered mice to trigger the production of designated amounts of a receptor for the neurotransmitter NMDA (N-methyl-D-aspartate) in the forebrains of the animals.[68] The modification significantly boosted the ability of these mice "to solve maze tasks, learn from objects and sounds in their environment and to retain that knowledge."[69] More recent developments in the area of cognitive enhancements suggest that the appearance of drugs capable of improving memory, concentration, and learning are simply a matter of time.[70] It seems clear, then, that the convergence of the cognitive sciences, biotechnology, medicine, and nanotechnology is going to provide ways of dramatically improving

A range of advances in the cognitive sciences, biotechnology, medicine, and nanotechnology appear to be converging toward giving humans heretofore unprecedented capabilities to modify or enhance the physical, cognitive, and socio-emotional performance of individuals.

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64 Braddock and Chatham, *Training Superiority & Training Surprise*, p. 13.

65 For an overview of where synthetic environments appear to be headed, see "Playing To Win," *The Economist,* December 4, 2004, pp. 24–25.

66 Adam Russell and Bartlett Bulkley, *Human Performance Modification Primer* (Herndon, VA: Scitor Corporation, January 2007), FOUO (For Official Use Only), pp. 1–5, 9–13.

67 Michael S. Gazzaniga, "Smarter on Drugs," *Scientific American Mind*, September 2005, pp. 33–34.

68 Sean Henahan, "Single Gene Boosts Brain," *Access Excellence*, September 2, 1999, online at http://www.accessexcellence.org/WN/SUA13/smartgene999.html. This research was reported in the September 2, 1999, issue of *Nature*.

69 "Genetic Engineering Boosts Intelligence," *British Broadcasting Corporation*, September 1, 1999, online at http://news.bbc.co.uk/1/hi/sci/tech/435816.stm.

70 "All on the Mind," *The Economist*, May 24, 2008, pp. 103–104.

individual combat performance quite different from those based exclusively on realistic combat training. At a minimum, these technologies open the door to high or even superior levels of tactical performance by individuals who are relatively untrained in the sense of having benefited from Western-style CTC training.

In addition, there is the prospect that technological progress in robotics will eventually achieve enough on-board intelligence to enable autonomous combat systems to carry out various battlefield tasks that previously required either human operators or human oversight.[71] Today it is possible to identify systems that, once fired or launched, thereafter function as autonomous robots, beyond further human intervention. The AIM-9 Sidewinder, the Army's Guided MLRS (Multiple Launch Rocket System), and intercontinental ballistic missiles are all examples. True, the constraints within which any of these weapons operate once fired or launched are quite narrow compared to the degree of autonomy science-fiction writers have long envisioned. Over time, however, there can be little doubt that these constraints will be gradually relaxed. Indeed, the powered version of Low Cost Autonomous Attack System (LOCAAS) developed by the Air Force and the Defense Advanced Research Projects Agency was originally envisioned as a flying robotic weapon that could search for, identify, and attack targets within a 50 square kilometer area all on its own.[72] The key technologies were a ladar (laser detection and ranging) seeker and target-recognition algorithms that could be relied upon to identify specified targets (tanks, surface-to-air missile launchers, etc.). While neither the Air Force nor the Army subsequently elected to field this system due to concerns about turning battlefield robots loose even within an area this small, the development appears to have succeeded technically. Lethal battlefield robots will eventually emerge. And it may well be that American adversaries will have fewer qualms about employing them than US military leaders have exhibited to date.

Adversaries need not go down the same paths in choosing weaponry, designing forces, and developing employment doctrines that the US military has preferred for decades.

The final trend likely to erode the value of tactical expertise in coming decades arises from the fact that adversaries need not go down the same paths in choosing weaponry, designing forces, and developing employment doctrines that the US military has preferred for decades. The US military has long enjoyed considerable advantages in non-nuclear strike operations based primarily on manned aircraft, which in turn have demanded relatively proficient aircrews. There is no reason why future adversaries interested in attacking targets at over-the-horizon distances need to lean as heavily on manned aircraft as the American military has. The growing capabilities of ballistic and cruise missiles to achieve comparable effects offer an alternative approach to the

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[71] For insight into the state-of-the-art in robotic technology aimed at real-world problems, see the results in 2007 from the Defense Advanced Research Projects Agency's (DARPA's) Urban Challenge, which demonstrated for the first time the ability of autonomous vehicles to operate in traffic in an urban setting (see DARPA, "DARPA Urban Challenge: Fiscal Year 2007 Report," January 18, 2008). Stanford University's entry won the 2005 Desert Challenge event, but came in second, losing to Carnegie Mellon University's entry in the 2007 Urban Challenge.

[72] The Air Force slides presented at the LOCAAS industry day slides in June 1998 are available at http://www.fas.org/man/dod-101/sys/smart/docs/locaas_Industry_Day/sld001.htm.

same problem. Ballistic or cruise missiles with terminal precision guidance can be as effective against many targets as having manned aircraft attack those same targets with unpowered munitions such as LGBs or Joint Direct Attack Munitions (JDAMs), but the former approach requires considerably less operator skill than the latter.

At least one nation with the economic power and emerging technological prowess to compete militarily with the United States is the People's Republic of China (PRC). People's Liberation Army (PLA) planners have "observed the primacy of precision strike in modern warfare and are investing in offensive and defensive elements of this emerging regime."[73] Among other things, their long-term goal appears to be to develop anti-access/area-denial capabilities sufficient to hold at risk western-Pacific airbases, ports, surface combatants (including US aircraft carriers), air defense systems, and command-and-control facilities located from their coastline out to the so-called second island chain running from southern Japan through the Mariana Islands, including Guam, to western New Guinea. Toward this end, China's "Second Artillery Corps" (*Dierpaobing*) has deployed around 1,000 CSS-6 and CSS-7 short-range ballistic missiles (SRBMs) opposite Taiwan, and the PLA is acquiring a variety of medium-range ballistic, land-attack cruise, and anti-ship cruise missiles—including the modern Russian-made SS-N-22 (code-named SUNBURN) and SS-N-27B (SIZZLER).[74] By and large, these capabilities do not demand the levels of operator skill associated with, say, effectively operating an American carrier battle group and the carrier's deployed air wing.

The challenge posed to American forces in the western Pacific by emerging PRC anti-access/area-denial capabilities requires the resources of a large, economically powerful, technologically advanced nation. Carrier battle groups, anti-satellite weapons, and reconnaissance-strike complexes able to locate and attack targets 1,000 or 2,000 nautical miles away require resources that are beyond the reach of most nations, much less of insurgent groups or terrorist organizations. Nonetheless, some of the technologies involved can be exploited by smaller countries or even terrorist cells. Take Hezbollah's rocket campaign against Israel in the summer of 2006. With unguided rockets, Hezbollah fighters were limited to aiming at entire Israeli settlements, towns, and cities, much as the Germans did with V-1s and V-2s during 1944–1945. But the ongoing proliferation of guided mortars rounds, artillery shells, and rockets suggests that, in the long run, even insurgents and terrorists can be expected to gain access to these classes of guided munitions. Furthermore, against fixed targets at least, employing them effectively will not require a great deal of training or skill. Thus, some of the same technological trends likely to erode the tactical efficacy of highly trained combatants also make it easier for American adversaries to choose weapons and ways operating that are much less contingent on the skills of their individual combatants than the approaches favored by the US military.

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[73] Office of the Secretary of Defense (OSD), *Annual Report to Congress: Military Power of the People's Republic of China* (Washington, DC: DoD, 2007), p. 16.

[74] Ibid., p. 17.

CHAPTER 4 > WICKED PROBLEMS AND THE COGNITIVE DEMARCATION BETWEEN TACTICAL EXPERTS, OPERATIONAL ARTISTS AND STRATEGISTS

Section 3 was primarily about shedding light on the cognitive processes underlying the intuitive responses of individual combatants at the tactical level. The logical follow-on question to that discussion is whether those same cognitive processes extend to the challenges of operational art and higher-level strategy. The short answer is that they do not. The cognitive skills demanded of operational artists and competent strategists appear to differ fundamentally from those underlying tactical expertise in do-or-die situations characterized by intense time pressures and substantial uncertainty. This view is not intended to deny that intuition can play a role in operational art and strategy. However, in the case of designing operations or formulating long-term strategy at the theater level or higher, skills such as a capacity for conceptual framing of the problem, for objective assessments of the strengths and weaknesses on both sides with an eye toward identifying exploitable asymmetries, and for the creation of a heuristic line of response reflecting the uniqueness of the problem at hand all appear to be more central. As a result, operational design and strategy require much greater reliance on explicit reasoning and conscious oversight of intuition (System 2 in Figure 1).

The cognitive skills demanded of operational artists and competent strategists appear to differ fundamentally from those underlying tactical expertise in do-or-die situations.

To begin to see why the cognitive skills underlying operational art and strategy differ fundamentally from those underlying tactical expertise, recall that Section 2 closed with a quotation concerning the main lesson regarding training that USJFCOM drew from the major-operations phase of Operation Iraqi Freedom. That quotation, though, was incomplete. The part cited at the end of Section 2 stressed the role realistic training had played in the superior tactical performance of US forces in March–April 2003. The full quote, however, goes on to suggest that American performance had been less satisfactory at the operational level:

> **Training provided an insurmountable warfighting edge at the tactical level, while critical operational level capabilities remained essentially untrained.**[75]

If the more or less same cognitive skills that underlie tactical expertise also underlie performance at the operational level, then this is a very puzzling finding. Assuming USJFCOM's lessons-learned analysts knew what they were talking about, the implication is that operational art involves different cognitive skills than those honed by realistic training at CTCs such as the Army's National Training Center. If so, then one would expect competence at operational art or strategy to require different training and professional education than that provided by NTC rotations or participation in Red Flag exercises.

Intuition and reasoning are grounded in different structures in different parts of the brain.

This hypothesis is strongly supported by a simple empirical fact. Our current understanding of how human brains function indicates that intuition and reasoning—Systems 1 and 2 in Figure 1—are grounded in different structures in different parts of the brain. Beyond sensory perception, which is common to animal brains as well, human brains have evolved "two parallel but interacting" modes of thought: one involving the conscious, calculative weighing of alternatives; the other a more instinctive mode in which sensory knowledge "activates neural systems that hold non-declarative disposition knowledge related to the individual's previous emotional experience of similar situations."[76] As Kahneman observed in 2002, there is now "considerable agreement on the characteristics that distinguish" the decision-making associated with the two basic modes of thought: the instinctive or intuitive one is "fast, automatic, effortless, associative and difficult to control or modify"; the other, evident in explicit reasoning and analysis, is "slower, serial, effortful, and deliberately controlled."[77]

To be sure, these two fundamental modes of cognition are deeply entwined and interconnected. While early efforts to a master a skill are typically a matter of consciously following step-by-step procedures or rules, as skill is gained conscious rule-following gives way increasingly to automated responses that operate more or less unconsciously. In addition, current evidence indicates that the implicit long-term memories associated with skills, habits, and conditioning are stored in more primitive portions of the brain (the cerebellum, stratum, and amygdala) than are explicit memories about people, objects, places, facts, and events, which are converted to lasting memories in the hippocampus and then stored in the areas of the cerebral cortex corresponding to the senses involved.[78] In evolutionary terms, the neocortex is

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[75] USJFCOM, *Joint Lessons Learned: Operation Iraqi Freedom,* p. 39 (**boldface** in the original).

[76] Stephen Peter Rosen, *War and Human Nature* (Princeton, NJ: Princeton University Press, 2005), p. 47.

[77] Kahneman, "Maps of Bounded Rationality," p. 450.

[78] Eric R. Kandel, *In Search of Memory: The Emergence of a New Science of Mind* (New York: W. W. Norton, 2006), pp. 127–133.

the most recent part of the human brain, whereas the cerebellum, hippocampus, and amygdala are older structures.

Deliberate reasoning and the kind of careful thinking about alternative courses of action characteristic of sound strategic discourse, moreover, are strongly correlated with the cortex. The neurological evidence is compelling that damage to the ventromedial prefrontal areas of the cerebral cortex "consistently compromises, in as a pure a fashion as one is likely to find, both reasoning/decision making, and emotion/feeling, especially in the personal social domain."[79] While reason "depends on several brain systems, working in concert across many levels of neuronal organization," later cases of brain injuries confirm that the damage Phineas Gage received in an 1848 accident to the ventromedial region of his prefrontal cortices largely erased "his ability to plan for the future, to conduct himself according to the social rules he previously had learned, and to decide on the course of action that ultimately would be most advantageous to his survival."[80]

Insofar as operational art and strategy are—or should be—more deliberative, analytic endeavors, then, there are solid empirical grounds for associating them with the reasoning mode of cognition. Researchers can now identify a collection of systems in the brain consistently dedicated to the goal-oriented process we call reasoning . . . with a special emphasis on the personal and social domain."[81] Figure 2 posits a relation between the two distinct modes of human cognition and the traditional levels of war. Since the 1920s, when Russian military theorists began discussing an operational level of war between tactics and strategy, it has become commonplace among military theorists to divide modern warfare into the three levels shown in the left side of Figure 2. It

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[79] Antonio Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (New York: G. P. Putnam's Sons, 1994, Penguin Books ed. 2005), p. 70.

[80] Ibid., pp. xvii, 32–33. At the time, Gage was in charge of a railroad gang working on the expansion of the Rutland & Burlington Railroad into Vermont. While Gage was tamping down powder in a hole drilled into rock, the powder discharged driving the iron rod he was using upward, through his left cheek, into the base of his skull, traversing the front of his brain, exiting the top of his head, and landing more than one hundred feet away (ibid., pp. 3–5). While Gage survived the accident, the damage eliminated several unique human properties, including "the ability to anticipate the future and plan accordingly within a complex social environment; the sense of responsibility toward self and others; and the ability to orchestrate one's survival deliberately, at the command of one's free will" (ibid., p. 10). Damasio describes a modern Phineas Gage he encountered in his clinical practice (ibid., pp. 34–51).

[81] Ibid., p. 70. It is generally estimated that there are about one hundred billion (100,000,000,000 or 1011) nerve cells in a human brain and that, on average, each neuron communicates with one thousand other nerve cells—Paul Greengard, "The Neurobiology of Dopamine Signaling," Nobel Lecture, December 8, 2000, in Hans Jörnvall, *Physiology or Medicine 1996–2000* (Singapore: World Scientific Publishing Company, 2003), p. 328. The brain is a supersystem of systems, each of which is "composed of an elaborate interconnection of small but macroscopic cortical regions and subcortial nuclei, which are made of microscopic local circuits, which are made of neurons, all of which are connected by synapses" (Damasio, *Descartes' Error*, p. 30). However, the basic functional unit of the mature cortex appears to be minicolumns containing "~80–100 neurons, except for the striate cortex where the number is ~2.5 times larger" (Vernon B. Mountcastle, "The Columnar Organization of the Neocortex," *Brain*, April 1997, p. 701).

is also not unusual to add a political or grand-strategic level atop of military strategy.[82] Whether this additional layer is added or not, the supposition advanced in the right side of Figure 2 is that there are only two cognitive domains from the standpoint of human decision-making and the boundary lies between tactics and operational art.

While the basis in cognitive science and neurology for a bi-modal view of human decision-making is clear, why locate the cognitive boundary between intuitive and deliberative modes of thought between tactics and operational art? One clue can be seen in the complete statement of USJFCOM's main conclusion regarding training in the wake of OIF. The clear message is that tactical competence does not necessarily translate into operational competence.

Tactical competence does not necessarily translate into operational competence.

A more substantive rationale lies in the greater complexity and ambiguity of operational problems than tactical ones. Klein's 1998 *Sources of Power* describes a February 1991 incident from Operation Desert Storm in which the anti-air warfare officer on duty aboard HMS *Gloucester*, Lieutenant Commander Michael Riley, chose to fire at an incoming radar contact that he identified as an incoming Iraqi Silkworm anti-ship missile aimed at the *Gloucester*.[83] The other possibility was that the contact was a friendly American A-6 returning from an attack mission, but Riley later insisted that he *knew* it was a Silkworm in the first five seconds of the engagement. Despite his certainty, after the target had been shot down, the *Gloucester*'s captain and officers had to sweat out four tense hours of worry before they were able to confirm that the target had been an Iraqi Silkworm rather a friendly aircraft. Riley stated in an interview a year after the incident that he had correctly identified the contact so quickly because he sensed that it was almost imperceptibly accelerating. Other considerations, however, including analysis of the radar tape from the incident, indicated that there was no way Riley could have detected acceleration in the first five seconds. Only after running the tape again and again did analysts solve the mystery. Rob Ellis from the Defence Research Agency realized that what cued Riley to the acceleration was that the initial radar contact of the Silkworm was further from the coast than an A-6 at a higher altitude would have been when initially detected by the *Gloucester*'s radar. Also the contact was coming from the direction of a known Silkworm site. The cues, then, that enabled Riley to correctly grasp the situation and make the right decision were extremely subtle. At the same time, the problem he faced was relatively straightforward.[84] Either the target was a Silkworm missile with a warhead large enough to sink the *Gloucester*, or it was a returning Coalition aircraft that had neglected to turn on its IFF (identification friend or foe) during egress from Kuwait. Either way, the

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[82] See, for example, Allan R. Millett and Williamson Murray (eds.), *Military Effectiveness*, Vol. I, *The First World War* (Boston, MA: Allen & Unwin, 1988), p. 3.

[83] Klein, *Sources of Power*, pp. 35–39.

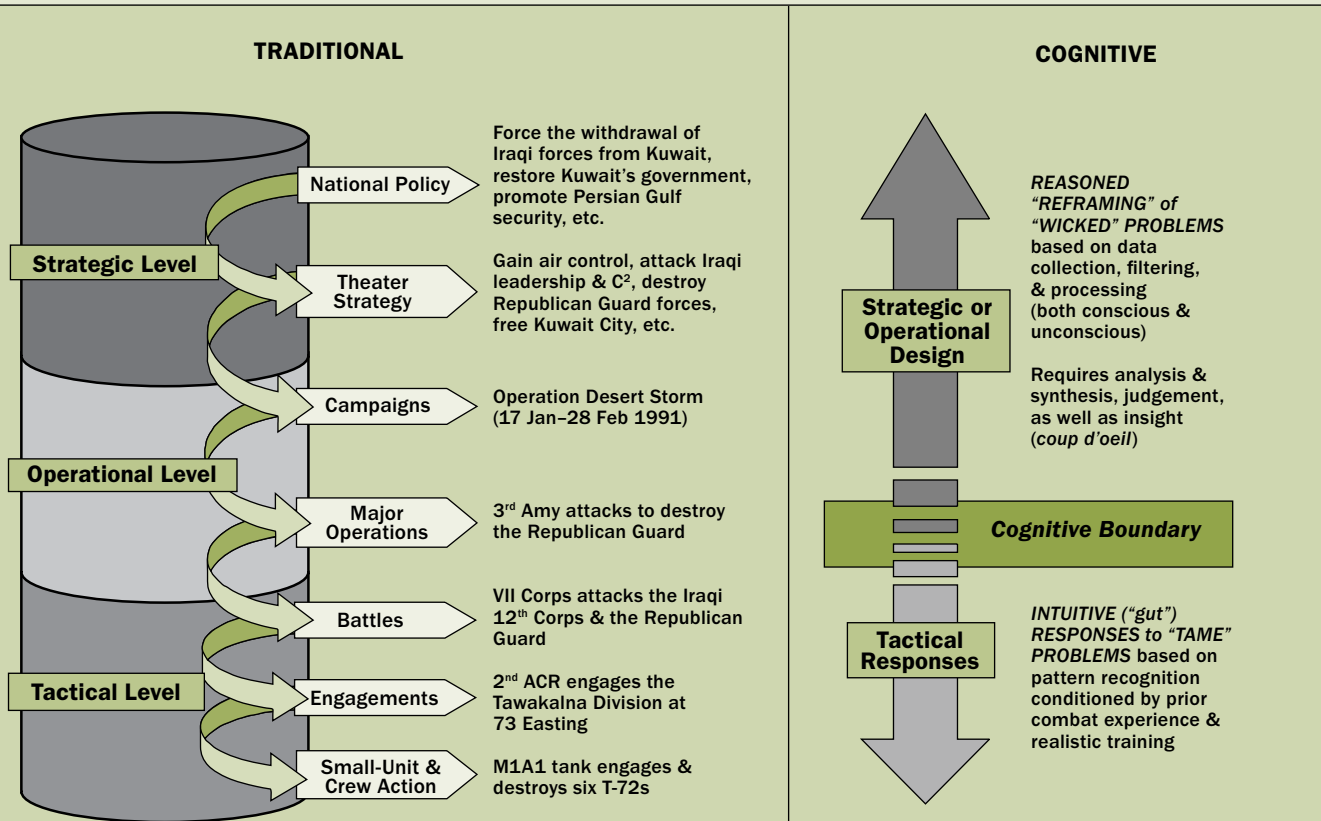
[84] In this case, intuition worked. Intuition, however, can also fail, as it did in July 1988 when the Aegis cruiser USS *Vincennes* mistakenly shot down an Iranian Airbus 300. Klein's *Sources of Power* devotes an entire chapter to analyzing this incident (see pp. 75–87).

decision Riley needed to make was binary—to fire or not, depending on his assessment of the radar contact. There was also an unambiguously correct response to the tactical dilemma he faced—if he correctly assessed the situation.

Operational and strategic problems, by contrast, are rarely, if ever, as straightforward as the tactical one Lieutenant Commander Riley faced in February 1991. Instead, they generally appear to be among the class of messy, ill-defined, social dilemmas for which Horst Rittel and Melvin Webber introduced the term "wicked problem" in 1973. At the time, Rittel and Webber were focused on social planning problems such as locating a freeway, modifying school curricula, adjusting tax rates, or confronting crime, and they argued that all such societal dilemmas are wicked problems.[85] They contrasted wicked problems with "tame" or "benign" ones, which they characterized as being amenable to scientific or engineering solutions. A more recent account describes tame problems as:

[85] Horst W. J. Rittel and Melvin M. Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences*, Vol. 4, 1973, p. 160.

FIGURE 2. **A COGNITIVE VIEW OF THE TRADITIONAL LEVELS OF WAR**



Source: Barry Watts, CSBA.

- Having a relatively well-defined and stable problem statement;
- Having a definite stopping point (that is, we know when a solution has been reached);
- Having a solution that can be evaluated as being right or wrong;
- Belonging to a class of similar problems, which can be solved in a similar manner; and
- Having solutions that can be tried and abandoned.[86]

Wicked problems, by contrast, exhibit sharply different characteristics, including the following:

- There is no definite statement of the problem; instead, understanding of the problem depends on one's ideas about how to respond to it;
- There are no stopping rules;
- Proposed responses are better or worse, not right or wrong;
- Every wicked problem is essentially unique and novel, which implies it cannot be solved "just like" some previous problem;
- There is no immediate or ultimate test of a possible response to a wicked problem;
- Instead, any response attempted is a "one-shot" trial because anything tried counts significantly, which means wicked problems do not allow trial-and-error learning;
- Wicked problems do not have an enumerable set of potential solutions, nor is there a well-described set of permissible operations than can be mechanically incorporated into a definitive solution; and
- The causes of a wicked problem can be explained in many ways, depending on the nature of proposed responses.[87]

Perhaps the simplest way to encapsulate the differences between these two classes of problems is to note that wicked problems, unlike tame ones, really do not have solutions in the engineering sense that tame ones do. Wicked problems are social interactions, and particularly in war the enemy also gets a vote on how one's responses may fare — especially in the long run.

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[86] Tom Ritchey, "Wicked Problems: Structuring Social Messes with Morphological Analysis," p. 1, last modified November 2007, available at http://www.swemorph.com/wp.html.

[87] Ibid., pp. 2–3; Jeff Conklin, "Wicked Problems and Social Complexity," 2006, pp. 7–8, available at http://cognexus.org/wpf/wickedproblems.pdf. The Conklin article is now the first chapter of his *Dialogue Mapping: Building Shared Understanding of Wicked Problems* (Wiley, 2006).

Consider the illustrative strategic and operational problems in the left side of Figure 2 from the first Iraq war. At the strategic level the broad aims President George H. W. Bush asked the US military to achieve following Iraq's invasion of Kuwait were to: bring about the complete, immediate, unconditional withdrawal of Iraqi forces from Kuwait; restore the legitimate government of Kuwait; promote security and stability in the Persian Gulf; and protect American citizens abroad.[88] Similarly, at the operational level General Norman Schwarzkopf's challenge was to design a theater campaign to achieve the president's stated political objectives.[89] It does not require much reflection to recognize that, in comparison with Lieutenant Commander Riley's dilemma, these Desert Storm problems were wicked rather than tame ones. The distinction between wicked and tame problems, therefore, provides a further argument for locating the cognitive boundary shown in Figure 2 between tactics and operational art while the two distinct modes of human cognition undermine the possibility of having multiple cognitive boundaries. In the case of the 1991 Desert Storm campaign, recall that until the end of October 1990, Schwarzkopf was only allowed to deploy about 250,000 US troops to the Gulf and that his offensive planning to that point had focused on a one-corps thrust directly into Kuwait. Not until October 30th did President Bush endorse sending another 200,000 troops, including the US 7th Corps in Germany, and only in the aftermath of this increase in available resources did Schwarzkopf's campaign concept shift to the "left hook" that was actually executed during the 100-hour ground offensive that ended the conflict.[90] Among other things, this change in the design of the campaign illustrates the sort of give and take between political and military leaders over ends and means that is one of the hallmarks of a creative, open-ended approach to dealing with wicked problems.

The Israeli experiment in operational art during 1995–2006 provides additional evidence for the location of the single cognitive boundary in Figure 2. This experiment was motivated by the growing perception of some Israeli officers — mainly paratroopers and special forces—that after the military triumph of the Six Day War in June 1967 the Israeli Defense Forces (IDF) had increasingly lost its way in the areas of operational and strategic competence. By the late 1980s a circle of "young Turks" aspired to nothing less than the reformation of the IDF's higher command, their view being that the IDF's single-minded focus on tactical virtuosity had led to growing

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88 Bush, having declared that Iraq's aggression against Kuwait "will not stand" on August 5, 1990, articulated these strategic objectives in a television address on August 8th. This address announced the president's decision to begin deploying forces to Saudi Arabia.

89 Barry D. Watts and Thomas A. Keaney, *Effects and Effectiveness,* in Gulf War Air Power Survey, Vol. II, *Operations and Effects and Effectiveness* (Washington, DC: US Government Printing Office, 1993), Part II, p. 74.

90 Bush effectively made the decision to add a second corps on October 30, 1990, in response to General Colin Powell's recommendation that Schwarzkopf needed another 200,000 troops for a viable offensive option.

gaps or disconnects between the political and strategic ends of the Israeli state and what the IDF was able to deliver on the battlefield.

The first attempt to begin reversing this decline in operational performance got underway in the spring of 1991. The leader of the initiative was Major General Doron Rubin, then head of the Office of Joint Training and Doctrine on the IDF's general staff. Rubin began sponsoring studies of operational issues by active field commanders and, with the assistance young Turks such as Brigadier Shimon Naveh, then a division commander, precipitated a series of debates and experimental exercises aimed at improving Israeli generalship.[91] Serious opposition to this questioning of IDF generalship soon arose, and Rubin's initiative came to an abrupt end in June 1991 when the Office of the Chief of the General Staff announced that his position was going to be downgraded to a one-star billet. Since no other two-star billet was available, Rubin had little choice except to resign from active service.

The Rubin affair, however, did not prove to be a dead end. In 1994 Rubin's successor, Brigadier General Ya'acov Or, invited Shimon Naveh and Dov Tamri, both of whom were reserve brigadiers with special forces backgrounds, and Dr. Zvi Lanir, who had been doing cognitive research on the functioning of IDF one-stars, to form a special task force to help him address the IDF's shortcomings in generalship.[92] The group reported their findings, including the outlines of a concrete program to remedy the situation, to Or in December 1994. The following February, after Lieutenant General Amnon Lipkin-Shahak had become Chief of the General Staff, a decision was made to establish the Operational Theory Research Institute (OTRI) within the IDF to develop an Israeli theory of operational art and conduct courses to prepare selected officers destined for higher command to deal creatively with wicked operational problems via what came to be termed "systemic operational design" (SOD).[93] From then until early 2006, OTRI's small staff conducted research into operational art and ran a course for small groups of officers who had demonstrated the potential for higher command. OTRI's operational course typically ran four days a week for periods of four or five months. About a quarter of the time was devoted to theory, the rest to exercises. The first course was held in 1996 and was eventually given five more times.[94]

As promising and creative as OTRI was in reinvigorating Israeli generalship from 1995 to the spring of 2006, its base of support in the IDF was never extensive. Those most committed to OTRI were the paratroopers and special forces. Even within the

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[91] Shimon Naveh, "Operational Art and the IDF: A Critical Study of a Command Culture," September 30, 2007, pp. 16–18, 77–79. Naveh's study was done under the auspices of the Center for Strategic and Budgetary Assessment for the Office of Net Assessment, Office of the Secretary of Defense.

[92] Ibid., pp. 80–81.

[93] Ibid., pp. 96–97.

[94] Author's notes from a discussion with Shimon Naveh, May 17, 2006. These notes cover a three-day visit to OTRI focused on issues such as SOD, the nature of operational art, the challenges of generalship, and the cognitive requirements for operational artists. During this visit, Watts was also able to interview several graduates of OTRI's operational course.

army, the armor community, far from buying in on the enterprise, appears to have been a source of growing resentment, especially due to the influence OTRI was able to exert over which officers were given senior commands. Nor did the air force or navy ever embrace OTRI's program. Moshe Ya'alon, who had commanded the IDF Paratroop Brigade, was able to protect and promote OTRI, first as the head of the IDF's Central Command, then as the IDF deputy chief of staff (2000–2002), and, finally, as Chief of the General Staff (2002–2005).[95] After Ya'alon was succeeded by Lieutenant General Dan Halutz as chief of staff in June 2005, however, it did not take long for pent up resentment to reach the boiling point. On May 30, 2006, Naveh and Tamari were suspended from their duties over alleged irregularities in their billing practices.[96] These suspensions effectively ended a decade of Israeli experimentation in operational art.

Nonetheless, there is little question that systemic operational design was seen by the IDF as an operational-level theory and praxis explicitly aimed at coping with ill-structured or wicked problems within an Israeli context. To cite one example, the IDF's Nablus operation in April 2002, commanded by Brigadier General Aviv Kokhavi, illustrates a real-world application of OTRI's SOD. Kokhavi characterized his approach on this occasion as "*inverse geometry*, the reorganization of the urban syntax by means of a series of microtactical actions."[97] What this rather abstract description appears to mean is that the Israelis, under the influence of OTRI, reconceptualized the problem of dealing with the Palestinian fighters scattered like a network of loosely organized gangs within the West Bank city of Nablus. At the strategic level, the Israelis felt that they could not ignore an estimated several hundred Palestinian fighters operating in Nablus, particularly after Hamas orchestrated a suicide attack at the Park Hotel in Netanya on March 27th, 2002. This attack during a Passover dinner killed 30 Israelis (including some Holocaust survivors), injured about 140 more, and was apparently intended to derail momentum from a peace offer made by the Saudis to solve the Arab-Israeli conflict. A military solution to the militants in Nablus and other West Bank cities was needed, but one that would minimize potential Israeli casualties. Kokhavi's concept for the Nablus operation was based on reconceptualizing the use of space in urban terrain and how Israeli forces would maneuver within that space. The result was his notion of "walking through walls," rather than using streets

The Israelis reconceptualized the problem of dealing with the Palestinian fighters scattered like a network of loosely organized gangs within the West Bank city of Nablus.

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95 Ya'alon's view, which closely mirrors Naveh's, is that tactical proficiency is the easiest part of fighting; the main challenge for senior commanders is engaging in an interactive discourse with the political leadership to create the conditions in which tactical executors can apply force in ways likely to achieve the outcomes desired by the politicians (Interview with Moshe Ya'alon, Washington, DC, June 14, 2006).

96 See Caroline Glick, "Column One: Halutz's Stalinist Moment," *Jerusalem Post*, online edition, June 8, 2006. Glick was a member of the OTRI staff when the Israeli experiment in operational art was effectively terminated by Halutz and his deputy.

97 Eyal Weizman, "Lethal Theory," *Log*, Spring 2006, p. 53, available online at http://roundtable.kein.org/files/roundtable/Weizman_lethal%20theory.pdf. This file appears to be galley proofs. Log is an architectural magazine.

and alleyways, so as to be able to swarm the Palestinian fighters with minimal exposure to the militants while limiting harm to the civilian population. Obviously there were a lot of other ways Kokhavi could have tackled his part of Operation Defensive Shield. But the concept he chose illustrates that OTRI's systemic operational design aimed at dealing with wicked problems, not tame ones. It also provides additional evidence for the placement of the cognitive boundary in Figure 2 between the tactical and operational levels of war.[98]

Wicked problems are the domain of operational art and strategy, whereas tame problems are the realm of tactics.

Wicked problems, then, are the domain of operational art and strategy, whereas tame problems — or at least tamer ones — are the realm of tactics. This insight is precisely what led Naveh to characterize tactical executors as artisans (or engineers), the operational commander as an architect (or artist), and the political leaders authorizing the operation as the strategic sponsor (or customer).[99] Given the fundamental differences between wicked and tame problems, as well as the differences between the two modes of cognition in Figure 1, the logical implication is that the cognitive skills exercised by combatants with tactical expertise in any area of modern warfare differ fundamentally from those required of operational artists and competent strategists.

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[98] Worth adding, though, is David E. Johnson's observation that Israeli problems in Gaza and the West Bank were inherently intractable in the sense that, short of a peace settlement with the Palestinians, they were insoluble (telephone conversation, April 16, 2008). SOD, therefore, focused on using targeted assassinations and occasional incursions to keep the threat to a manageable level, but offered no final solution. In a broad sense, the Israelis themselves characterized operations like the one in Nablus as "mowing the grass." By contrast, the American dilemma in Iraq since 2003 is one that the United States could opt to walk away from, just as the country did in the case of Vietnam. In Gaza and the West Bank, the Israelis do not have this option.

[99] Author's notes from a discussion with Shimon Naveh and other members of OTRI, May 15, 2006.

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CHAPTER 5 > INSTITUTIONALIZING OPERATIONAL ART

To recapitulate the argument so far, Section 2 reviewed the American revolution in training affairs and the positive effects it had on US first-battle competence and fighting power after the Vietnam War. Section 3 identified tactical expertise with intuitive responses based on situation awareness and pattern recognition. Generally speaking, the reasoning mode of human cognition is not involved in intuitive tactical responses beyond oversight, and this oversight is often too lax to override the errors and biases to which intuition is prone without conscious effort. Section 4 identified trends that suggest high levels of tactical expertise should not be counted upon to give American forces as much margin of advantage in the future conflicts as they have in recent campaigns such as Operations Desert Storm, Enduring Freedom, and Iraqi Freedom. Finally, Section 5 argued that the cognitive skills required of operational artists and competent strategists differ fundamentally from those demanded of skilled soldiers, sailors, marines, and airmen in tactical situations. Why? Because the wicked problems of strategy and operations are qualitatively different from the tame ones of tactics. Again, wicked problems do not really have solutions in the engineering sense that tames ones do. Recall, too, that the main lesson USJFCOM drew from OIF was that training had provided US forces with insurmountable advantages at the tactical level, whereas even the major-combat-operations phase of the campaign during March–April 2003 revealed critical shortfalls in performance above the cognitive boundary in Figure 2. Moreover, as the post-regime-change phase of OIF turned into an American occupation beset by terrorism, sectarian violence, and insurgency, additional operational and strategic shortfalls emerged despite the tactical proficiency of American and other coalition forces.

Wicked problems do not really have solutions in the engineering sense that tames ones do.

The likelihood that realistic tactical training will not provide as much advantage in the future as it has in the past is no reason whatsoever to abandon CTCs and exercises such as Red Flag. It would be irresponsible—if not criminally negligent—for the American military to begin sending its soldiers, sailors, marines, and airmen into

combat without providing the realistic training to arm individuals with a robust library of intuitive responses that they can draw upon whenever push comes to shove. At the same time, however, the shortcomings that have become increasingly evident in US operational art and strategy since Taliban and al-Qaeda fighters escaped from Afghanistan's Shahi-Kot Valley in March 2002, together with the profound complexities of wicked problems, argues that operational design and strategy are areas in which substantial improvement in American competence is possible.[100] In fact, improvement appears to be not only possible, not only desirable, but imperative if the United States is to cope with the more complex security challenges of the 21st century. Given the prospect that the margins of advantage that the US military can expect to derive from the superior tactical skills of its individual combatants are likely to decline in the future, an obvious way to compensate is to put greater effort into achieving operational and strategic competence. While tactical incompetence can be costly, mistakes at the operational level in the conception and design of operations tend to be even more costly, and strategic missteps costlier still.

While tactical incompetence can be costly, mistakes at the operational level tend to be even more costly, and strategic missteps costlier still.

Consider, as one example, Operation Market Garden in World War II. The Allied objective was a narrow thrust through Holland to reach the Ruhr and ultimately threaten Berlin in an effort to end the war in Europe in 1944. Field Marshal Bernard Montgomery's plan involved dropping three airborne divisions and a Polish parachute brigade behind German lines to capture a series of bridges over the main rivers and canals of the Netherlands, thereby facilitating the rapid advance of armored units across the Rhine and into Germany.[101] The operation ultimately failed, disproving Montgomery's pivotal assumption that the Germans were on the brink of collapse.[102] Especially costly was the inability of the British 1st Airborne Division, even after elements of the Polish regiment was inserted three days late, to secure the bridge at Arnheim. Of the just over 10,000 troops in this elite British unit at the beginning of Market Garden, some 1,300 were killed, another 6,450 taken prisoner, and the unit saw no further action during World War II. While the 1st Airborne Division managed to hold its position north of the Nederrijn River for eight days rather than the four estimated by Allied planners, and even though one depleted battalion held the bridge area for three days and four nights, the operational context in which 1st Airborne fought so heroically was aptly encapsulated in the title of Cornelius Ryan's 1974 book: *A Bridge Too Far*.

A more sweeping illustration of the fact that tactical virtuosity cannot be depended upon to redeem operational blunders and, especially, strategic ones is provided by

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[100] For insight into Operation Anaconda in the Shahi-Kot Valley, see Sean Naylor, *Not a Good Day To Die: The Untold Story of Operation Anaconda* (New York: Berkeley Caliber Books, 2005); also, Stephen Biddle, *Afghanistan and the Future of Warfare: Implications for Army and Defense Policy* (Carlisle, PA: Strategic Studies Institute, November 2002).

[101] David Eisenhower, *Eisenhower at War 1943–1945* (New York: Random House, 1986), pp. 422–423, 441–444.

[102] Ibid., p. 473.

the German army in World War II. There is little doubt that the tactical performance of the *Wehrmacht* throughout 1939–1945 was "measurably superior to that of any of the armies…it fought."[103] However, Adolph Hitler had "politically emasculated" the *Wehrmacht* long before he invaded Poland, and neither the German army's consistent tactical virtuosity nor its occasional flashes of operational brilliance sufficed to overcome the many strategic mistakes that followed.[104] The decision to invade the Soviet Union in the summer of 1941 without putting German industry on a wartime footing is one telling illustration of strategic incompetence. Another is Hitler's even more calamitous insistence on using the army to carry out a campaign of extermination against the Jews and Bolsheviks rather than trying to mobilize the discontent of a Soviet population long terrorized by Joseph Stalin.[105] These examples, along with Market Garden, bolster the proposition that the US military undoubtedly has more to gain from emphasizing operational art and strategy in coming decades than it stands to lose if the trends detailed in Section 4 do increasingly erode the margins of tactical advantage provided by realistic training.

How urgent is the need to begin moving in this direction? Beyond what has already been said about operational and strategic shortfalls in Afghanistan and Iraq, the fact is that the bulk of US military training and battle experience in recent years has concentrated on tactics, techniques, and procedures (TTPs) aimed at solving tame problems, not the wicked ones of operational art and strategy. Again, the US Army provides the best example, although there is no shortage of evidence for suspecting that the other Services have been at least equally guilty of failing to nurture operational artists, much less passable military strategists. For decades, the primary path to high rank and leadership positions in the US Army has been selection, first, to brigade command and, later, to division command. "Command is preeminent in the hierarchy of importance of assignments, [as] evidenced by the centralized board selection process the Army uses to pick battalion and brigade commanders."[106] Prior to the 9/11 attacks, advancement to brigade and division command depended heavily on performance at the NTC. Since 9/11, combat tours in Iraq or Afghanistan have become more important in determining which officers are promoted and selected to command. Further, as combat tours lengthened to 15 months, the opportunities and time Stateside for broader educational or joint professional experiences have grown more limited while

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[103] Lieutenant General John H. Cushman (US Army, ret.), "Challenge and Response at the Operational and Tactical levels, 1914–45," in Allan R. Millett and Williamson Murray (eds.), *Military Effectiveness*, Vol. III, *The Second World War* (Boston: Allen & Unwin, 1988), pp. 328–329.

[104] Jürgen E. Förster, "The Dynamics of *Volksgemeinschaft*: The Effectiveness of the German Military Establishment in the Second World War," in Millett and Murray, *Military Effectiveness*, Vol. III, *The Second World War*, pp. 182, 191–204.

[105] Martin Malia, *The Soviet Tragedy: A History of Socialism in Russia, 1917–1991* (New York: The Free Press, 1994), p. 286.

[106] David E. Johnson, "Preparing Potential Senior Army Leaders for the Future: An Assessment of Leader Development Efforts in the Post-Cold War Era," RAND, Arroyo Center, September 2002, p. 23.

Hard thinking is precisely what operational art—and strategy for that matter—demands.

the emphasis on tactical experience has become even more pronounced. Granted, prior to 2006, a handful of American officers, including some attending mid-career PME courses such as the Army's School of Advanced Military Studies (SAMS), were afforded the opportunity to visit OTRI and observe Israeli thinking on operational art. Naveh has also been a senior mentor at a number of Army wargames and is a consultant to TRADOC on operational art. On the whole, however, operational art in the sense of systemic operational design focused on wicked problems has yet to make significant inroads into the US Army or the other American Services. Yet, as Huba Wass de Czege concluded after Unified Quest 2007, operational art interpreted as using problem framing to conceive, formulate and design the stratagem most suited to gaining advantage in ill-structured situations is "*the art form most neglected in military doctrine, and most in need of cultivation*."[107]

The remainder of this section, therefore, focuses on the following question: How might the cultivation of operational art in the US military be achieved? More specifically, how might the American military Services set about institutionalizing operational-level competence? This emphasis defers, for now, the problems of institutionalizing either military strategy or national security policy, but as will be explained there are reasons for doing so.

The first point to be made about institutionalizing operational competence is that doing so is likely to be difficult given the instinctive tendencies of tactical practitioners to fall back on patterns and solutions that have proven "good enough for government work" in the past. To hark back to the quotation from Daniel Kahneman in the introduction, people are not inclined to do hard thinking as opposed to jumping on the first plausible thought that comes to mind. Yet hard thinking is precisely what operational art—and strategy for that matter—demands. In this regard, one of the more interesting techniques OTRI developed was to use white boards, rather than maps, as the basis for brainstorming operational problems.[108] The reason was recognition that traditional maps tended to tie thinking too tightly to past assumptions and patterns, whereas the whole point of SOD was to free the commander's thinking from those constraints in order to create a unique line of response tailored to the problem at hand. In Naveh's lexicon, "system framing" and "operation framing" aimed at creating new, situation specific operational frameworks, and white boards enabled commanders to think more creatively with fewer constraints.[109]

Here it may be helpful to observe that preference for white boards serves much the same function as scenario planning did in helping managers at Royal Dutch/Shell

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[107] Brigadier General (US Army, ret.) Huba Wass de Czege, "How Should SOD Derived Ideas Be Inserted into US Army Doctrine?" August 2007, unpublished issue paper, p. 23 (*italics* in original).

[108] Author interview with Brigadier General Gal Hirsch, at OTRI, May 16, 2006. Hirsch was a paratrooper who had attended the third OTRI operational-art course. At the time he was commander of the 91st Division on Israel's northern border.

[109] BG (res.) Dr. Shimon Naveh, "Questions of Operational Art: The Deep Structure of SOD," OTRI presentation, December 2005, slide 6.

think through how to respond to the fourfold jump in the price of a barrel of oil, accompanied by lower demand as consumers began conserving, that followed the October 1973 Arab-Israeli War. Pierre Wack headed the business environment division in Royal Dutch/Shell's planning department during this period and is credited with preparing the company to respond more quickly and effectively to the shocks of 1973–1974. As he later wrote about the utility of scenario planning at Royal Dutch/Shell:

> During stable times, the mental model of a successful decision maker and unfolding reality match. Some adjustment and fine tuning will do. Decision scenarios have little or no leverage.
>
> In times of rapid change and increased complexity, however, the manger's mental model becomes a dangerously mixed bag; rich detail and understanding can coexist with dubious assumptions, selective inattention to alternative ways of interpreting evidence, and illusory projections. In these times, the scenario approach has leverage and can make a difference.
>
> . . .
>
> By presenting other ways of seeing the world, decision scenarios allow managers to break out of a one-eyed view. Scenarios give managers something very precious: the ability to reperceive reality. In a turbulent business environment, there is more to see than managers normally perceive. Highly relevant information goes unnoticed because, being locked into one way of looking, managers fail to see its significance . . .[110]

Operational problems, being wicked, are characterized by complexity and uncertainty embedded in a turbulent environment riddled with uncertainties.

Operational problems, being wicked, are characterized by complexity and uncertainty embedded in a turbulent environment riddled with uncertainties. Wack's notion of "reperceiving" reality goes to the heart of systemic operational design and the preference of OTRI graduates for white boards rather than maps during the framing process.

A related observation is that Israeli experience with system framing and operation framing led to the increasing use of rather abstract concepts and terms. Given the constant goal of transcending inappropriate assumptions and thought patterns, some use of specialized language may have been unavoidable. However, Israeli commanders who tried to apply SOD often found themselves hard pressed to communicate their operational designs to their own tactical leaders tasked with implementing the design unless it was first translated back into more familiar, traditional military terminology.[111]

These observations and insights into the Israeli practice of operational art during 1995–2005 suggest that it may not be the sort of thing that can be readily taught to large numbers of officers as an academic subject at existing American command-and-staff or war colleges. Indeed, operational design in the face of ill-structured and,

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[110] Pierre Wack, "Scenarios: Shooting the Rapids," *Harvard Business Review*, November–December 1985, p. 11.

[111] Gal Hirsch, for example, began using the term "snailing" to describe the low-signature operational pattern he developed while commanding the IDF's Ramallah brigade in 2002. His insight was to take away the terrorists' targets as much as possible. But his subordinates, particularly the reservists, insisted they were lions rather than snails, and "snailing" was even ridiculed in the Israeli press.

possibly, intractable problems may not even be the sort of thing that can be addressed by a new PME program such as the one National Defense University instituted for the 2007–2008 academic year aimed at training a cadre of national security professionals "capable of integrating the contributions of individual Government agencies on behalf of larger national security interests."[112] While this aim addresses a need that has become more and more evident as the American involvement in Iraq has metastasized into the long, hard slog of nation-building that Donald Rumsfeld foresaw as early as October 2003, it is far from clear that it is especially suited to producing senior commanders with the cognitive skills demanded of operational artists, much less of strategists.

What, then, might be a first step toward developing a cadre of senior officers within the US military possessing some degree of competence in operational design? The seniority, selectivity, and limited "class" size of OTRI's approach is worth considering. During Naveh and Tamari's tenure, the IDF's Operational Theory Research Institute only ran its operational course six times during roughly eleven years. The number of officers who attended a given course was never large—no more than 15–20 officers at a time. In the beginning, OTRI's founders looked at the US Army's SAMS course as a potential model, but decided that majors were too junior to be able to exert the kind of impact on future operations that they sought in the immediate future. Hence, they elected to focus the operational art course on prospective commanders rather than staff officers, and to concentrate on colonels and brigadiers likely to advance to senior command positions (although some promising lieutenant colonels and at least one Israeli major general also attended OTRI's course). In contrast to American PME practices, a few of the officers who went through the course did so while actually holding commands. This explains why the course schedule was limited to four days a week. Attendees who were serving commanders needed at least one day a week to catch up on their "day jobs." Thus, OTRI's founders elected to concentrate their operational course on a very select subset of IDF officers, namely those with promotion and command potential who were also perceived to have the cognitive skills and mindset for operational design when confronted with ill-structured problems.

These observations raise delicate questions about how such officers would be identified and nurtured within the US military establishment. Who would identify them, what professional education in operational art should they receive, and how should their careers be managed, especially in terms of future command assignments? These are extremely sensitive issues within and among all four of the US military Services. Rather than trying to craft an American solution, it may be better to consider adopting British practices. Today the armed forces of the United Kingdom have a PME establishment that, like the American one, has placed much greater emphasis on jointness since the Joint Services Command and Staff College (now at Shrivenham,

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[112] John W. Yaeger, "Developing National Security Professionals," *Joint Force Quarterly*, Issue 49, 2nd Quarter 2008, p. 115.

Oxfordshire) replaced four former staff colleges in 1997, due in large part to resource limitations. Then, in 2002, the Defence Academy of the United Kingdom was formed as the umbrella organization to provide civilians and military personnel alike with high-quality education, primarily at the post-graduate level, in fields related to defense as well as doing national-security research.

Since the late 1980s, the problem of identifying officers with the potential for operational art has been handled in the United Kingdom not by a school or college but by the Higher Command and Staff Course (HCSC). The course currently lasts 14 weeks during January–April and is limited to 31 "students," made up of three international officers, three or four individuals from the British Civil Service, and 24 serving British military officers. The military students are mostly of the rank of captain (Royal Navy), colonel (Royal Army/Marines), or group captain (Royal Air Force), but most classes have also included several one-star officers (commodore, brigadier, or air commodore). For British officers, HCSC slots are allocated among the services, and competition for them within each service is apparently keen, since the course serves as a gateway to higher rank and command. Only individuals with the potential for serving at least two higher ranks are selected.

The stated aim of the HCSC is "to prepare selected officers and officials for higher command and staff appointments."[113] However, the core challenge during the course is whether participants can make the transition from tactics to operational art. The HCSC's directing staff, which consists of combat-arms officers who have passed the course, closely monitor student performance with this end in mind. Assessments are made of written work, exercise performance, syndicate discussions, and contributions in plenary sessions. In the case of British Army officers attending the HCSC, the end-of-course report is key for selection to brigade command.[114]

Presently, the US military does not have any equivalent to the British Higher Command and Staff Course, either organizationally or functionally. If the need of the US military is to develop senior officers with the cognitive skills demanded for operational-level competence, then a logical first step would be to create an American equivalent of the HCSC. The National Defense University at Fort McNair in Washington, DC, would appear to be the best venue for such a course. It would not solve all the political and bureaucratic problems associated with the selection and nurturing of American operational artists, but it would be a sensible first step toward addressing a critical need.

Note, too, that the cognitive talents an American HCSC would seek to identify and nurture should not be limited to military officers. The British emphasize a distinction

If the need of the US military is to develop senior officers with the cognitive skills demanded for operational-level competence, then a logical first step would be to create an American equivalent of the HCSC.

[113] Available at http://www.da.mod.uk/colleges/jscsc/Courses/HCSC/document.2005-12-07.1298773627.

[114] The information in this paragraph is based on discussions in early 2008 with J. P. MacIntosh, head of the Advanced Research and Assessment Group, and one member of the HCSC's Directing Staff. The main blocks of instruction in the HCSC's 2008 syllabus are: (1) strategy, security and military thinking; (2) operational art and campaigning; (3) alternative thinking; (4) multi-agency matters; and (5) practical campaigning.

between operations and campaigning. In their lexicon, operations is fundamentally "kinetic," meaning that operational art concentrates on the effective application of lethal force. Campaigning, by comparison, opens the door to utilizing other elements of national power, not just lethal force—indeed, not even predominately kinetic means. This broader perspective is an important one, and suggests why an American version of the HCSC should not be limited to serving military officers.

What bearing might the establishment of an American version of the British HCSC have on the capacity of serving US military officers to design effective military strategies? As already mentioned, the foremost cognitive challenge for uniformed officers lies in making the transition from tactics to operational art. Because the cognitive skills required of operational artists appear to be fundamentally the same as those required of competent military strategists, improving US performance in designing operations would also benefit American military strategy—at least in the long run.

Any real improvements in military strategy must start with national-level strategy.

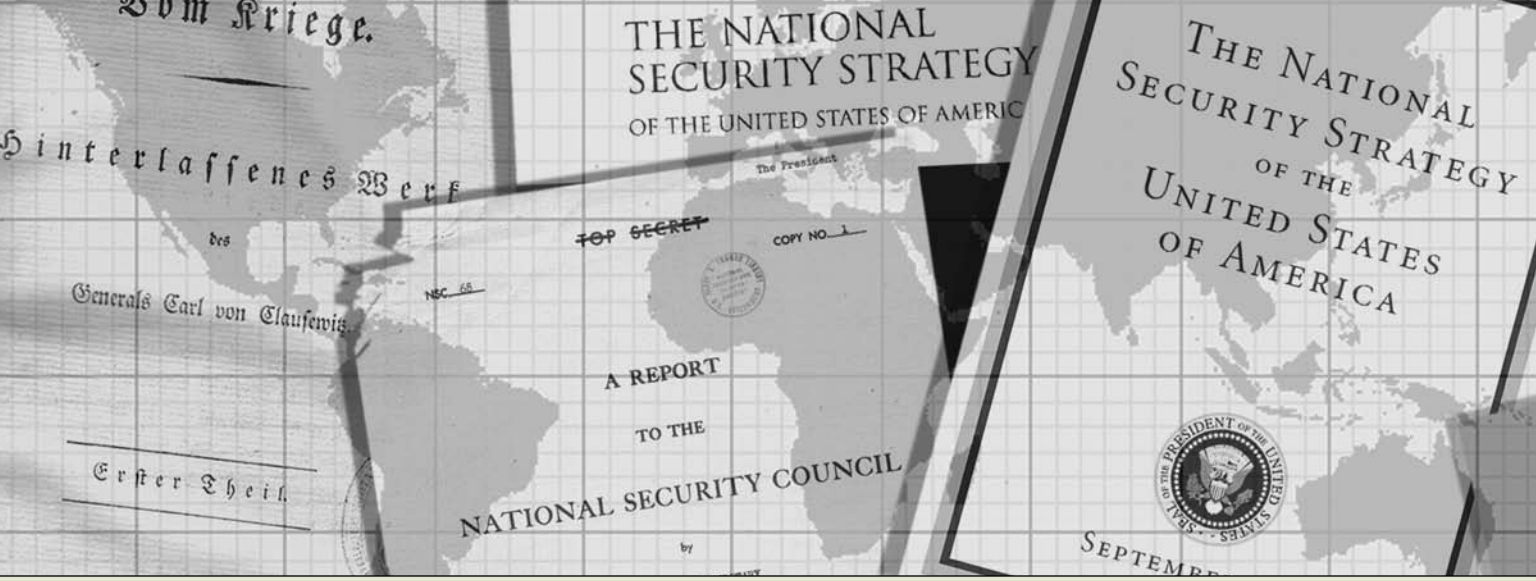
However, there are several reasons for not recommending a parallel course or effort aimed explicitly at trying to educate the officer corps on military strategy. First, British experience indicates that by the time officers are eligible for, or have attained, flag rank, many—perhaps a majority—will still have difficulty getting their thinking out of the "tactical weeds," so to speak. Most officers in combat arms will have gotten where they have in their service careers based mainly on demonstrating tactical competence, and few are likely to retain the mental agility to move beyond tactics. If so, then identifying those individuals with the mindset and talents for operational design, nurturing them, and ensuring that they are given appropriate command assignments should suffice to generate a cadre of officers with the cognitive skills for military strategy.

Second, whether at the operational or strategic level, the cognitive skills needed for competent, much less expert, performance are probably not things that can be taught by traditional PME schooling. One may wish that a new course or different war college curriculum could do so. But the mental agility to make the transition from tactics to operational art or above tends to be either present in officers well along in their careers or not, and the British HCSC focuses on testing and selecting for the presence of this capacity, not as a means for teaching or inculcating it.

Third, in American practice at least, military strategies are inevitably shaped and constrained by national security policy. There is no better evidence of this fact than the efforts of the Joint Chiefs of Staff (JCS) during President Dwight Eisenhower's administration to develop military strategies aimed at rolling back Soviet influence, based on granting military commanders release authority for nuclear weapons, or seeking to reduce forward commitments by withdrawing US forces from Europe.[115] In

[115] Robert R. Bowie and Richard H. Immerman, *Waging Peace: How Eisenhower Shaped an Enduring Cold War Strategy* (Oxford: Oxford University Press, 1998), pp. 161–164, 167–169, 175, 180, 191–192, 194, 197–198.

each of these cases, the president made policy choices that precluded JCS strategies. Thus, US military strategy is contingent on American national security policy, and any real improvements in military strategy must start with national-level strategy.


Vom Kriege.
Hinterlassenes Werk
des
Generals Carl von Clausewitz.
Erster Theil.
THE NATIONAL SECURITY STRATEGY
OF THE UNITED STATES OF AMERIC
The President
TOP SECRET
COPY NO. 1
NSC 68
A REPORT
TO THE
NATIONAL SECURITY COUNCIL
by
THE NATIONAL SECURITY STRATEGY
OF THE
UNITED STATES
OF AMERICA
SEPTEMBER

Unfortunately, American competence at crafting long-term strategy at the national level appears to have been declining for some time. While problems in this area date at least back to the early 1970s—if not to the late 1960s when American nuclear strategy hit a dead end—the most prominent recent case is the American adventure in Iraq.[116] Unquestionably Operation Iraqi Freedom has not gone as smoothly as anticipated by its architects in January and February 2003. True, major combat operations during March–April 2003 swiftly defeated Saddam Hussein's military forces and removed his Baathist regime from power. Since then, however, US forces have become bogged down trying to defeat al Qaeda terrorists and Sunni insurgents while containing sectarian violence between Sunnis, Shia, and Kurds. As a result, the US Army has been stretched thin by the large number of brigades tied down in Iraq and Afghanistan. As Army vice chief General Richard Cody testified in March 2008, the Army is "out of balance," meaning that the "current demand for forces in Iraq and Afghanistan exceeds the sustainable supply" and limits its ability to provide forces for other contingencies.[117] At the same time, ongoing operations in both countries have steadily consumed capital equipment: tanks, helicopters, armored fighting vehicles, etc. American combat deaths in Iraq passed the 4,000 mark in early 2008, and the

American competence at crafting long-term strategy at the national level appears to have been declining for some time.

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[116] Marc Trachenberg has argued that US nuclear strategy hit a dead end during the mid-1960. Especially in Thomas Schelling's case, he writes, strategy was reduced to "tactics writ large—not military tactics, but bargaining tactics; . . . the great problem of international politics, the problem of war and peace, was reduced to the problem of behavior during crisis and after the outbreak of hostilities"—Marc Trachtenberg, *History and Strategy* (Princeton, NJ: Princeton University Press, 1991) p. 45. This view, however, overlooks the contributions of individuals like Andrew W. Marshall from the late 1960s to the end of the Cold War to formulate strategies for long-term competition with the Soviets in peacetime. See, in particular, A. W. Marshall, *Long-Term Competition with the Soviets: A Framework for Strategic Analysis* (Santa Monica, CA: RAND, April 1972), R-862-PR.

[117] General Richard A. Cody, Statement before the Senate Armed Services Committee, Committee on Readiness and Management Support, 2nd Session, 110th Congress, March 13, 2008, p. 1; available at http://armed-services.senate.gov/statemnt/2008/April/Cody%2004-01-08.pdf.

direct costs of the US mission in Iraq have already exceeded prewar estimates by at least an order of magnitude. In February 2003, deputy defense secretary Paul D. Wolfowitz emphasized to the House Committee on the Budget that any estimates of the costs of regime change and Iraqi reconstruction were highly speculative at best. Nevertheless, he also told the committee that press reports of costs in the vicinity of $60–95 billion were not credible, and suggested that Iraq's oil revenues of $15–20 billion a year could cover reconstruction.[118] Through fiscal year 2007, however, some $450 billion has been allocated to OIF and another $127 billion to OEF; adding in homeland security and other costs of the "Global War on Terror," total funding has come to $610 billion.[119] Looking ahead, DoD estimates of future OIF funding requirements suggest that, by 2017, the cumulative bill for Iraq alone will be $835 billion to $1.26 trillion.[120] Combined with the fragility of the security situation inside Iraq even in the wake of the five-brigade surge in 2007, these observations make a *prima facie* case that American strategy since 9/11 has failed to achieve a harmonious fit between the political ends sought and the resources required.

This conclusion is now well supported by evidence that planning for Operation Iraqi Freedom was shortsighted about the problems the United States would face once Saddam Hussein's regime had been overthrown. This shortsightedness, in turn, was compounded by other mistakes once the American liberation of Iraq metastasized into an open-ended occupation. Going into OIF President Bush and defense secretary Rumsfeld

> focused on the combat phase and the military objectives of the operation (removing Saddam Hussein from power and defeating his military forces) and failed to realize that the ultimate political objectives of the operation (establishing a peaceful and democratic Iraq) would either succeed or fail depending on how events unfolded after the military objectives had been achieved.[121]

Subsequently, the dissolution of the Iraqi military, reinforced by L. Paul Bremer's de-Baathification order, left tens of thousands of Iraqis abruptly banned from political life and unemployed in a country saturated with arms.[122] And until Petraeus took over in Iraq, American ground forces appear to have concentrated on tracking down and eliminating terrorists and insurgents rather than providing security for the

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[118] Wolfowitz in "Department of Defense Budget Priorities for Fiscal Year 2004," Hearing before the Committee on the Budget, House of Representatives, Serial No. 108-6, February 27, 2003, pp. 17–18.

[119] Steven M. Kosiak, "The Cost of US Operations in Iraq and Afghanistan and for the War on Terrorism Through Fiscal Year 2007 and Beyond," Center for Strategic and Budgetary Assessments, September 27, 2007, p. 2.

[120] Ibid., p. 5.

[121] Nora Benashel, "Mission Not Accomplished: What Went Wrong with Iraqi Reconstruction," *The Journal of Strategic Studies*, June 2006, p. 467 (*italics* in original).

[122] Thomas E. Ricks, *Fiasco: The American Adventure in Iraq* (New York: The Penguin Press, 2006), pp. 158–166.

Iraqi population. Not only did this initial warfighting orientation reflect the lack of a counterinsurgency strategy during the early years of the American occupation, but it bore a striking resemblance to General William Westmoreland's search-and-destroy operations in Vietnam during 1965–1968.[123] As Antulio Echevarria wrote in 2004, the emphasis of the US military on offensive action aimed at destroying enemy forces in both Vietnam and Iraq prior to Petraeus reflects "an American style of warfare" that amounts to "a way of battle more than a way of war":

> . . . the American way of war tends to shy away from thinking about the complicated process of turning military triumphs, whether on the scale of major campaigns or small-unit actions, into strategic successes.[124]

Until quite recently, then, the American military Services have been inclined to consider post-conflict operations not as a part of war itself, but as something belonging to its aftermath—a view that has obscured "the fact that the principal condition for strategic success in the wars in Afghanistan and Iraq was the establishment of a political (and to a certain extent an economic) order favorable to the United States."[125]

While the symptoms of poor and declining American strategic performance are plain to see, diagnosing the underlying causes requires a degree of clarity about what strategy is and the cognitive requirements for doing it well. Strategy can be a meaningful concept in both competitive and non-competitive situations. In non-competitive situations, strategy usually involves the relatively irreversible commitment of resources to create or build an envisioned future.[126] In competitive situations such as combat or long-term military competition in peacetime, strategy is about finding or creating decisive advantages. Decisive advantages, in turn, generally have to do with asymmetries between the two sides. Thus, strategy in competitive situations boils down to identifying or creating advantages that can be exploited over time to progress toward one's ultimate objectives despite the active opposition of a thinking, reactive adversary. As business strategist Richard Rumelt put it in 2004:

In competitive situations strategy is about finding or creating decisive advantages. Decisive advantages generally have to do with asymmetries between the two sides.

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[123] William C. Westmoreland, *A Soldier Reports* (Garden City, NY: Doubleday, 1976, Da Capro Press ed. 1989), pp. 83, 152; Andrew F. Krepinevich, Jr., *The Army and Vietnam* (Baltimore, MD: The Johns Hopkins University Press, 1986), pp. 190-193; Phillip B. Davidson, *Vietnam at War: The History 1946–1975* (Oxford: Oxford University Press, 1991), pp. 350–354, 360–362.

[124] Antulio J. Echevarria, II, "Toward and American Way of War," Strategic Studies Institute, US Army War College, March 2004, p. 7.

[125] Ibid., p. 18.

[126] Richard P. Rumelt, "Some Thoughts on Business Strategy," PowerPoint presentation, September 25, 2007, slide 3. Rumelt is a professor in the Anderson School of Management at the University of California, Los Angles (UCLA). The occasion for the cited presentation was a seminar on strategy conducted by CSBA for the Office of Net Assessment, Office of the Secretary of Defense.

> The quintessential strategy story is of unexpected strength brought against discovered weakness. Not simply the deft wielding of power, but the actual discovery of power in a situation, an insight into a decisive asymmetry.[127]

The most important corollary to this characterization of strategy concerns our inability to predict the future in any detail. The applicable Arab proverb, which Rumelt recalls first hearing from Pierre Wack, is: *He who predicts the future lies, even if he tells the truth*. The implication is that strategies are *heuristics* in the sense of being guesses as opposed to *solutions* in an engineering sense. For example, when George F. Kennan proposed containment as the overarching American strategic concept for dealing with Soviet power at the beginning of the Cold War, no one knew how the competition would eventually turn out.[128] Even in the late 1980s, when the structural weaknesses of the Soviet system were becoming obvious to many Western observers and Russian elites had lost confidence in the future, the precise timing and the exact way in which the Soviet Union collapsed during 1989–1991 were still beyond prediction. Why? Because among the various causes that contributed to the USSR's dissolution were contingent events such as Mikhail Gorbachev's elevation to general secretary of the Soviet communist party on March 11, 1985, and his later decisions to pursue *perestroika* and *glasnost* in hopes of saving the Soviet system.[129] The unpredictability of the future in social situations such as military competition or outright war is what limits strategy to heuristics, separates strategy from detailed strategic planning (see Figure 4), and underlies the wickedness of wicked problems.

Strategies are *heuristics* in the sense of being guesses as opposed to *solutions* in an engineering sense.

It follows from the heuristic nature of strategy that an overarching *strategic concept* such as containment ultimately requires many underlying *implementing strategies* if it is to be pursued over time with some hope of success as circumstances change and evolve. This distinction is Clark Murdock's and highlights the difference between strategic concepts and the implementation strategies they require.[130] These notions can be used to illuminate the fine structure of containment's implementation during the US-Soviet Cold War (Figure 3).

One final caveat about strategic performance warrants mention. The American strategy of containment in Figure 3 has come to be viewed in the West as having been

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[127] Richard P. Rumelt, unpublished manuscript for a book to be titled *Hard Won*, dated 2004, p. 1 (cited with permission).

[128] Kennan first proposed a policy of a "long-term, patient but firm and vigilant containment of Russian expansive tendencies" until the seeds of decay inherent in the USSR advanced enough to destroy the Bolshevik state from within in a 1947 article published anonymously: see X, "The Sources of Soviet Conduct," *Foreign Affairs*, July 1947.

[129] Walter Laqueur, *The Dream That Failed: Reflections on the Soviet Union* (New York and Oxford: Oxford University Press, 1994), p. 100. Gorbachev's "blindness to the real foundations of Soviet communist power gave rise to policies that helped to destroy that power"—Robert M. Gates, *From the Shadows: The Ultimate Insider's Story of Five Presidents and How They Won the Cold War* (New York: Touchstone, 1996), p. 508.

[130] Clark A. Murdock, *Future Making: Getting Your Organization Ready for What's Next* (Stevensville, MD: Murdock Associates, 2007), p. 118.

a good and efficacious strategy. In hindsight it does appear to have been a wise strategy. But in saying this it is important to understand that the most that can be claimed is a *correlation* between a long-term strategy and the outcome of the competition in which it was pursued. Correlations, however, are not the same thing as causality. A vivid illustration of the difference is the folktale of the Russian czar who learned that the most disease-ridden province in his empire was also the province with the most doctors and then proceeded to address the problem by having all the doctors shot

FIGURE 3. **AMERICAN COLD WAR "STRATEGY"**

Strategic *Concept* ("Grand Strategy"):

- The long-term containment of Soviet expansionist tendencies through persistent pressure until Soviet power is no longer a threat (1947)

Implementing *Strategies*:

- Strategic Air Command (SAC) established (1946) & General Curtis LeMay appointed CINCSAC (1948), which set the stage for massive retaliation
- The European Recovery Program or "Marshall plan" (1947)

  The North Atlantic Treaty Organization (1949)
- Truman's decision to produce the hydrogen bomb (1950)
- A rapid build-up of US military, political, and economic might to contain, if not roll back, Soviet power (NSC 68, April 1950)
- Massive nuclear retaliation, coexistence, and Eisenhower's priority on maintaining a sound US economy (1953)
- Flexible response and countering Soviet wars of national liberation (1960s)
- Détente, including strategic arms limitations agreements with the USSR in 1974 and 1979
- Nixon's normalization of relations with China (1971-1972)
- The Helsinki Accords on human rights (1975)
- Assault Breaker (1978); NATO's Follow-on Forces Attack (1984)
- PD/NSC-59's nuclear targeting of Soviet leaders (1980)
- The Reagan administration's defense build-up (1981) and Strategic Defense Initiative (1983)
- The US response to the Soviet invasion of Afghanistan ("Charlie Wilson's war" in the 1980s)

Source: Barry Watts, CSBA.

dead.[131] In the case of American strategy during the Cold War, it seems reasonable to presume that good strategy helped. But there were also strategic blunders on the Soviet side as well as the deep structural problems. One of the most severe flaws was the fact, pointed out by Friedrich Hayek in the 1940s, that central economic planners could never be as efficient as markets.[132] Alan Greenspan put it best when he observed in 2007 that the verdict on the thesis that central economic planning is superior in allocating resources for the common good to markets operating in the context of property rights backed up by the rule of law and a degree of trust among strangers has "been rendered and, and it is unequivocally negative."[133] Thus, in judging the efficacy of strategies in social competitions, restraint is usually necessary in deciding how much a sensible strategy may have contributed to the ultimate outcome.

Merely muddling through leaves decision makers willing hostages to blind luck and utterly defenseless against the strategies of the other side.

The difference between correlations and how much credit should be attributed to strategies (or operational designs) once the outcomes of either peacetime military competition or wartime conflict have become reasonably clear should not, however, be construed as arguing that strategy is wholly illusory. In 2000, Richard Betts provided a systematic analysis of various reasons for complete skepticism about strategy's efficacy, including how little "demonstrable relationship" there can be between strategies and outcomes, and the impediments to execution inherent in organizational limitations and policymakers' biases.[134] Nevertheless, after examining ten different arguments for denigrating strategy as illusory, Betts concluded that while strategy may often be an illusion it is "not always" so: "Sensible strategy is not impossible, but it is usually difficult and risky, and what works in one case may not in another that seems similar."[135] This conclusion is right on the mark. To slightly modify one of Betts' more telling justifications for taking strategy seriously, what alternatives are there for national leaders and senior military commanders but to engage in strategy? The most plausible alternative is day-to-day muddling through in the vain hope that one will be successful despite having eschewed the hard thinking needed to devise a sensible strategy. But merely muddling through leaves decision makers willing hostages to blind luck and utterly defenseless against the strategies of the other side. Consider, for example, the slim likelihood of regularly beating a chess grand master by simply responding at each turn with whatever next move first pops into one's mind. The reality is that competitive situations force us to make choices, and we also know

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[131] Steven D. Levitt and Stephen J. Dubner, *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything* (New York: HarperCollins, 2005 rev. ed), p. 8.

[132] For Hayek's mature views on the inherent impossibility of central economic planning, see W. W. Bartley III, (ed.), *The Collected Works of F. A. Hayek, Vol. I, The Fatal Conceit: The Errors of Socialism* (Chicago, IL: University of Chicago Press, 1988), pp. 6–10, 14, 19–23, 25, 27, 31–32, 37, 42–43, 49–51, 66–88.

[133] Alan Greenspan, *The Age of Turbulence: Adventures in a New World* (New York: The Penguin Press, 2007), p. 141.

[134] Richard K. Betts, "Is Strategy and Illusion?" *International Security*, Autumn 2000, p. 5.

[135] Ibid., pp. 46, 48.

that intuition alone often fails us. To eschew strategy in matters of strategic choice is to eschew reason. As Betts has pointed out, when making choices in which killing is an issue, eschewing strategy is tantamount to giving up on the use of military force as a morally defensible instrument of policy.[136] More pragmatically, the first option that springs to mind may conceal dubious or mistaken assumptions, or simply fail to be the best option once carefully compared with one or more alternatives. Lastly, both the generation of a few alternatives and their comparison is more a function of reasoning than of intuition.

With these insights in mind regarding strategy, it is now possible to begin teasing out the deeper reasons why American strategic performance has been so poor in recent decades. To put the issue in context, while Iraq tends to be the poster child for the view that American capacity for serious, sustained strategy formulation and implementation is in decline, Aaron Friedberg is right to insist that the problem cannot be blamed on the current administration or its immediate predecessors.[137] That said, what might be some of the reasons for declining performance in an area that risks a loss of efficiency in allocating resources at a minimum, if not strategic catastrophe at worst? Rumelt has spent much of his career thinking about why there is so much bad strategy in business. The number one reason in his experience is the failure to recognize or state that the resources to execute the strategy are scarce.[138] This insight is not exactly new. In 1960, Charles Hitch and Roland McKean made much the same point:

> Resources are always limited in comparison with our wants, always constraining our action. (If they did not, we could do everything, and there would be no problem of choosing preferred courses of action.)[139]

The number one reason is the failure to recognize or state that the resources to execute the strategy are scarce.

Here it should suffice to reiterate that American strategists grossly underestimated the blood and treasure that would be required to turn post-Saddam Iraq into an economically viable, somewhat democratic state. Wolfowitz's previously mentioned comments from February 2003 about the costs of rebuilding Iraq are especially telling.

Another common cause of bad strategy in Rumelt's experience is the tendency to make false assumptions about one's own competence or the causal relationships between one's strategic actions and real-world outcomes. In the run-up to the war, both Vice President Richard Cheney and Wolfowitz expressed confidence that the Iraqi people would see American forces as liberators, not as occupiers, and that there would be no need for a prolonged presence of US military forces in Iraq after regime

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[136] Ibid., pp. 5, 16, 47–48.

[137] Friedberg, "Strengthening U.S. Strategic Planning," p. 47.

[138] Rumelt, "Some Thoughts on Business Strategy," slide 11.

[139] Charles J. Hitch and Roland N. McKean, *The Economics of Defense in the Nuclear Age* (Cambridge, MA: Harvard University Press, 1960), p. 23.

change.[140] As for post-war reconstruction of the country, the head of organization initially created in January 2003 to oversee the effort, Jay Garner (a retired Army lieutenant general), told his staff that they should expect to complete their mission within 90 days.[141] In both areas, American strategy appears to have succumbed to over-confidence, if not hubris.

The hard part of implementing any strategic concept is figuring out how to achieve the desired ends within existing resource and other constraints while taking into account the strengths and weaknesses of both sides.

Last but not least, toward the bottom of Rumelt's list of recurring strategy sins is mistaking strategic goals for strategy.[142] It is not enough to announce desirable ends to be sought. The hard part of implementing any strategic concept is figuring out how to achieve the desired ends within existing resource and other constraints while taking into account the strengths and weaknesses of both sides. As Ken Allard has put it, the notion that strategy is little more than conjuring up some "big, hairy audacious goals" is "absurd."[143] Nonetheless, conflating the serious business of implementing a strategic concept with setting goals appears to have become a recurring pathology among the majority of those involved in crafting American strategy in recent years. To see evidence, one need look no further than the last two editions of the *National Security Strategy of the United States of America*, which were published in 2002 and 2006, respectively. Based on the title of these documents, one would expect them to be concise statements of America's current national-security strategy. But close examination of either the 2002 or 2006 versions reveals little more than lists of goals and sub-goals.

Take the 2002 edition of *The National Security Strategy of the United States of America*. Published roughly a year after al Qaeda's "9/11" attacks on the World Trade Center and the Pentagon, it starts, logically enough, with an appraisal of the United States' position in the world. Totalitarianism, it argues, has been decisively defeated, and the United States finds itself in "a position of unparalleled military strength and great economic and political influence."[144] The announced strategic concept, then, is not to exploit this position of strength for unilateral American advantage, but to create a long peace and a "balance of power that favors human freedom, meaning conditions in which all nations and all societies can choose for themselves the rewards and challenges of political and economic liberty."[145]

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[140] "Department of Defense Budget Priorities for Fiscal Year 2004," p. 9; "Interview with Vice-President Dick Cheney" on Meet the Press, NBS News, March 16, 2003, available at http://www.mtholyoke.edu/acad/intrel/bush/cheneymeetthepress.htm.

[141] Benashel, "Mission Not Accomplished," p. 461.

[142] Betts has made the same observation ("Is Strategy and Illusion?" p. 7).

[143] Kenneth Allard, *Business as War: Battling for Competitive Advantage* (Hoboken, NJ: John Wiley & Sons, 2004), p. 1. Allard's skepticism about the "superficiality and transience of the principal precepts governing strategy in the business world today" is well founded (ibid., p. 88). However, his conception of strategy, whether in business or war, is not appreciably different from traditional definitions (see pp. 85–103).

[144] The White House, *The National Security Strategy of the United States of America*, September 17, 2002, p. iii.

[145] Ibid., p. iii.

Unquestionably, this *strategic concept* is a noble aspiration but, in itself, it does not really constitute a strategy without the specification of concrete, adequately resourced implementation *strategies*. What did the White House's 2002 strategy document offer in this regard? All it went on to say was that, in order to achieve the strategic concept, the United States would:

Strategy is more than setting out audacious goals.

- Champion aspirations for human dignity;
- Strengthen alliances to defeat global terrorism and work to prevent attacks against us and our friends;
- Work with others to defuse regional conflicts;
- Prevent our enemies from threatening us, our allies, and our friends, with weapons of mass destruction;
- Ignite a new era of global economic growth through free markets and free trade;
- Expand the circle of development by opening societies and building the infrastructure of democracy;
- Develop agendas for cooperative action with other main centers of global power; and
- Transform America's national security institutions to meet the challenges and opportunities of the twenty-first century.[146]

These "strategies," however, are little more than a list of sub-goals that, if achieved, would underwrite the overarching strategic goal of achieving a balance of power favoring human freedom. But, again, strategy is more than setting out audacious goals, and the rest of this 2002 strategy document consists of a series of short sections elaborating on these eight sub-goals. It offers little detail or clarity on how American leaders might identify, or create, asymmetries that could be exploited to achieve either America's overriding goal or its supporting sub-goals. As Michèle Flournoy has observed regarding the various national-level strategy papers written in recent years, they "tend to be either glossy, coffee-table documents that articulate an administration's aspirational goals and philosophy or single-agency documents that described how one particular instrument of power should be employed."[147]

To be fair, the last two editions of the *National Security Strategy of the United States of America* are public documents, and it is not implausible to suppose that the detailed strategies an administration might implement to achieve its national

[146] Ibid., pp. 1–2.

[147] Michèle A. Flournoy, "Navigating Treacherous Shoals: Establishing a Robust Interagency Process for National Security Strategy, Planning, and Budgeting," in Richmond M Lloyd (ed.), *Defense Strategy and Forces: Setting Future Directions* (Newport, RI: Naval War College, 2007), p. 271.

security goals would not be set out in public for all to see—especially in the midst of a war. Perhaps goals are all one would reasonably expect to see in public formulations of American national security strategy. On the other hand, the decision of President George W. Bush to initiate a war of choice in Iraq and all that has flowed from that decision shed considerable insight into the detailed strategies his administration chose to pursue in hopes of achieving the national security goals set out in 2002. Once again, we do not yet know how OEF and OIF will ultimately turn out insofar as stated American national security goals developed after 9/11 are concerned. This fact cannot be overemphasized. A positive strategic outcome is still possible—even if at a high cost in blood and treasure for us, our allies, and both the Afghani and Iraqi peoples. Nevertheless, it also seems clear that American strategic performance over the last decade has been as sub-par as the air-to-air performance of US Navy F-4 crews was during the last 13 months of Operation Rolling Thunder. Especially in the case of Operation Iraqi Freedom, strategies were implemented to pursue a laudable strategic concept with little regard for resource constraints while, at the same time, making overly optimistic assumptions about American competence at nation-building and mistaking desirable goals for implementing strategies.

Even more perplexing than the poor strategic performance of the American government during the early days of its adventure in Iraq is the apparent failure to learn from the experience. Take the recurring problem of mistaking strategic goals for strategy. One might have thought that the 2006 version of *The National Security Strategy of the United States of America*, published three-and-a-half year later, might have focused a bit more on concrete strategies to achieve US security goals. But in fact the only discernible change in 2006 was the addition of a ninth goal to the eight in the 2002 document: namely to engage the opportunities and confront the challenges presented by globalization.[148] Beyond that, all one can discern are laudable goals and sub-goals. Evidence of strategy in the sense of detailing concrete steps to achieve these goals and sub-goals within existing resources, other constraints, and responses of our adversaries remains notable for its absence.

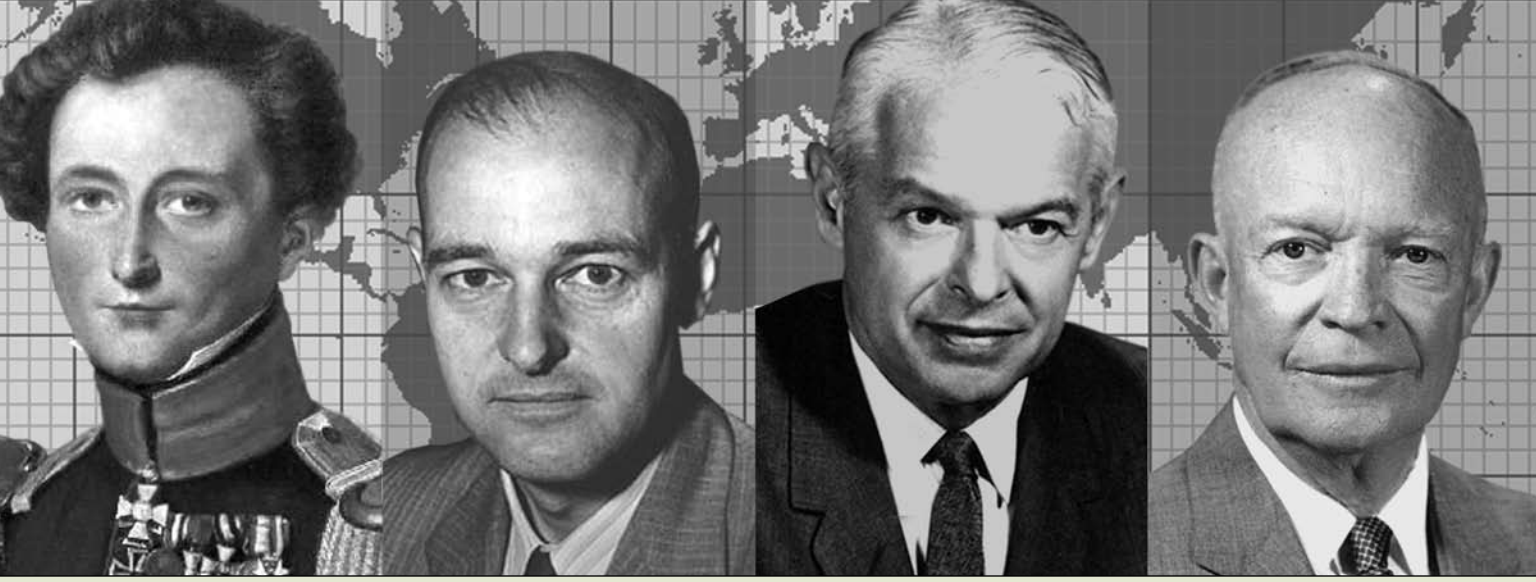
What does all this imply about American strategic competence? On the whole, American strategic performance appears to have been deteriorating for more than a half century. While Figure 3 suggests that the late 1970s and early 1980s saw some sensible strategies implemented directly against the Soviet Union, the overall decline in American strategic performance arguably dates from the 1960s or late 1950s. Even more unsettling, the apparent inability of senior government officials to avoid such fundamental errors as mistaking strategic goals for genuine strategy indicates that there has been no appreciable reversal of the overall decline in recent years. In 2005, the Bush administration brought Peter Feaver from Duke University to the National

[148] The White House, *The National Security Strategy of the United States of America,* March 16, 2006, p. 47.

Security Council for the express purpose of improving US strategy.[149] Feaver's experience during the next two years, however, was that no one in the administration was truly interested in doing serious strategy or strategic thinking. Time and again, his efforts during 2005–2007 to precipitate thinking at the NSC level about long-term strategy were stymied by the near-term focus on how anything he proposed would affect the situation in Iraq.[150]

[149] Stephen Hadley, who succeeded Condoleezza Rice as the president's assistant for national security affairs in early 2005, reorganized the NSC that March. The reorganization established five deputy national security advisors to focus on the President's priorities of winning the war on terror, succeeding in Iraq and Afghanistan, advancing the President's freedom and prosperity agendas, and explaining the president's strategy at home and abroad (Stephen J. Hadley, White House memoranda, March 28, 2005, available at http://www.fas.org/irp/news/2005/03/nsc-reorg.pdf).

[150] Peter D. Feaver, email to Barry Watts, January 5, 2008.



CHAPTER 7 > INSTITUTIONALIZING STRATEGIC COMPETENCE

If, as argued in the previous section, American strategic performance has been poor and deteriorating for decades, then it would appear imperative to take steps to regenerate and preserve some modicum of strategic competence at the top of the US government. The first question that usually comes up in this regard is finding a place to locate a core group of individuals with the cognitive skills and experience to develop long-term strategies at the national level without being hostage to the periodic changes from one presidential administration to the next or the imperatives of day-to-day events. This criterion turns out to be harder to meet than might be thought.

As a point of departure, it may be helpful to consider some of the possibilities suggested by past American experience in formulating national strategy. Since the Second World War, national strategy has been crafted in various parts of the US government's executive branch. One of the earliest formulations of Cold War containment strategy took place in the State Department. In January 1950, President Harry Truman directed Secretary of State Dean Acheson and Secretary of Defense Louis Johnson to undertake a reexamination of US objectives in peace and war, including the possible effects on American goals and strategic plans should the Soviet Union develop thermonuclear bombs.[151] By this time Paul H. Nitze had succeeded George Kennan as head of the State Department's Policy Planning Staff, and Acheson turned to Nitze to oversee the writing of what became NSC-68, "United States Objectives and Programs for National Security."[152] Although Kennan is usually credited with having conceived containment, he did not embrace Nitze's emphasis on a massive military buildup to roll back Soviet power and was "dead set against the writing of NSC-68."[153] Similarly, defense secretary

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[151] S. Nelson Drew (ed.), *NSC-68: Forging the Strategy of Containment* (Washington, DC: National Defense University Press, 1994), p. 33.

[152] Walter Isaacson and Evan Thomas, *The Wise Men: Six Friends and the World They Made* (New York: Simon & Schuster, 1986), p. 490.

[153] Ibid., p. 495.

Louis Johnson largely opted out of this exercise due to his distrust of Acheson and commitment to reducing, rather than increasing, US defense spending.[154] As a result, not only did Nitze end up in charge of the working group at the State Department that drafted NSC-68 in February 1950 but he also did much of the drafting himself.

It is worth noting that NSC-68's recommendation for increased military spending would probably not have been implemented if North Korea had not invaded South Korea in June 1950.[155] NSC-68's strategy rejected standing pat with the current US security programs, isolation, or going to war with the USSR. Instead, the document opted for "more rapid building up of the political, economic, and military strength of the free world" to contain Soviet power until such time as the USSR's leaders abandoned their expansionist goals.[156] While Truman did not immediately embrace NSC-68's conclusions, once war had broken out on the Korean Peninsula an ad hoc NSC committee drafted NSC-68/1, which envisioned US defense spending growing from $35.3 billion in 1951 to $63.4 billion by 1953.[157]

Eisenhower himself initiated Solarium.

The next major Cold War strategic planning effort was President Dwight Eisenhower's "Project Solarium" and the subsequent development of NSC 162/2. Eisenhower himself initiated Solarium. At the end of an off-the-record meeting in May 1953 at which Secretary of State John Foster Dulles presented three strategy options for dealing with the Soviets, Eisenhower directed that they try to resolve the disagreements over them by organizing teams of "bright young fellows" to explore the three options.[158] Each team was to explore an alternative strategy (the current containment policy, a stronger containment policy aimed at drawing a line beyond which further expansion of Soviet power would not be tolerated, and the rollback of Soviet influence).[159] The teams set to work in June 1953, refining their assigned strategies in isolation from one another at National Defense University. They had small support staffs as well as the latest intelligence, economic, and other pertinent data at their disposal.[160] After working for five weeks, the three Solarium teams briefed their results to the president at an all-day, special meeting of the NSC in the White House library on July 16th. Team A (current containment)

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154 Ibid., p. 500.

155 Ibid., p. 504.

156 "A Report to the President Pursuant to the President's Directive of January, 31, 1950," April 7, 1950, Section IX, pp. 1, 25, and Conclusions, pp. 3–4.

157 Drew, *NSC-68: Forging the Strategy of Containment*, p. 98. Actual defense outlays in fiscal year (FY) 1951 totaled $19.6 billion, but grew to $43.4 billion in FY 1953. Budget authority grew from $14.1 billion in FY 1950 to a Korean War peak of $60.2 billion in FY 1952 ($604.2 billion in FY 2009 constant dollars). Source: Office of the Secretary of Defense (Comptroller), *National Defense Budget Estimates for FY 2009*, March 2008, pp. 110, 128.

158 Bowie and Immerman, *Waging Peace*, p. 125. The May 8, 1953, meeting at which Eisenhower decided to undertake a systematic review of US strategy took place in the White House solarium, thereby providing the name for the project.

159 A fourth strategy, preventative war, was contemplated but dropped (Bowie and Immerman, *Waging Peace*, p. 126).

160 Ibid., p. 127.

argued for sufficient military power and other political and psychological actions to contain Soviet power without risking war; Team B (strong containment) argued for a categorical declaration that "any Soviet or Soviet-sponsored armed aggression would invite a general war"; and Team C (rollback) rejected the status quo and argued for accepting even greater risks than Team B in order separate certain areas from the Iron Curtain and "bring about clear-cut defeats" of Soviet power.[161] After the three teams had briefed their strategies, Eisenhower spoke extemporaneously for about 45 minutes, reviewing the main points. He particularly emphasized that he would not accept any strategy that cost too much or risked general war.[162]

Eisenhower's comments, while ruling out rollback, did not immediately produce a new strategy. The Solarium teams felt they had fundamental disagreements. As a result, Solarium set in motion a three-month effort by the NSC and its Planning Board to draft a new statement of American national security policy. The initial drafting was done by the Special Committee appointed by national security advisor Robert Cutler. The Special Committee was composed of Planning Board members representing the Departments of State and Defense, the Joint Chiefs of Staff, and the Central Intelligence Agency; it was chaired by S. Everett Gleason from the NSC, and was assisted during the first month by a member from each of the Solarium teams.[163] NSC 162/2, "Basic National Security Policy," emerged from this effort at the end of October 1950. The new national security strategy chose to minimize the risk of Soviet aggression by maintaining a strong security posture based on:

> massive atomic capability, including necessary bases; an integrated and effective continental air defense system; ready forces of the United States and its allies suitably deployed and adequate to deter or initially to counter aggression, and to discharge required initial tasks in the event of a general war; and an adequate mobilization base; all supported by the determined spirit of the U.S. people.[164]

Solarium and NSC 162/2 constituted one of the more coherent and well-run American strategy efforts during the Cold War.

Thus, the Solarium exercise, together with the subsequent drafting of NSC 162/2 by the NSC's Planning Board, produced what Flournoy judges to have been the last time the National Security Council was "empowered and resourced to lead a robust, interagency strategy and planning process for national security."[165] Unquestionably Solarium and NSC 162/2 constituted one of the more coherent and well-run American strategy efforts during the Cold War, and it was executed under the auspices of the National Security Council. However, after 1960 "the NSC largely abandoned its

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[161] Ibid., pp. 128, 131, 134–135.

[162] Ibid., p. 137.

[163] Ibid., p. 141.

[164] NSC 162/2, "Basic National Security Policy," October 30, 1953, p. 19; available at http://www.jan.vandercrabben.name/nsc/index.php. Not all the strategy issues raised by Solarium were settled with the adoption of NSC 162/2. Some were resolved in other documents and some were not finally settled until a year or more of further debate (Bowie and Immerman, *Waging Peace*, p. 7).

[165] Flournoy, "Navigating Treacherous Shoals," p. 273.

formal role as the locus for national strategic planning."[166] Presidents John Kennedy and Lyndon Johnson, whose experience prior to the presidency had been in Congress, preferred informal and ad hoc meetings with individual advisors or small groups to Eisenhower's more systemic and formal approach.[167]

In the more recent case of Operation Iraqi Freedom, what long-range strategic thinking there was occurred mainly within the Defense Department. The key interactions on overall strategy seem to have been between President George W. Bush, defense secretary Donald Rumsfeld, and General Tommy Franks, the combatant commander of US Central Command. All the now available evidence suggests that Colin Powell, the secretary of state, was frozen out of the real strategic planning, and that the national security advisor, Condoleezza Rice, did not exert much influence on strategic decisions such as putting the Defense Department in charge of Iraqi reconstruction after regime change or Bremer's early decisions on de-Baathification or dissolving the Iraqi military.[168]

These episodes point to three different places in the executive branch where a core group of competent strategists might be located. Given the way OIF has gone so far, one is reluctant to recommend that the Department of Defense be the place. During the Truman administration, the State Department was arguably more successful, but that was a very different time and the threats less complex than those now confronting the United States in Iraq, Afghanistan, and, in the case of nuclear proliferation, in Iran and North Korea. Moreover, even if you include the US Agency for International Development, the State Department lacks the resources and personnel for such tasks as protracted nation building on the scale of Iraq after Saddam Hussein. In many respects, therefore, the National Security Council would appear to be the logical locus for a strategy group — especially from the standpoint of striving for a genuinely interagency focus and developing a long-term perspective that transcends the "tyranny of the in-basket."[169] The drawback, however, is that under recent administrations the national security advisor and NSC staff have become increasingly caught up in domestic politics, functioning more and more as the president's men (and women). At the time, the cabinet-level principals on the National Security Council (the secretaries of state and defense, the director of national intelligence, the chairman of the Joint Chiefs of Staff, etc.) have tended to be too consumed by day-to-day events and representing the positions of their organizations to engage consistently and effectively in the hard intellectual labor of developing long-term strategy. A further constraint on strategy formulation has been the culture of leaks and potentially embarrassing revelations by

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166 Friedberg, "Strengthening U.S. Strategic Planning," p. 51.

167 Bowie and Immerman, *Waging Peace*, pp. 258–259.

168 President Bush signed National Security Presidential Directive (NSPD) 24 on January 20, 2003, which established the Defense Department as the lead agency for postwar Iraq (Bensahel, "What Went Wrong with Iraqi Reconstruction," p. 458).

169 Flournoy, "Navigating Treacherous Shoals," p. 272.

former officials after they have left the government and begun writing their version of events for commercial publication.[170]

What, then, might be a viable solution to the challenges of designing coherent, well-thought-through national security strategy? One possibility might be to embed a small group of strategists—probably no more than ten individuals (including the group's director)—in the Office of Management and Budget (OMB).[171] Positioned in OMB the group would have access to ample data on the resource constraints affecting long-term strategic choices, and it is conceivable that the prospects of at least some members of the strategy group persisting from one administration to the next might be greater in OMB than the National Security Council. A reasonable presumption is that any such long-term strategy group would be headed by a political appointee, wherever it is located in the executive branch. However, by locating it in OMB the need to appoint its director at the beginning of an administration could have the hidden benefit of prompting incoming presidents to make a conscious choice about whether to pay serious attention to national security strategy at all. The feeling of most who have worried about the decline in US strategic performance since the 1960s is that strategy is unlikely to happen if the president does not take a personal interest. Additionally, as a practical matter, the strategy group's access to the president and other senior administration officials would be an important determinant of its ability to institutionalize some level of strategic competence at the top of the US government. After all, the true aim of strategy is to "aid the collective thinking of the highest echelons of the government," not to produce detailed plans.[172] Consequently, if top government decision makers refuse to use the strategists they may have at their disposal, or fail to take strategy seriously, even the most competent, far-sighted strategy organizations will not be able to improve American strategic performance.

Strategy is unlikely to happen if the president does not take a personal interest.

Standing up an entirely new strategy organization is not the only way to institutionalize strategic competence. A less radical approach might be to create a structural mechanism to integrate the efforts of the top officials responsible for strategy and policy planning across the executive branch of the US government. The idea, as Aaron Friedberg suggested in 2007, would be to recreate something along the lines of the Eisenhower-era Planning Board, which was chaired by Eisenhower's national security advisor, often convened two or more times a week, involved nine or ten participants, and produced policy papers that laid out strategic issues and alternatives, including identifying unresolved disagreements among NSC principals.[173] Today, the members of

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[170] Friedberg, "Strengthening U.S. Strategic Planning," p. 53. Project Solarium and NSC 162/2 involved hundreds of people working over a period of months. Yet, as Friedberg notes, "word of the existence of this review, to say nothing of its contents, does not appear to have leaked" (ibid., p. 54).

[171] Andrew W. Marshall, the Director of Net Assessment, Office of the Secretary of Defense, deserves credit for this suggestion.

[172] Friedberg, "Strengthening U.S. Strategic Planning," p. 48.

[173] Ibid., p. 56; Bowie and Immerman, *Waging Peace*, pp. 92–93.

The job of the Planning Board was to do provide the NSC with the best strategic thinking possible in the government.

such a board might include the NSC's director for defense policy and strategy (the position Feaver held until he returned to Duke University in 2007), the heads of the policy planning shops at State and Defense, and designated individuals from the Department of Homeland Security, the Joint Staff, and the intelligence community with similar responsibilities for national strategy. Obviously there are a lot of details that would have to be worked out for such a board to have a fighting chance of beginning to institutionalize strategic competence at the top of the US government. To do so, it would need to concentrate on strategic *thinking*, not strategic *planning*, much less *programming*.[174] For this reason, it might be better designated a "Long-Term Strategy Board." However, if staffed with the right people and allowed to operate more informally than formally, it could "create a powerful mechanism for pooling the perspectives and synchronizing the collective thought and action of the entire executive branch."[175]

Eisenhower's fundamental insight when he established the NSC Planning Board was that the NSC principals simply did not have enough time to do the intellectual hard work needed to produce the best, most informed decisions on national security strategy.[176] In addition, because Eisenhower's cabinet officers also had to represent the positions of their own organizations, there was the danger that the strategic choices they agreed to on their own might gravitate toward bureaucratic compromises between entrenched constituencies rather than the wisest choices from the standpoint of the national interest. The job of the Planning Board, therefore, was to do provide the NSC with the best strategic thinking possible in the government. Though nominated by regular NSC members and appointed by the president, Planning Board members were normally prohibited from accompanying their principals on overseas trips so they "could stay on the job and provide a continuity of planning and thought" to search for statesmen-like strategy solutions that transcended the bureaucratic interests of their departments or agencies.[177]

One caveat needs to be appended to the two possibilities for regenerating American strategic competence just described. Neither of them is intended to develop or oversee the kind of formal strategic planning process—replete with annual, semiannual, and quadrennial reviews, scenario-based planning processes, and so forth—proposed by

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[174] As Henry Mintzberg emphasized in 1994, strategic planning in the business world "has really been *strategic programming*, the articulation and elaboration of strategies, or visions, that already exist" (Henry Mintzberg, "The Fall and Rise of Strategic Planning," *Harvard Business Review*, January–February 1994, p. 107).

[175] Friedberg, "Strengthening U.S. Strategic Planning," p. 57. Friedberg's article also mentions two other possibilities: restructuring the NSC to include a fully staffed planning directorate, and having the national security advisor appoint one or two full-time strategic planners to create an NSC strategic planning cell (ibid., pp. 58–59). Friedberg's preference, though, is for the informal planning board.

[176] In the fall of 1973, defense secretary James R. Schlesinger prevailed upon Andrew W. Marshall to move from the NSC to the Pentagon to establish a net assessment function in the Office of the Secretary of Defense. Schlesinger's motivation appears to have been similar to Eisenhower's in 1953 when he established the NSC Planning Board: to have at his disposal some bright minds without day-to-day line responsibilities to help him with his strategic thinking.

[177] Bowie and Immerman, *Waging Peace*, pp. 91–92.

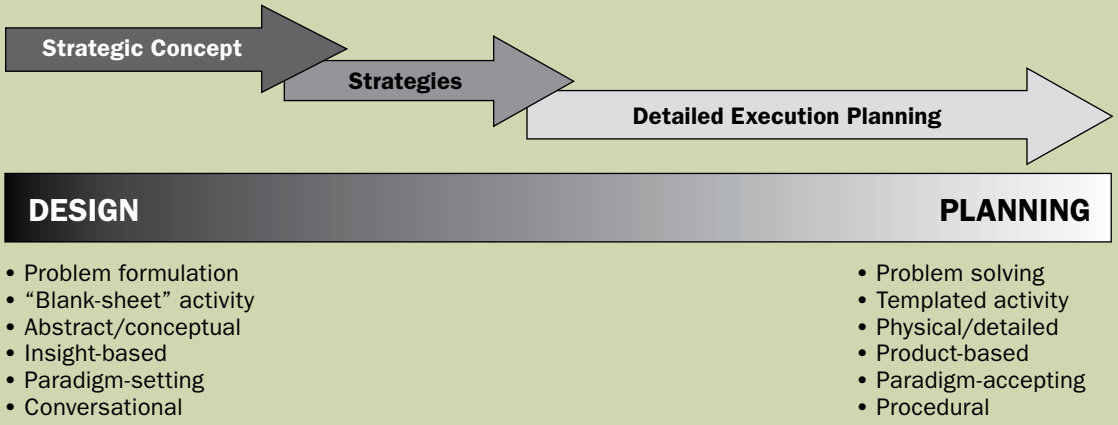
Michèle Flournoy in her 2007 article "Navigating Dangerous Shoals" and other writings with Shawn Brimley.[178] The reason goes back to the distinction mentioned briefly in the previous section about the difference between strategy and detailed strategic planning. Strategic planning *processes* have to do with the coordination of resources in time and space in order to implement specific strategies guided by a strategic concept such as containment. In a competitive situation, strategic concepts and implementing strategies are about finding or generating advantages and determining what to do with them once they have been identified or created. This distinction is crucial, as the respective attributes of strategic design versus execution planning in Figure 4 indicate. One need look no further than to the Joint Staff's complex, bureaucratic strategic planning process, which includes dozens of participating agencies and constituencies, to realize that it is fundamentally about coordination, buy-in, and bureaucratic compromise.

Genuine strategy, by contrast, is about developing heuristic approaches for dealing with ill-structured, wicked problems accompanied by the clear recognition that one cannot, at the outset, predict whether one's strategy will ultimately succeed or not. It is this capacity for heuristic design, whether at the level of operational art, military strategy, or national security policy, that has atrophied in American practice since the Vietnam War, and which so desperately needs improvement.

One cannot, at the outset, predict whether one's strategy will ultimately succeed or not.

[178] See, for example, Michèle A. Flournoy and Shawn W. Brimley, "Strategic Planning for National Security," *Joint Force Quarterly*, 2nd Quarter 2006, pp. 81–86. This article drew on a 2005 paper by Flournoy and Brimley, "Strategic Planning for U.S. National Security: A Project Solarium for the 21st Century," commissioned by the Princeton Project on National Security's working group on threat assessment.

FIGURE 4: **STRATEGY VERSUS PLANNING***



* Figure 4 is adapted from John F. Schmitt, "A Systemic Concept for Campaign Design," working draft for the Concepts and Plans Division, Marine Corps Warfighting Laboratory, version 0.3, June 22, 2006, p. 5.


A REPORT
TO THE
Vom Kriege
Clausewitz

CONCLUSIONS

Since the late 1960s, realistic combat training has provided US soldiers, marines, sailors, and airmen with substantial margins of tactical advantage—especially in early engagements and battles. High quality combat training against skilled opposing forces of the sort pioneered by Topgun, later manifested in Red Flag and NTC rotations, and currently offered at CTCs such as the Joint Readiness Training Center for units deploying to Iraq or Afghanistan, have generated tactical advantage by providing individuals with a library of intuitive responses they can draw upon in time-pressured combat situations. Cognitively, such training enables individuals to avoid the basic mistakes that have been the source of most combat losses during early missions by honing situation awareness.

Trends in automation, synthetic combat environments, human performance enhancements, robotics, and access to guided munitions that do not demand as much operator skill to be employed effectively all argue, however, that the margins of tactical advantage realistic training has given US forces in recent conflicts may confer less of a warfighting edge in future decades. Again, adversaries are free to choose weapons and ways of fighting that reduce the steepness of the learning curves that their individual combatants must climb to achieve "good enough" levels of tactical effectiveness. Suicide bombers, like Japanese Kamikaze pilots during World War II, require far less proficiency than American combatants who hope to survive lengthy, much less repeated, combat tours. Consider, for example, the difficulties even the most highly trained, combat-experienced American troops have experienced in Iraq trying to cope with suicide bombers and improvised explosive devices (IEDs). Similarly, rocket attacks on the Green Zone in Baghdad have proven as difficult to prevent on the basis of superior tactical skills as were similar attacks on airbases like Tan Son Nhut outside Saigon in 1968.

The prospect of declining margins of tactical advantage from realistic combat training is not, of course, a defensible reason for sending America's sons and daughters

into future combat engagements relatively untrained. Here the most straightforward response would be to make greater use of synthetic learning environments to reduce the long-term costs of realistic combat training. The need to move aggressively in this direction was a primary finding of the 2001 Defense Science Board task force on training superiority and training surprise.

If realistic combat training does turn out to confer less advantage in the future than it has in the past, how might the US military offset or compensate for this adverse trend? In the long run, the most robust and difficult to imitate answer is to move "up the food chain" and improve American performance at the operational and strategic levels. The shift in Operation Iraqi Freedom under General Petraeus from concentrating on hunting down terrorists and insurgents to, instead, emphasizing security for the civilian population was a change in operational concept. Designing good operational concepts or strategies, however, requires different cognitive skills than those at the heart of tactical proficiency. Cognitively, the boundary in Figure 2 is reflected in the difference between intuitive responses based on pattern recognition and reasoned responses that analyze underlying assumptions, alternative courses of action, and the very way in which the problem is perceived or framed. It reflects the difference between tame problems, which usually have solutions, and wicked ones, which generally do not. These differences explain why, as recently as 2003, the US military enjoyed insurmountable advantages at the tactical level while critical operational level capabilities were essentially untrained.

For American military officers, the principal challenge in improved operational performance is making the intellectual transition from tactics to operational art. Many officers, perhaps most, will find this a difficult transition, and the mental agility to make it does not seem to be something that can be taught at command-and-staff or war colleges. If this selectionist view of the variance in human cognitive skills is correct, then providing a means of identifying officers who can cope with the wicked problems of operational design offers the most practical way of institutionalizing competence in the US military above the tactical level. Creating an American analog to the British Higher Command and Staff Course would be one way of providing an institutional gate or filter aimed at identifying and nurturing officers with the cognitive skills for operational art (and strategy).

There are three reasons for not attempting any explicit institutional changes to foster better performance by the US armed forces at military strategy. First, the underlying cognitive skills demanded of operational artists appear to be basically the same ones demanded of strategists (Figure 2). Second, military strategy is sufficiently constrained by national security strategy that the dominant issue is American performance at this higher level, and more proficient military strategists have little leverage, given the American tradition of civilian control of the military, to correct strategic missteps or poor strategizing at the level of the president and the National Security Council. Third, assessments of American performance at this level suggest that, at least since the 1970s, US political leaders have been increasingly prone to

such elementary confusions as mistaking desirable grand strategic objectives for actual strategies that might have a chance of achieving the desired ends within existing resource constraints and despite the efforts of adversaries to frustrate American strategy.

The most promising institutional solution to improving strategic performance at the top of the American government may well be to revive something along the lines of the Eisenhower-era Planning Board on the NSC. An NSC Long-Term Strategy Board (LTSB) should be small—populated by eight to ten of the lead strategists and policy planners from the executive departments, the intelligence community, and the Joint Staff. Its members should also be relatively unencumbered with the kinds of line responsibilities that make it so difficult for cabinet-level officers to find the time to do long-term strategy. While the LTSB's chair would be a political appointee, Andrew Krepinevich has suggested that a way of providing continuity from one administration to the next would be to treat the position along the lines of the chairman of the Federal Reserve System. Whether or not the next administration, or a subsequent one, elects to adopt these specific suggestions, the broader point is that reversing the decline in American performance at the level of national security strategy is an urgent matter. To ignore it and embrace merely muddling through is tantamount, as Betts has written, to giving up on the use of military force as a morally defensible instrument of policy.

Reversing the decline in American performance at the level of national security strategy is an urgent matter.

Acknowledgments

Two individuals deserve mention for encouraging and supporting the research that led to this report: Vice Admiral (ret.) Arthur K. Cebrowski and Andrew W. Marshall. Until his untimely death in late 2005, Cebrowski headed the Office of Force Transformation (OFT), Office of the Secretary of Defense (OSD). Marshall directs OSD's Office of Net Assessment, a position he has held since October 1973.

In 2004 Cebrowski asked me to take a look at future US needs for realistic combat training. I wrote two training reports for OFT. They forced me to begin thinking about its current and future importance for the American military.

In 2003, Marshall began asking me to undertake a net assessment of combat training. Though I initially resisted on the grounds that the intelligence community was unlikely to produce the comparative data a traditional net assessment would have required, he eventually agreed to an alternative structure that compared training's current and future efficacy for the US military. That assessment was done in 2006.

The following year, Marshall asked me to explore what history has to say about why it is vital to take strategy seriously and try to do it well. This paper was used as a read-ahead for a September 2007 CSBA conference on strategy, and led directly to the two strategy chapters in this report. As usual, Marshall directed me toward important topics and raised exactly the right questions about them.

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