The Pentagon Labyrinth:
10 Short Essays to Help You Through It

From 10 Pentagon Insiders,
Retired Military Officers and Specialists
with Over 400 Years of Defense Experience

Straus Military Reform Project
Center for Defense Information

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Edited by Winslow T. Wheeler

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Essay 9

"Evaluating Weapons: Sorting the Good from the Bad"

by Pierre M. Sprey

The world is awash in mediocre or even useless weapons. The good ones are few and far between. Telling the difference is of utmost consequence to the people who have to use the weapons—and to the nation that has to pay for them.

If you are seriously trying to understand whether a given fighter, destroyer, tank, rifle or truck is worth acquiring, you will soon find yourself buried under a mountain of misinformation—the more expensive the weapon, the deeper you'll be buried. Here are a few guideposts for digging your way out:

RULE 1: *Weapons are* not *the most important ingredient in winning wars. People come first; ideas are second and hardware is only third.*

After 1973's crushing 80-to-1 victory by Israelis flying F-4s and Mirages against Arab pilots flying MiGs, the commander of the Israeli Air Force (IAF), Gen. Mordecai Hod, famously remarked that the outcome would have been the same if both sides had swapped planes. He was exactly correct, simply because the IAF had the most rigorous system in the world for filtering out all but the most gifted pilots. In every war, it's the few superb pilots that win the air battle. A tiny handful of such pilots have dominated every air-to-air battleground since World War I: roughly 10 percent of all pilots (the "hawks") score 60 percent to 80 percent of the dogfight kills; the other 90 percent of pilots ("doves") are the fodder for the hawks of the opposing side.[1] Technical performance differences between opposing fighter planes pale in comparison.

[1] See Herbert K. Weiss, "Systems Analysis Problems of Limited War," *Annals of Reliability and Maintainability*, AIAA, New York, July 18, 1966. Weiss' extensive probing of air combat, submarine and land battle data are among the most original and useful quantitative analyses of combat data ever done. Available at http://pogoarchives.org/labyrinth/09/01.pdf.

Submarine warfare is strikingly similar: the best 10 percent of the skippers account for the majority of the tonnage sunk. And, when the ace skippers switch boats, the high scores go with the skipper, not with the crew left behind.

Ground combat is much subtler and more complex than air or naval warfare—thus, relative to hardware, people and ideas are even more dominant. In 1940, the Germans, outnumbered 1.5 to 1 in armor by French and British tanks[2]—most of them technically superior—crushed France in just three weeks. The smaller German tank forces hardly mattered; they won because they had far better combat leaders, tactics and morale, and because their troops were far better trained. Fifty years later, commenting on a similar disparity in people, General Schwarzkopf said the outcome of Gulf War I would have been the same if the U.S. and Iraqi armies had exchanged weapons—thereby echoing General Hod.

People are so overwhelmingly important in war that, as we shall see in Rule 5, the single most important characteristic of a weapon is its effect on the user, that is, whether it helps or hurts the user's combat skills, adaptability and fearlessness.

RULE 2: *Not all weapons are equally important in war. Their importance is unrelated to their cost.*

Rifles and machineguns, cheap as they are, are far more important than fighters or bombers in winning wars. That's as true today as it was in World War II. As thoughtful observers have noted, the ubiquitous availability since the 1950s of automatic (burst fire) rifles like the AK-47—as opposed to previous semi-automatic (single shot per trigger squeeze) rifles—is a dominant leveling factor in the astonishing success rate of guerillas against much better equipped regular armies over the last half century. As just one example, in small unit firefights early in the Vietnam War, the AK-47-equipped Viet Cong irregulars had a significant exchange rate advantage over U.S. infantry, despite huge U.S. advantages in artillery, helicopters, radios and vehicles. Sadly, the U.S. infantryman was much hampered by his M-14, a heavy and cumbersome rifle, entirely unusable when in burst fire mode.

That is exactly why in 1963 the theater commander, General Westmoreland, reviewing the remarkable firefight successes of units combat testing a

[2] Karl-Heinz Frieser, *The Blitzkrieg Legend* (Naval Institute Press, 2005). Frieser reports 3,554 British-French tanks (including 300 British) and 2,429 German ones; in total vehicles, the Allies had 300,000 versus only 120,000 for the Germans, still heavily reliant on horse-drawn transport. The crucial German tank advantage was in the "people" domain: *each tank had a radio*. Allied tanks had essentially no radios.

remarkably light and reliable new automatic rifle, the commercially-produced AR-15, immediately demanded that the AR-15 replace the M-14 throughout Vietnam—over the violent objections of the entire U.S. Army ordnance bureaucracy, all die-hard defenders of the M-14 they had spawned. Fearing Army-wide replacement of their pet, the small arms bureaucrats delivered to Westmoreland in late 1964 a "militarized," heavier, less effective version of the AR-15, the infamous early M-16A1, which they deliberately furnished with a powder that would make it jam in combat.[3] As a result, young GIs died with jammed M-16s in their hands. It took three years and a brutally incisive congressional investigation[4] to force the Army bureaucracy to fix the M-16 they had sabotaged.

Other examples of crucially important, cheap—and therefore neglected—systems spring quickly to mind. Acquiring a better five ton truck has far more impact than C-5 or C-17 airlifters on the mobility and sustenance of our troops in battle—but doesn't receive one-hundredth as much congressional or public attention. Similarly, our troops have no squad radio that is effective in jungles, woods and cities. Such a $250 walkie-talkie would do more for winning firefights and saving GI lives than the elaborate, $15 billion JTRS digital do-everything command and control radio network that is the Defense Department's current infatuation.

Weighing the results of the last 70 years of air warfare, cheap $15 million close air support planes will clearly contribute far more to saving American troops in trouble and to winning wars than $2.2 billion B-2s or $160-plus million "multipurpose" fighters like the F-35[5]—no matter whether we're facing Taliban fighters or massed tanks.

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[3] Col. Richard R. Hallock, (U.S. Army, ret.), "M-16 Rifle Case Study," March 16, 1970. (Prepared for the chairman of the President's Blue Ribbon Defense Panel.) This is a document of historic significance, not previously available: a uniquely accurate, insightful, objective and carefully documented account of the M-16's development and the malign battle of the Army bureaucracy—up through the chief of staff—to prevent its adoption. Written by an insider who was an eyewitness to the entire tragedy, from the rifle's brilliant genesis through a searing congressional investigation of Army culpability. Find a copy of this document at http://pogoarchives.org/labyrinth/09/02.pdf.

[4] "Report of the Special Committee on the M16 Rifle Program of the Armed Services Committee of the House of Representatives," October 19, 1967. The Ichord Report stands as one of the all-too-few landmarks of incisive congressional oversight, a must-read for anyone who wants to understand how and why entrenched and incompetent weapons acquisition bureaucrats supported by sleazy contractors lead directly to deaths in combat. Find a copy of this document at http://www.vietnam.ttu.edu/star/images/256/2560131001a.pdf for the first 50 pages and at http://www.vietnam.ttu.edu/star/images/256/2560131001b.pdf for the last six.

[5] See Pierre M. Sprey, "Notes on Close Air Support," Intrec Inc. Internal Study, Potomac, MD, May 1974. This is an extended introduction to the nature of the close air support

Victory at sea is equally unrelated to weapons cost. By the end of 1914, 28 diminutive German submarines, each one-fortieth the cost of a battleship, had wrested control of the seas from the 47 mighty battleships, 195 cruisers and 200 destroyers of the Royal Navy. The battleship had become irrelevant forever—though the obstinacy of hidebound admirals and the corrupting power of lucrative procurement budgets kept the battleship in full tilt production for 30 more years.

And in its carrier reincarnation, the battleship is still soaking up the lion's share of the U.S. Navy budget to this day. The preoccupation with $14 billion carriers escorted by $1 to $3 billion destroyers has led to virtually complete Navy neglect of strategically essential coast control capabilities like $175 million minesweepers, $60 million coastal patrol ships, $35 million fast missile-torpedo boats and $4 million riverine-estuarine warfare boats. In the 1991 Gulf War, the Navy's perennially inadequate minesweeping forces made it too dangerous to launch a 17,000 Marine amphibious assault that General Schwarzkopf had planned.[6] Recently, in the Indian Ocean, the U.S. Navy's utter lack of coastal patrol and fast attack boats left our merchant ships mostly unprotected against pirates in rubber skiffs. As a result, we witnessed the ludicrous scene of using a $1 billion destroyer to subdue four rifle-armed pirates in a 25-foot inflatable.

RULE 3: *You can't tell effective weapons from useless ones without a clear definition of each combat-essential effectiveness characteristic—and that definition must be derived directly from combat evidence.*

Consider the marksman's definition of rifle effectiveness: the ability to kill a standing soldier at 500 yards with one shot. That's plausible to the layman but laughably irrelevant to anyone who's ever been in an infantry firefight. Pursue the marksman's definition and you'll pick a rifle that's got so much recoil, is so heavy and puts out so few rounds that it's nearly useless to the average 19-year-

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(CAS) mission, the effectiveness characteristics required, and a comparison of aircraft available for the mission in 1974 (which remains essentially unchanged today, since no new CAS-specific aircraft or weapons have been developed in the intervening 35 years). Find a copy of this document at http://pogoarchives.org/labyrinth/09/03.pdf. See also Pierre M. Sprey, "Combat Effectiveness Considerations in Designing Close Support Fighters," Briefing for the Office of the Secretary of Defense and for the Industrial College of the Armed Forces, 1983. This includes an effectiveness analysis, design characteristics and cost for a feasible close air support aircraft significantly more lethal and survivable than the A-10 at one-fourth the size and half the cost. See this document at http://pogoarchives.org/labyrinth/09/04.pdf.

[6] Marvin Pokrant, *Desert Storm at Sea: What the Navy Really Did* (Westport: Greenwood, 1999), 98.

old GI ambushed by insurgents spraying lethal bursts from ancient but fully automatic AK-47s.

In stark contrast to the marksman's dream, real infantry rifle combat occurs far more often at 15 to 50 yards than at 500—and never involves single shots or single shooters. Targets are rarely more visible than a momentary muzzle flash or puff of smoke. Getting lots of rounds off nearly instantly is of overwhelming importance. Near misses (suppressive fire) are almost as useful tactically as hits. For a brief exposition of how this distillation of actual rifle combat translates into quantitative effectiveness measures, see below.[7]

Similarly, real air-to-air combat is separated by a chasm from the technologist's dangerously beguiling dream of beyond-visual-range (BVR) combat: push a button, launch a missile at a blip on the scope at 25 miles, then watch the blip disappear without ever having laid eyes on the target. That concept of combat, oblivious to the inconvenient details of real air-to-air fights[8], leads to huge, cumbersome fighters loaded down with tons and tons of heavy stealth skins, massive radars and missiles, and failure-ridden electronics of unmanageable complexity. The most recent fighter built in pursuit of the BVR combat delusion, the F-22, has a $355 million sticker price and costs $47,000 per hour to fly, making it impossible to fly the hours necessary to train pilots adequately (people first!)—and impossible to buy enough fighters to influence any seriously contested air war.

As opposed to the BVR dream, actual air combat almost invariably starts with two or more attackers "bouncing" and surprising an unaware flight of fighters at

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[7] Pierre M. Sprey, "Coming to Grips with Effectiveness in Rifles," Informal Briefing for the Office of the Secretary of Defense, 1981 and for the Congressional Military Reform Caucus. Presents a very brief synopsis behind the brilliant measures of rifle effectiveness developed and defined by Col. Richard R. Hallock as a basis for his 1965-1966 CDEC Small Arms Weapon System (SAWS) Field Experiment. Find this at http://pogoarchives.org/labyrinth/09/05.pdf. For a more detailed, formal definition of these measures and the associated test conditions, see pp. III-3 to III-8 in "The Evaluation of Small Arms Effectiveness Criteria, Volume 1," Intrec Inc. for Defense Advanced Research Projects Agency, May 1975. This is the clearest available description of the pioneering SAWS Field Experiment, including the meticulously realistic details of the computerized target ranges, the training of test subjects, the squad firing scenarios and the extraordinary measures for preserving the test's all-important target range unfamiliarity. Find a copy of this document at http://pogoarchives.org/labyrinth/09/13.pdf.

[8] See Lt Col Patrick Higby, U.S. Air Force, "Promise and Reality: Beyond Visual Range (BVR) Air-to-Air Combat," Research Paper prepared for Air War College Electives Program, Maxwell Air Force Base, March 30, 2005. This paper is available at http://www.vmi.edu/uploadedfiles/archives/adams_center/essaycontest/20042005/higbyp_0405.pdf. It is also available at http://pogoarchives.org/labyrinth/09/06.pdf.

their normal cruise speed (no more than mach .7 to .9 for all existing fighters). The surprise factor looms large: in every war of the past century, 75 percent to 90 percent of all pilots shot down in air-to-air combat were unaware. Attackers must close to within roughly a quarter mile or less to get positive eyeball identification of friend or foe (no current electronic identification is secure enough to prevent shooting friends) before maneuvering into missile or cannon firing position, then getting a shot off as quickly as possible. If the defenders wake up (an infrequent occurrence among "doves"), or if the attackers' first firing pass misses (a frequent occurrence), a dogfight ensues with both sides maneuvering to gain firing position and to defeat enemy firing passes.

To win this kind of fight places a premium on gifted pilots, above all else. In distant second place are the airplane characteristics that will help those pilots to win, as follows:

- achieving surprise by visual and electronic undetectability, e.g. tiny size, no radar emissions and higher *cruise* speed than the enemy's (which ensures that he can't sneak up from behind);

- ability to launch lots of friendly fighters into enemy skies every day (achieved through low sticker price, low maintenance leading to many sorties per day and long cruise endurance) and ability to generate lots of air combat training hours (ditto) to produce plenty of gifted pilots;

- superior agility—i.e., better turn, better acceleration and quicker control response—to gain firing position and defeat enemy firing passes (less weight, more thrust and more wing area each increase agility);

- carrying weapons that deliver reliable kills *quickly* (cannons first, simple infrared missiles second, radar missiles are off the table since they are neither quick nor reliable).

For a more thorough treatment of real fighter combat, and how it shapes effectiveness characteristics, see below.[9]

[9] Pierre M. Sprey, "Comparing a Quarter Century of Fighters," Straus Military Reform Project, Center for Defense Information. April 2006, http://www.cdi.org/pdfs/Sprey%20Quarter%20Century.pdf. The briefing introduces combat-derived measures of effectiveness for air-to-air fighters, measures that are then used to compare existing fighters. See also Pierre M. Sprey, "Comparing the Effectiveness of Air-to-Air Fighters: F-86 to F-18." The study, available at http://pogoarchives.org/labyrinth/09/08.pdf was released by the Office of the Secretary of Defense (PA&E) in April 1982. It defines measures of effectiveness in detail for air-to-air fighters based on combat data, evaluates the effectiveness of past and contemporary

In a similar vein, studying the great successes achieved by tank forces in combat quickly dispels the two pillars of orthodox armor wisdom: first, that combat judges tanks by how well they fight other tanks and, secondly, that the cannon is the tank's most important weapon. Neither dogma has anything to do with the way George Patton or Heinz Guderian employed armor in achieving their astonishing victories. For a more realistic view of tank combat and a definition of tank effectiveness that is more useful in weeding out bad tanks and designing better ones, see a briefing prepared by this author in 1979.[10]

RULE 4: *To understand the characteristics that separate weapons effective in combat from mediocre or useless ones, read ten times more combat histories than research and development (R&D) sagas or weapons technology eulogies. Most useful are combat histories from the foxhole, cockpit or periscope point of view.*

One read through pioneering combat historian S.L.A. Marshall's "Men Against Fire"[11] will teach you more about how rifles are used in combat—and the huge edge enjoyed by burst fire over single shots—than two trailer truckloads of U.S. Army Materiel Command rifle analyses. His 1958 "Sinai Victory"[12] chronicles how raggedy-looking but superbly-trained Israeli platoon leaders and troops, using ancient World War II .50 caliber-equipped jeeps and hand-me-down Spitfire aircraft, achieved blitzkrieg results that none of their contemporary tank-and-jet equipped armies would have been able to match.

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fighters from around the world, and then, using the same measures, synthesizes the design characteristics of a new ultra-agile, ultra-small supercruising fighter (of demonstrably higher effectiveness than today's F-22). For a discussion of effectiveness across several types of weapons using these combat derived criteria, see http://pogoarchives.org/labyrinth/09/07.pdf.

[10] Pierre M. Sprey, "Comparing the Effectiveness of Current Tanks," Briefing for Office of the Secretary of Defense, 1979. Derives combat-history-based measures of effectiveness for tanks and compares the M-1, the M-60 and the T-62. Find a copy of this document at http://pogoarchives.org/labyrinth/09/10.pdf.

[11] S.L.A. Marshall, *Men Against Fire: The Problem of Battle Command* (New York: Morrow, 1947). This is a path-breaking analysis of when and why soldiers do or don't fight. Also read the essential follow-on, Marshall's *The Soldier's Load and Mobility of a Nation* (published by the Marine Corps Association and others) on the rapid destruction of fighting spirit when the infantryman's load exceeds 40 pounds—a central though widely ignored constraint when designing small arms, anti-tank weapons or any other infantry equipment.

[12] S.L.A. Marshall, *Sinai Victory* (New York: Morrow, 1958). Uses the 100 hour Israeli campaign of 1956 to paint an unparalleled picture, rich in combat detail, of why people are vastly more important than hardware. It contains a must-read appendix on the eminently sensible Israeli methods of training for lightning tactical decisions under combat stress.

Read Japanese World War II ace Saburo Sakai's "Samurai!"[13] and Wing Commander H.R. Allen's "Who Won The Battle of Britain"[14] and you'll know far more about the realities of air combat than if you had absorbed every official U.S. Air Force history from World War II to Desert Storm.

To come to grips with the essence of submarine warfare, start with "Silent Victory" by Clay Blair Jr.[15] If you want to understand fast attack boat combat and how much relevance the Navy has lost by neglecting it, read "PT-105" by Dick Keresey[16] and "The Battle of the Torpedo Boats" by Bryan Cooper.[17]

RULE 5: *For any weapon, the list of essential effectiveness characteristics must include the weapon's direct effect on the user's skill, combat adaptability and training (people first!)—and, equally important, the effect on the number of weapons (i.e. the force level) actually delivered on the battlefield. Any definition of effectiveness lacking these two elements is useless.*

In rifles, the effect of the weapon on the user's skill is all too obvious: the four-fold reduction in "kick" (i.e., recoil energy) of the 5.56 mm bullet of the M-16 versus the 7.62 mm of the M-14 allows the average infantryman to put more

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[13] Saburo Sakai, Martin Caiden and Fred Saito, *Samurai!* (Bantam, 1985). The great Japanese ace's superb insights into the dominance of pilot ability, the gulf between the gifted and ungifted pilot, and how the United States achieved air superiority, not by bombing fighter factories but by decimating Japan's gifted pilots in the air.

[14] Wing Commander H.R. Allen, *Who Won the Battle of Britain?* (London: Barker, 1974). This is a common sense, eyewitness account of how inept tactics and appalling Royal Air Force command incompetence caused needless slaughter of young British fighter pilots while allowing the Luftwaffe to gain air superiority over England for two weeks.

[15] Clay Blair Jr., *Silent Victory: The U.S. Submarine War Against Japan* (Naval Institute Press, 1975). This meticulously researched history drives home the dominance of the submarine in the strangling of the Japanese economy, as well as the huge gap in combat results between good and bad skippers. It is commendably frank on the many inexcusable U.S. Navy command blunders: the admirals' short shrift for submarines before and during the war, their incompetent torpedo procurement, their combat-irrelevant tactical doctrine, and their grossly inadequate training and selection of skippers.

[16] Dick Keresey, *PT-105* (U.S. Naval Institute Press, 1996). Chronicles the disproportionate contributions of the lowly, cheap fast boat in interdicting Japanese army transports as well as Imperial Navy fighting ships. It drives home the overwhelming importance of controlling coastal waters and the futility of trying to do so with a deepwater Navy.

[17] Bryan Cooper, *The Battle of the Torpedo Boats* (London: MacDonald, 1970). Covers the strategic importance of fast boat coastal operations and their interdiction successes in the D-Day, Dunkirk, North African and Italian campaigns as well as in the Aegean—and, of course, the fast boat's major role in the Southwest Pacific island-hopping strategy.

bullets on or near the target at any combat-relevant range (and with less training), as is convincingly demonstrated by several critically important analyses of rifle field tests.[18]

In fighters, the effect of high cost and the associated burden of high maintenance downtime are equally obvious. The F-22 costs 10 times as much as an early model F-16 fighter and, due to its huge maintenance load, can fly only half as many sorties per day. Thus, for equal investment, the F-22 delivers only one-twentieth as many airplanes over enemy territory as the F-16—a crippling disadvantage, no matter whether the F-22's stealth and weapons work or don't work.

RULE 6: *In sorting good weapons from bad, relying on R&D test results for assessing combat accuracy, probability of kill, reliability, effective range, etc. is disastrous. Sadly, operational or field test results have become almost equally useless, except for occasionally uncovering unanticipated problems. Unfiltered, non-anecdotal samples of combat results trump everything else.*

Though vastly harder to implement than any outsider can conceive, honest and realistic effectiveness testing of weapons is feasible. But the inherent military bureaucratic obstacles have grown so insurmountable that I know only two examples of truly combat-representative testing, uninfluenced by the procurement bureaucracy: the uniquely brilliant and realistic 1965-1966 SAWS M-14 vs. M-16 vs. AK-47 field test[19] and the A-10 Armament Directorate's Lot Acceptance Verification Program (LAVP) for 30 mm rounds,[20] a superb 1978 airborne firing lethality test against 300 fully functional Soviet and U.S. tank targets that inspired the Live Fire Testing Program mandated by the Congress. Since 1978 there have been essentially no similarly realistic effectiveness tests.

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[18] See pp. 43-59 of "Small Arms Weapon System Analysis: A Review and Evaluation," Department of the Army, Office of the Chief of Staff, 1966. Not previously available, this insightful appendix of a larger study was commissioned, read and then ignored at the highest levels in the Army. Find a copy of this document at http://pogoarchives.org/labyrinth/09/09.pdf. See also pp. 88-90 of the "M-16 Rifle Case Study " (footnote 4) and "Coming to Grips with Effectiveness in Rifles" (footnote 7).

[19] See pp. IV-1 to IV-46 of "The Evaluation of Small Arms Effectiveness Criteria, Volume 1," Intrec, Inc. for Defense Advanced Research Projects Agency, May 1975, available at http://pogoarchives.org/labyrinth/09/13.pdf.

[20] Pierre M. Sprey, "The Terrible Cost of Not Testing with Real Weapons Shooting at Real Targets," Briefing presented to the U.S. Air Force Armament Development and Test Center (Eglin Air Force Base) and to the Congressional Military Reform Caucus, 1979. Contains useful insights into the early roots of live fire testing in the DOD and examples of the tragic combat consequences of flawed testing. Find a copy of this document at http://pogoarchives.org/labyrinth/09/11.pdf.

R&D tests, though perhaps useful to designers and engineers, are inherently useless for judging a weapon's effectiveness because they suffer from an insurmountable conflict of interest: they are controlled by the weapon's development agency. Developer agencies always have a powerful vested interest in proving that their creation is a success and more effective than any alternatives. In theory, operational or field tests, that is, those run not by developers but by military end-users, are free of this conflict. In reality, the "keep the money flowing" pressures of contemporary military senior leadership make rigorous, honest and useful user tests impossible. A 1981 briefing catalogs the most common—and still ongoing—abuses in operational testing.[21] In the nearly three decades since, the list of OT&E abuses has hardly changed, though the bias in test outcomes has become far more egregious. The single most crippling new abuse is the now-common practice of having contractors (or their subsidiaries) "participate" in the writing of operational test reports evaluating their own product.

A dramatic example of the gulf between the rosy optimism of R&D testing and the brutal reality of combat is the AIM-7 Sparrow air-to-air radar missile, the mainstay of the technologists' hopes of beyond-visual-range combat for at least 40 years. The Sparrow's initial R&D tests reported 80 percent to 90 percent kill rates. Of course, nearly 100 percent of these tests were against non-maneuvering drone targets, many of them with artificially strengthened radar returns. Operational tests claimed 50 percent to 60 percent kill rates, shooting at mostly non-maneuvering targets with a token light maneuver thrown in now and then.

Combat reality raised its ugly head in the skies over North Vietnam. Successive "improved" Sparrow models from the AIM-7B to the AIM-7F never got above the 8 percent to 10 percent hit rate. Lots of angry F-4 fighter pilots came home cursing about getting a perfect tail position on a MiG, firing all four Sparrows on board, and watching all four miss. And, bitterest pill of all, they had no cannon onboard the F-4B/C/Ds to use after the missiles missed. Ironically, the Sparrow's highly touted 90 percent R&D kill rate was the aircraft bureaucracy's prime excuse for omitting the gun.

Combat proved the AIM-7 to be worse than useless: the drag and weight penalties of carrying four large missiles and of the expanded fuselage needed to hold the large, heavy radar and its bulbous radome sorely degraded the dogfighting performance of the F-4—as well as that of the later F-14, F-15 and F-18.

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[21] Pierre M. Sprey, "Today's OT&E: Abuses and Remedies," Informal Briefing by Pierre M. Sprey for Congressional Military Reform Caucus, 1981. Find a copy of this document at http://pogoarchives.org/labyrinth/09/12.pdf.

Similar glowing peacetime test reports followed by fatal combat failures can be reported for a multitude of other systems. The $1 million per shot Tomahawk cruise missile passed its Navy Operational Evaluation tests with flying colors. In Gulf War I, DOD admitted the Tomahawk failed to fly and find the target nearly half the time; the true effectiveness rate in attacking actual targets was classified, but lower.[22] Five different expensive radar jamming pods—the ALQ-75, 76, 77, 81 and 87—all passed their operational tests and were sent into Vietnam combat to protect fighters against radar surface-to-air missiles. All five failed. To the end of the war, pilots had to defeat missiles by outmaneuvering them, often while burdened with the heavy pods.

As final food for thought, the testing morass has serious implications for the nation's imagined strategic nuclear capabilities. The accuracy and reliability of our ICBMs are tested under the same appallingly unrealistic conditions and the same "keep the money flowing" pressures as our air-to-air missiles. As a result, it is entirely conceivable that the wartime launch reliability of ballistic missiles and their target miss distances could be *an order of magnitude* worse than reported to the President and to our highest military commanders.

RULE 7: *When judging weapons effectiveness, seek out informed skeptics, both in and out of uniform. Weigh carefully their insights on weapons shortcomings. Ignore the corporate flacks, military procurement program managers, acquisition command flag officers, civilian high tech advocates and, above all, the "experts" and "experienced users" trotted out by the military services whenever their favorite programs are under attack.*

No example demonstrates better the enormous value of an informed skeptic than the Patriot tactical ballistic missile defense system. During Gulf War I, 158 Patriots were fired at incoming Iraqi Scud ballistic missiles, an ancient and ineffective derivative of the World War II German V-2 rocket. Army press releases during the war claimed 100 percent of Scuds were shot down, reducing this to 96 percent in the first testimony to Congress, then 80 percent, 70 percent and a final figure of 52 percent, though with a caveat that only 25 percent could be supported with "high confidence." The Army's slow backpedaling from their initial outrageous claims was entirely due to the meticulous analyses of combat videotapes by a single courageous, highly qualified skeptic, M.I.T. professor Theodore Postol. His final work demonstrated that, *at best*, only 2 to 4 of the 158 incoming Scuds had been destroyed by Patriots, even though more than 3 Patriots were fired at each Scud, on average. In truth, Postol showed there was no conclusive evidence that *any* Scuds had been destroyed by Patriots.

[22] See p. 141 of "Operation Desert Storm: Evaluation of the Air Campaign," U.S. General Accounting Office, GAO/NSIAD-97-134, June 1997, http://www.gao.gov/archive/1997/ns97134.pdf.

Even worse, when the Patriots were deployed to defend Tel Aviv halfway through the Iraqi Scud campaign, Postol's evidence showed they *increased* Israeli casualties per Scud by 74 percent and apartments damaged per Scud by 340 percent—apparently mostly due to explosion debris from the large numbers of Patriots that missed.[23]

Needless to say, the 0 percent to 5 percent combat success rate of Patriot batteries against the primitive Scuds is a poster child for the false claims and likely failures in combat of our $90 billion Ballistic Missile Defense System.

Wrap-Up

There can be no question that independent, reasoned, combat-based effectiveness assessments of our major weapons programs by people both inside and outside DOD are needed more than ever. Be under no illusions about the huge obstacles facing any such attempts—obstacles imposed by corporate hunger for profits, by encrusted military procurement bureaucracies pursuing their self-interest and by military users slavishly defending traditional doctrine. Tackling these powerful interests takes guts and tenacity. But if we don't take them on, the country will continue to pay more and more for shrinking forces that contribute less and less to our nation's security.

[23] Other accounts of the non-success of Patriots in the First Gulf War may vary regarding the details, but they all agree on the fundamental message. Hearings in Congress in April 1992 left serious doubt whether any Scuds had been effectively hit by Patriots. See the testimony for these hearings at http://www.fas.org/spp/starwars/congress/1992_h/. For further analysis, also see George N. Lewis, "How the US Army Assessed as Successful a Missile Defense that Failed Completely," *Breakthroughs of the Security Studies Program of MIT* 12, no. 1 (Spring 2003). http://web.mit.edu/ssp/publications/breakthroughs/Breakthroughs03.pdf. .

The Pentagon Labyrinth aims to help both newcomers and seasoned observers learn how to grapple with the problems of national defense. Intended for readers who are frustrated with the superficial nature of the debate on national security, this handbook takes advantage of the insights of ten unique professionals, each with decades of experience in the armed services, the Pentagon bureaucracy, Congress, the intelligence community, military history, journalism and other disciplines. The short but provocative essays will help you to:

- identify the decay—moral, mental and physical—in America's defenses,
- understand the various "tribes" that run bureaucratic life in the Pentagon,
- appreciate what too many defense journalists are not doing, but should,
- conduct first rate national security oversight instead of second rate theater,
- separate careerists from ethical professionals in senior military and civilian ranks,
- learn to critique strategies, distinguishing the useful from the agenda-driven,
- recognize the pervasive influence of money in defense decision-making,
- unravel the budget games the Pentagon and Congress love to play,
- understand how to sort good weapons from bad—and avoid high cost failures, and
- reform the failed defense procurement system without changing a single law.

The handbook ends with lists of contacts, readings and Web sites carefully selected to facilitate further understanding of the above, and more.

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