Estimating Casualties in a War to Overthrow Saddam

by Michael O'Hanlon

Michael O'Hanlon is a senior fellow at the Brookings Institution. A shorter version of this article appeared in *Slate* in September 2002 and in October 2, 2002, testimony before the House Armed Services Committee. Among his other publications, O'Hanlon is coauthor with Ivo Daalder of *Winning Ugly: NATO's War to Save Kosovo* (Brookings, 2000), wrote *Defense Policy Choices for the Bush Administration* (2001 and 2002), and is coauthor of the Congressional Budget Office's January 1991 study on the likely costs of the Persian Gulf War. He and the editors of *Orbis* hope that, whatever the status of U.S. policy towards Iraq when this article is read, the analysis will be useful not only in regard to a potential invasion of Iraq but to other possible military campaigns.

Is it possible to make meaningful estimates of the likely casualties that would be suffered by U.S. military personnel, Iraqi troops, Iraqi civilians, and other civilian populations in a U.S.-led war to overthrow Saddam Hussein's regime? Answering the questions of whether Saddam can be deterred, whether he is progressing quickly towards a nuclear weapons capability, and whether he has any meaningful links to Al Qaeda are at least as critical as assessing casualties in deciding whether the United States should lead a war against him. But any decision about war would benefit from a general sense of likely war casualties. Indeed, it has been recognized for years that expected casualties are generally an important consideration when Americans make decisions about whether and how to go to war.[1]

The analytical community has been more wary of estimating casualties in a possible future war against Iraq than it was prior to the initiation of Operation Desert Storm in 1991. At that time, a number of scholars, largely using models and databases developed for assessing the NATO-Warsaw Pact military balance during the Cold War, estimated the losses likely to result in a war to expel Iraqi forces from Kuwait. Virtually all these estimates were too high, but they were also generally more accurate than those produced by the Pentagon before the U.S.-led war against Iraq began. Indeed, they were virtually all correct in predicting a short, decisive conflict in which U.S. casualties would be far less than those of the Vietnam

[1] Eric V. Larson, *Casualties and Consensus* (Santa Monica, Calif.: RAND, 1996).

or Korean wars. In that sense, the flawed estimates were still useful. And it may now be possible, building on lessons learned from that experience, to improve the accuracy of predictions for a future war.

This article attempts such a prediction. Consistent with military and strategic logic, and with leaked Pentagon war plans from the summer of 2002, it assumes that such a war would involve about 250,000 American forces. The invasion might involve rapid ground-force strikes against Iraqi command-and-control assets as well as weapons of mass destruction (WMD) sites in the earliest hours of combat, even as main invasion forces march more slowly through Iraq towards Baghdad and other cities.[2] By using these sorts of "inside-out" tactics, U.S. forces would avoid the delays inherent in a mechanized march from Kuwait and other neighboring countries to Baghdad, which would probably take at least several days and provide Saddam tactical warning that he was at risk. The U.S. forces would target Saddam, his palace guard, his elite forces, and his WMD, while avoiding attacks against regular army troops, to encourage their defections—and to leave them intact to help stabilize a post-Saddam Iraq. Given the differences between Iraq and Afghanistan—most notably, the huge size of Iraqi forces vis-à-vis the internal opposition, as well as Iraq's familiarity with U.S. airpower and its ability to take shelter from it in urban settings—it seems unlikely that the "Afghan model" of modern warfare could be easily applied to overthrow Saddam with only U.S. Special Forces and airpower.[3]

A number of uncertainties cloud any effort to make the scenario and the ensuing casualty predictions more precise. Hardest to predict, perhaps, is how many of Iraq's 425,000 troops would resist such an invasion, and for how long.

Despite the uncertainties, there is little reason to doubt the outcome of any such war. There are strategic wildcards—such as an Iraqi attack against Israel that provokes a devastating counterstrike, leading to a fracturing of whatever anti-Saddam coalition the United States might have cobbled together by then. But in military terms, it seems virtually certain that Saddam would be deposed and his regime destroyed.

If the war's outcome is not in real doubt, the costs of victory are. The following analysis attempts to narrow down the range of uncertainty

[2] On Pentagon war plans, see David E. Sanger and Thom Shanker, "U.S. Exploring Baghdad Strike As Iraq Option," *New York Times*, July 29, 2002; and Eric Schmitt, "U.S. Plan for Iraq is Said to Include Attack on Three Sides," *New York Times*, July 5, 2002. On the military logic and why the so-called Afghanistan model of warfare (relying on indigenous resistance elements, U.S. special forces, and American airpower) will likely not suffice in Iraq, see John Keegan, "'Heavy Invasion Is Best Option," *London Daily Telegraph*, Aug. 6, 2002; and Martin Indyk, Philip Gordon, and Michael O'Hanlon, "Getting Serious About Iraq," *Survival*, vol. 44, no. 3 (Autumn 2002).

[3] See Bill Gertz and Rowan Scarborough, "Afghanistan lessons don't apply to Iraq, general says," *Washington Times*, Aug. 22, 2002; and Philip Gordon, Martin Indyk, and Michael O'Hanlon, "Getting Serious About Iraq," *Survival* (Autumn 2002).

somewhat, while avoiding any suggestion that these types of predictions can be precise. My findings suggest that the United States and any other foreign militaries that ultimately participate in a war to change regimes in Baghdad could together lose anywhere from about 100 to 5,000 personnel. (Numbers of wounded troops could be four to five times as high, making for total casualties ranging roughly from 500 to 30,000.) The lower end of the range is only realistic if Iraq quickly capitulates, making an actual war very short in duration or even unnecessary, or if Iraqi forces can be drawn out of the cities to fight in the open. The upper ranges appear relatively unlikely to occur but cannot be dismissed.

Iraqi losses, including military personnel as well as troops, would probably be ten to twenty times as high as those of the invading forces. In rough terms, they might range from 1,000 to 100,000. If the warfare took place largely outside of cities most of these casualties would probably be military personnel. If the combat were in urban settings, then the majority of Iraqi losses would probably be civilians killed inadvertently in the course of the fighting.

Other groups would be at risk as well. Iraq probably has one to two dozen SCUD missiles capable of reaching populated regions in most of its neighbors' territories. Thankfully, their capacity to distribute chemical or biological agents abroad in such a way as to cause casualties is suspect. Saddam's special agents probably have only limited capacity to strike at Western targets. That said, should they enter into alliance with Hezbollah or Al Qaeda, it is possible that they could cause hundreds or even thousands of civilian casualties in places like Israel, Europe, and the United States through chemical or biological agents.

These results are sobering. To enter into a war against Saddam's regime with the expectation that it would be an easy victory would be irresponsible. Yet there is little reason to doubt that the United States and its allies would win a war quickly and with relatively modest casualties to their own forces by the standards of major military operations. Iraqi casualties could be much higher (though still almost surely an order of magnitude less than what Iraq suffered during the Iran-Iraq war of the 1980s by way of comparison[4]). For policymaking purposes, therefore, my results suggest that the casualty issue should raise the threshold for military action somewhat, by comparison with the implications of much of the recent American debate on the subject. But they also suggest that war is a viable option, should Saddam show signs of expanding his ties to terrorist organizations such as Al Qaeda or making more rapid progress towards a nuclear weapons capability.

This article first revisits the Desert Storm conflict, briefly summarizing the predictions made prior to that war and comparing them with the actual outcome, and shows how they can be adjusted to account for the actual

[4] For estimates, Anthony H. Cordesman and Abraham R. Wagner, *The Lessons of Modern War, Volume II: The Iran-Iraq War* (Boulder, Colo.: Westview Press, 1990), p. 3. The authors estimate that 150,00 to 340,000 Iraqis were killed and 400,000 to 700,000 wounded (Iranian casualties were estimated to be roughly twice as high).

outcome of that conflict. Then it broadens the methodological approach, surveying other recent U.S. combat experiences that featured urban fighting, both for their broad lessons and for their quantitative combat data. It applies these findings to derive estimates of American and Iraqi casualties in a future U.S.-Iraq war that may be more accurate than those based on the Desert Storm experience. Finally, the article estimates likely casualties from Iraqi use of WMD on U.S. troops and any targeted civilian populations.

Lessons from Desert Storm

In the 1980s, the scholarly community produced several studies using simple military models to forecast battle outcomes and casualties. The models were first employed to size up the NATO-Warsaw Pact military balance, but later applied for other purposes as well; they were also the subject of vigorous academic and policy debate.[5]

In particular, two main models were developed during this time period in the open literature. They were the Kugler-Posen "attrition-FEBA [forward edge of the battle area] expansion" model and the Epstein adaptive dynamic model. Both are more sophisticated than the famous, century-old Lanchester equations, which require simplifying assumptions about the nature of weaponry that apply much better to eighteenth-century musket fire, nineteenth-century battleship duels, or World War I artillery exchanges than to the modern battlefield.[6] They are much less sophisticated than the detailed, and classified, computer models such as "TACWAR" and "Janus" used by the Pentagon community to predict combat outcomes. But they benefit from their transparency, simplicity, and accessibility.[7] They also have every bit as good a track record in recent times of predicting combat outcomes.

[5] See for example, John J. Mearsheimer, "Why the Soviets Can't Win Quickly in Central Europe," *International Security*, vol. 7, no. 1 (summer 1982), reprinted in Steven E. Miller, ed., *Conventional Forces and American Defense Policy* (Princeton, N.J.: Princeton University Press, 1986), pp. 121–57; Barry R. Posen, "Measuring the European Conventional Balance: Coping with Complexity in Threat Assessment," *International Security*, vol. 9, no. 3 (Winter 1984/85), reprinted in Miller, ed., *Conventional Forces and American Defense Policy*, pp. 79–120; Joshua M. Epstein, "Dynamic Analysis and the Conventional Balance in Europe," *International Security*, vol. 12, no. 4 (Spring 1988), pp. 154–165; Eliot A. Cohen, "Toward Better Net Assessment: Rethinking the European Conventional Balance," *International Security*, vol. 13, no. 1 (Summer 1988), pp. 50–89; Steven J. Zaloga and Malcolm Chalmers, "Is There a Tank Gap?: Comparing NATO and Warsaw Pact Tank Fleets," *International Security*, vol. 13, no. 1 (Summer 1988), pp. 5–49; and Lutz Unterseher, "Correspondence: The Tank Gap Data Flap," *International Security*, vol. 13, no. 4 (Spring 1989), pp. 180–87.

[6] For a good explanation and critique of the Lanchester equations, see Joshua M. Epstein, *Strategy and Force Planning: The Case of the Persian Gulf* (Washington, D.C.: Brookings Institution, 1987), pp. 146–155.

[7] For an explanation of the advantages of simpler, more transparent models, see Zalmay Khalilzad and David Ochmanek, "Rethinking US Defence Planning," *Survival*, vol. 39, no. 1 (Spring 1997), pp. 43–64.

The first of these unclassified and relatively simple models, developed by Richard Kugler (now at National Defense University in Washington) and Barry Posen (of MIT), was optimized for a war of attrition in which NATO was presumed to be on the defensive. It is based on the assumption that a military of sufficient size can hold a front of a given length against all-out enemy assault. The defender should be able to defend its territory, provided it can reinforce its losses and protect any bulges in its flanks caused by attacker-forward progress with a sufficient force-to-space ratio.[8]

The second model, developed by Joshua Epstein at the Brookings Institution, has numerous similarities with the Kugler-Posen framework but challenges the idea that a sufficient "force-to-space" ratio ensures a viable defense. It also allows for the possibility that a defender might withdraw in order to buy time, improve its position, or slow the pace of battle. In other words, geography and the movement of forces are still part of the model. But in contrast to the FEBA expansion concept, Epstein's model causes the movement and geographic disposition of forces to influence casualty rates rather than to determine the adequacy of a given-sized defense for holding a given length of front against breakthrough attempts.[9]

Both of these models also specifically incorporate a role for ground-attack aircraft. Both focus on armored divisional equivalents and their heavy weaponry as the main dynamic variables in their associated equations. Armored division equivalents reflect not just the quantity of armored formations, but also their quality. A user of either model then specifies an assumed daily loss rate for the attacker, usually 1–5 percent per day for engaged troops, consistent with most of the experiences of World War II battles, subsequent Arab-Israeli wars, and other conflicts (though Epstein's model allows the defender to drive this maximum rate downward by assuming a defender retreat). Both then require the user to estimate an "exchange rate," or proportionality factor linking the losses of the attacker to those of the defender. This exchange rate also reflects the quality rather than simply the quantity of troops and equipment on each side of the war. Human casualties must be inferred once armored losses are calculated, but that is a straightforward exercise, provided that armored forces are in fact what make up the main combat formations of the battle at hand.

"Predicting" Desert Storm Before the War

How did these various models do in estimating the outcome of Operation Desert Storm? As noted, they both were used to predict rapid, decisive victory by coalition forces, with considerably higher casualties on the

[8] See Barry R. Posen, "Measuring the European Conventional Balance," pp. 79–120.

[9] See for example, Epstein, *Strategy and Force Planning*, pp. 63–88, 117–125; and Joshua M. Epstein, *Conventional Force Relations: A Dynamic Assessment* (Washington, D.C.: Brookings, 1990), pp. 48–80.

Iraqi side than the American side, and in that regard Posen and Epstein were both correct. More specifically, Posen forecast weeks of combat and 4,000 to 11,000 coalition casualties (including dead and wounded).[10] Epstein predicted weeks of combat as well, and a slightly broader casualty range of 3,000 to 16,000 (again, dead and wounded combined).[11] Both used models based on the premise of attrition warfare after relatively short air campaigns, given what was known about likely Pentagon war plans at the time. In that sense, they were less formal predictions than rough estimates based on publicly available indications of likely battle plans. The assumption of attrition warfare was largely correct, at least in the opening hours of combat, for U.S. Marines and associated forces who penetrated Iraqi defenses and drove towards Kuwait City. It was incorrect for the forces led by the Army's Seventh Corps, which executed the famous "left hook' to the west of Iraqi defenses, outflanking Iraqi forces in their initial movements, though engaging in occasional combat with Saddam's military thereafter.[12]

Meanwhile, press reports suggested that the Pentagon was prepared for 30,000 or more casualties in Operation Desert Storm, even though it presumably did have access to detailed battle plans when making its predictions.[13] For all of these estimates, one would presume that 15–20 percent of all U.S. casualties would have resulted in deaths and the rest in wounded personnel, given historical norms as well as the benefits of modern medical care.[14]

In the actual event, losses were less than forecast. By official count, 382 Americans died in the southwest Asian theater in the course of Operation Desert Shield, which began in August 1990, and Desert Storm, as that operation was renamed in January 1991. That count includes prewar and postwar accidents and other non-hostile acts. A total of 147 U.S. troops died in combat; of them, 35 were killed accidentally by friendly fire. About 500 additional Americans were wounded.[15] Considering allied forces as well, and using round figures, the coalition suffered about 240 combat deaths, 500 deaths over the course of the entire operation from all causes, and about 1,500 casualties including killed and wounded.[16]

[10] Barry R. Posen, "Political Objectives and Military Options in the Persian Gulf," Defense and Arms Control Studies Working Paper, MIT, Cambridge, Mass. (November 1990), pp. 24–25.

[11] Joshua M. Epstein, "War with Iraq: What Price Victory?" Briefing Paper, Brookings Institution, December 1990.

[12] Michael R. Gordon and Bernard E. Trainor, *The General's War: The Inside Story of the Conflict in the Gulf* (Boston, Mass.: Little, Brown, and Co., 1995), pp. 355–380.

[13] Congressional Budget Office, "Costs of Operation Desert Shield," January 1991, p. 15.

[14] Dupuy, *Attrition*, pp. 73–74, 131.

[15] See Directorate for Information Operations and Reports, "Persian Gulf War: Desert Shield and Desert Storm," Department of Defense, Dec. 15, 2001 (http://web1.whs.osd.mil/mmid/casualty); DoD, *Conduct of the Persian Gulf War: Final Report to Congress* (April, 1992), p. M-1.

[16] See also, Lawrence Freedman and Efraim Karsh, *The Gulf Conflict, 1990–1991; Diplomacy and War in the New World Order* (Princeton, N.J.: Princeton University Press, 1993), p. 409.

How far off were the prewar estimates, and what do the inaccuracies tell us about the value of trying to predict casualties? The lower bounds of the casualty estimates were actually only about a factor of two too high, though the midpoints of the estimates were off by about a factor of ten. On the whole, these casualty estimation efforts were rather successful despite their inaccuracies, especially for the broad policy points they implied—that war would be decisive, victorious, and not very bloody by the standards of past major conflicts.

"Predicting" Desert Storm After the Fact

With the right inputs and a clearer indication of how long the air war would last prior to the ground campaign, the above models could have done an even better job of estimating likely casualties in Desert Storm. To make the Kugler-Posen and Epstein models more accurately generate the results observed in Desert Storm, one can begin by observing that Iraqi forces proved less adept at armored fighting than many had feared. Stephen Biddle has enumerated many of the basic mistakes the Iraqis made, including failing to post advance guards near trench lines or remove dirt from the vicinity of those trench lines to keep the locations of dug-in forces secret.[17]

In addition, American forces benefited from their supporting superstructure—intelligence, communications, equipment maintenance, and logistics support. The models, focused as they are on combat units and traditional weaponry and dependent on past combat data to generate battlefield performance parameters, do not tend to highlight such capabilities. These facets of modern war give an even greater benefit to a military like the U.S. armed forces, capable as it is of competently assimilating them all into the way it fights, and confer an even greater disadvantage on a country like Iraq that fails to understand or counter them.[18]

High technology, particularly the ability of U.S. airpower to prepare the battlefield for more than a month before the ground war, also played an unanticipated role. For example, the tactic of "tank plinking," in which laser-guided bombs were dropped on Iraqi armor (often in the early evening, when the desert sands cooled more quickly than Iraqi armor, revealing the locations of the latter to infrared sensors), was only developed in the course of the war. It could not have been easily foreseen in a combat prediction done before the war began. The ability of coalition aircraft to undertake that and other effective tactics from high altitude, out of range of Iraq's man-portable surface-to-air missiles, was also not foreseen—even by war

[17] Stephen Biddle, "Victory Misunderstood: What the Gulf War Tells Us about the Future of Conflict," *International Security*, vol. 21, no. 2 (Fall 1996), pp. 139–79.

[18] Stephen Biddle, "The Past as Prologue: Assessing Theories of Future Warfare," *Security Studies*, vol. 8, no. 1 (Autumn 1998), pp. 1–74.

planners, who had coalition pilots fly low for the first days of battle. More generally, American military equipment turned out to be even better than expected, by comparison with Soviet weaponry such as that fielded by the Iraqis. The WEI-WUV system, which combines a weapon effectiveness index with a weighted unit value, typically gave U.S. equipment an edge of only 10–20 percent over Soviet equipment of similar vintage, but in fact American weaponry outperformed Iraqi hardware more than these numbers would suggest.[19] As a result of all these factors, the American-led victory over Iraq was far more decisive than Israeli victories in previous wars against Syria, Jordan, and Egypt.[20]

Can these factors be adjusted to make future predictions more accurate? To a large extent, the answer is surely yes. The ability of coalition forces to wage an air war indefinitely prior to any ground assault can be reflected in how the models are used.[21] Superior American equipment can be reflected in a higher adjusted score for the U.S. inputs to battle.[22] Superior American fighting capability and poor Iraqi competence can be reflected in a lopsided "combat exchange ratio" that further amplifies the adjustments already made due to varying equipment quality. The U.S. ability to stay out of range of much Iraqi fire, at least on the open battlefield, can be reflected in a much lower daily attrition rate for the attacker than usually assumed.

One can get the gist of this without wading through complex calculations. Considerable uncertainty still surrounds the issue of Iraqi losses in Operation Desert Storm. But Iraq appears to have lost roughly 1,100 to 1,400 tanks, about 800 armored personnel carriers, and 1,000 to 1,500 artillery tubes during the air war. It lost another 1,000 to 1,200 tanks, about 700 armored personnel carriers, and 1,000 or more artillery tubes during

[19] U.S. Army Concepts Analysis Agency, War Gaming Directorate, *Weapon Effectiveness Indices/Weighted Unit Values III* (Bethesda, Md.: CAA, 1979).

[20] See Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey Summary Report* (Washington, D.C.: Government Printing Office, 1993), pp. 21, 58–64, 155; and Les Aspin and William Dickinson, *Defense for a New Era: Lessons of the Persian Gulf War* (Washington: Brassey's, 1992), pp. 1–41; for data on Arab-Israeli wars, see Posen, "Measuring the European Conventional Balance," p. 113; and Dupuy, *Numbers, Predictions, and War*, pp. 118–139.

[21] Other work, such as that done at the RAND Corporation, improves the inputs used in the air-only parts of the models. See Christopher Bowie, Fred Frostic, Kevin Lewis, John Lund, David Ochmanek, and Philip Propper, *The New Calculus* (Santa Monica, Calif.: RAND, 1993); David A. Ochmanek, Edward R. Harshberger, David E. Thaler, and Glenn A. Kent, *To Find, and Not to Yield* (Santa Monica, Calif.: RAND, 1998).

[22] One way in which this has already been done is reflected is through the so-called TASCFORM scoring system for military equipment, which gives a greater weight to high technology weaponry than did the WEI-WUV system; see Lane Pierrot, *Structuring U.S. Forces After the Cold War: Costs and Effects of Increased Reliance on the Reserves* (Washington, D.C.: Congressional Budget Office, 1992), pp. 46–53; and Michael E. O'Hanlon, *The Art of War in the Age of Peace: U.S. Military Posture for the Post–Cold War World* (Westport, Conn.: Praeger, 1992), p. 67.

the ground campaign. That translates into about three to four divisions lost during the air war and again as many during the ground war—though since each Iraqi division is only one-third to one-half as good as an American division, its losses were more like 1.5 "armored division equivalents" in each of the two main phases of the battle. These losses came out of initial Iraqi assets of up to 4,000 tanks, 3,000 artillery tubes, and 3,000 armored personnel carriers in the Kuwaiti theater (as well as about 340,000 personnel).[23] Iraqi personnel casualties are even more uncertain, but probably numbered in the low tens of thousands. Somewhat more than 2,000 Iraqi civilians are also believed to have died in the course of the conflict.[24]

The equipment losses resulted from total use of about 10,000 precision-guided air-to-ground munitions (PGMs) including Maverick and Walleye air-to-surface missiles and laser-guided bombs, as well as from ground fire. PGM attacks were most effective when Iraqi forces were in motion, as during the battle of Al Khafji in January, or after February 6, when the tactic of "tank plinking" was devised. Counting strikes against non-armored military vehicles as well, it appears that PGMs achieved roughly a 50 percent kill probability per shot fired. During the ground war, aircraft were most effective not in close-air support, but in striking moving Iraqi equipment well behind front lines.[25]

Following the Kugler-Posen and Epstein frameworks, one can then proceed as follows for understanding the ground war. (The air war results follow from the models immediately, once one enters in kill probabilities and sortie and attrition rates.) Coalition forces had the equivalent of roughly ten armored divisions in place prior to the outbreak of hostilities, as well as the capacity for conducting about 1,000 ground-attack sorties per day. By contrast, Iraq's forces included only about three equivalent divisions after the effects of the air war, and once the effects of poor Iraqi technology are factored in.[26] Assume that coalition ground force would lose 0.1 percent of their strength per day. Assume further that they would benefit from roughly a 20:1 combat exchange ratio, not in terms of casualties but in terms of "armored

[23] Keaney and Cohen, *Gulf War Air Power Survey Summary Report*, pp. 105–6; and General Accounting Office, *Operation Desert Storm: Evaluation of the Air Campaign*, GAO/NSIAD-97–134, pp. 8–10, 105–107, 146–148, 157–159.

[24] Civilian casualty estimated based on briefing by William Arkin of Greenpeace to Gulf War Air Power Survey project members, Oct. 31, 1991, cited in Keaney and Cohen, *Gulf War Air Power Survey Summary Report*, p. 75; for military casualty estimates, see Keaney and Cohen, p. 107.

[25] Keaney and Cohen, *Gulf War Air Power Survey Summary Report*, pp. 104–117, 203.

[26] Lane Pierrot, *Planing for Defense: Affordability and Capability of the Administration's Program* (Washington, D.C.: Congressional Budget Office, 1994), p. 22; William W. Kaufmann, *Assessing the Base Force: How Much Is Too Much?* (Washington, D.C.: Brookings, 1992), pp. 52–56; and Steven R. Bowman, "Persian Gulf War: Summary of U.S. and Non-U.S. Forces," Congressional Research Service, Feb. 11, 1991, pp. 1–8.

division equivalents." Next estimate that their ground-attack aircraft would fly about 1,000 combat sorties a day, carrying on average four munitions with an average kill probability of about 0.5, and that they would average finding an Iraqi vehicle to fire upon every two to five sorties. (That accounts for the difficulty of finding enemy targets and avoiding friendly units on the battlefield.)[27] In these ways, one can fit the equations to what happened in Desert Storm.[28]

Outcomes observed in Desert Storm would probably be relatively good predictors of outcomes for battle in similar geographic settings in a war in 2003 or 2004. Some might expect the United States to do even better the next time around, given improvements to its forces since 1991 as well as the continued decline of the Iraqi military. But U.S. forces bombed virtually as long as they wished in 1991, so having more planes capable of precision strike might make little difference. Most weapons used against armor—laser-guided bombs, Maverick, etc.—are unchanged relative to 1991. (Indeed, stocks of those weapons were large at the time of Desert Storm; the U.S. military had twice as many of those types of PGMs as it used, so the idea that the United States was severely constrained in its use of precision in that conflict is largely incorrect.[29]) The United States now has the all-weather, satellite-guided joint direct attack munition (JDAM). But it already had that weapon at the time of Operation Allied Force against Serbia in 1999, with little effect on its ability to strike fielded Serb forces. (The GPS-guided JDAM weapon, which typically misses its target by 5 to 10 meters, is not always sufficiently precise to strike armor; it is also vulnerable to jamming.[30]) Moreover, weather was not a severe handicap in Desert Storm, so adding all-weather capability to the U.S. PGM inventory might make only marginal difference under similar circumstances in the future.[31]

As for the Iraqis, even if they corrected some of the mistakes they made in 1991, it seems doubtful they would improve their future performance greatly. The Janus model suggests that simple tactical corrections could have allowed the Iraqis to take on the U.S. Army in a relatively fair fight. But Iraqi

[27] General Accounting Office, *Operation Desert Storm*, p. 146.

[28] Bill Kaufmann performed a similar exercise using the Lanchester equations; see Kaufmann, *Assessing the Base Force*, pp. 94–97. It is also possible to fit the Dupuy quantified judgment model to the observed data. That could be done by lowering the assumed daily coalition attrition rate, relative to what Colonel Dupuy prognosticated before the war. It would also be accomplished by increasing the sophistication, mobility, and combat effectiveness values assigned to coalition forces, and by increasing the surprise factor for the attacker while reducing the defensive posture factor advantage for the Iraqis (given the coalition use of the left hook). See Dupuy, *Attrition*, pp. 128–131.

[29] Keaney and Cohen, *Gulf War Air Power Survey Summary Report*, p. 211.

[30] Barry D. Watts, *The Military Uses of Space: A Diagnostic Assessment* (Washington, D.C.: Center for Strategic and Budgetary Assessments, 2001), pp. 42–3; Anne Marie Squeo, "U.S. Military's GPS Reliance Makes a Cheap, Easy Target," *Wall Street Journal*, Sept. 24, 2002.

[31] Keaney and Cohen, *Gulf War Air Power Survey Summary Report*, p. 173.

forces would likely have found ways to make other mistakes. (The Janus model assumes no such additional errors.)[32] Moreover, U.S. forces could change tactics in the event that Iraq found a way to hold its own in a given type of firefight, fighting more at night or relying more heavily on attack helicopters or working harder to avoid Iraqi defensive positions rather than driving straight through them.

But battles in which the Desert Storm analogy and models optimized to handle similar conflicts will be useful may be rare in a future U.S.-Iraq war. The above discussion helps validate the basic philosophy of using analytical frameworks to gauge possible combat losses, but the Kugler-Posen and Epstein models may not have great utility beyond that for a future invasion of Iraq.

Forecasting: Infantry and Urban Combat

In urban settings, airpower would be much more difficult to employ against Iraqi forces that could intersperse themselves with civilian vehicles and populations. Iraq employed this type of tactic near Basra during Desert Storm and in the subsequent eleven years, as it sought to place valued military assets near civilian populations to make it harder for the United States to bomb them.[33] Iraqi forces have much better cover within cities, or even forested regions, than in open desert. As one further demonstration of this rather obvious fact, recall that even after eight years of further modernization after Desert Storm, NATO airpower was of limited effectiveness against small groups of Serb forces operating within forests, towns, and civilian populations in the Kosovo war.[34] If U.S.-led forces tried to fly low to find enemy forces against this complex backdrop, they would have to contend with an Iraqi air defense network consisting, among other things, of some 6,000 air defense guns and 1,500 surface-to-air missile launchers (including man-portable SAMs).[35]

Nothing about new technology and new war-fighting concepts associated with the so-called revolution in military affairs seems likely to radically change the challenge of urban warfare anytime soon. For example, recent Marine Corps experiments incorporating such new concepts suggested that U.S. troops could still suffer quite high casualties in urban combat.[36] Other ideas that have been proposed by military planners for reducing the

[32] Biddle, "Victory Misunderstood," pp. 166–168.

[33] Keaney and Cohen, *Gulf War Air Power Survey Summary Report*, p. 115.

[34] Benjamin S. Lambeth, *NATO's Air War for Kosovo* (Santa Monica, Calif.: RAND, 2001), pp. 129–136, 230–234.

[35] International Institute for Strategic Studies, *The Military Balance 2001/2002* (Oxford: Oxford University Press, 2001), pp. 134–35.

[36] Thomas E. Ricks, "Urban Warfare: Where Innovation Hasn't Helped," *Wall Street Journal*, Oct. 12, 1999.

risks associated with urban warfare, such as quarantining parts of cities and interdicting movement in and out of them until an enemy cracks, do not seem particularly useful given the likely harm they would cause to innocent civilian populations in those cities.[37]

To find a better method for understanding likely future combat in Baghdad, two germane cases are considered here: the invasion of Panama in 1989 and the U.S. experience in Somalia from 1992 until 1994. To help make sense of some of this data, the model of the late Colonel Trevor Dupuy (U.S. Army) is also employed below, particularly for the case of Operation Just Cause in Panama. The Dupuy method does not include specific means for incorporating the effects of airpower and geography, so in that sense it is less sophisticated than the Kugler-Posen and Epstein models. Its advantage is that it focuses on soldiers, not armored divisional equivalents, making it more useful for infantry combat, in which armored formations are generally less central. As with the Kugler-Posen and Epstein models, it allows the user to modify input data to reflect the quality of each side's troops and equipment. It is also informed by a very detailed dataset on past conflicts. And it incorporates coefficients for a wide range of factors such as weather, surprise, and terrain that require subjective interpretation to employ, but that allow for more explicit consideration of these elements of combat than the other two models.[38] (Dupuy also applied his model to predicting Desert Storm casualties, with accuracy comparable to that of the other two models discussed before.[39])

Panama

In December 1989, U.S. forces overthrew Panamanian strongman Manuel Noriega and defeated his armed forces. About 22,500 American personnel participated. They included Navy Seals, Army Rangers, and Special Forces. They also included large numbers of the 10,000 American troops stationed in Panama, including the 193rd Infantry Brigade. Soldiers from the 82nd Airborne Division, 7th Light Infantry Division, and 5th Mechanized Infantry Division also participated. The operation involved simultaneous nighttime airborne operations against 27 objectives throughout the country.

[37] See Robert H. Scales, Jr., "The Indirect Approach: How U.S. Military Forces Can Avoid the Pitfalls of Future Urban Warfare," *Armed Forces Journal International*, vol. 31 (Oct. 1998), pp. 68–74.

[38] See Trevor N. Dupuy, *Attrition: Forecasting Battle Casualties and Equipment Losses in Modern War* (Fairfax, Va.: HERO Books, 1990), pp. 104–132; see also Trevor N. Dupuy, *Numbers, Predictions, and War*, revised edition (Fairfax, Va.: HERO Books, 1985); and Trevor N. Dupuy, *Understanding War: History and Theory of Combat* (New York: Paragon Books, 1987).

[39] Trevor N. Dupuy, *If War Comes, How to Defeat Saddam Hussein* (Fairfax, Va.: HERO Books, 1991), p. 104; Congressional Budget Office, "Costs of Operation Desert Shield," Jan. 1991, p. 15.

Special forces infiltrated key sites shortly before the airborne assaults to take down Panamanian communications and oppose any attempts by Panama to reinforce its forces under attack. The massive, simultaneous assault against Panama's 4,400-strong defense forces and its paramilitary forces of several thousand more personnel overwhelmed the latter, surprising them with its ferocity and coordination in the opening hours of battle. Twenty-three Americans died, as did about 125 Panamanian military personnel.[40] Some 200 to 600 Panamanian civilians died as well.[41]

As noted, the Dupuy method of modeling warfare is probably more useful than the Kugler-Posen or Epstein models for understanding this style of combat. Dupuy's methodology is a bit hard to follow, but sensible and logical. He begins by translating the number of troops fielded by each side into a total power figure, P (size of the fielded force × quality = P). It is modified to account for the degree of surprise achieved and the quality of the weather. Assuming U.S. forces 22,500 strong, according them a quality advantage of 3:1 over Panama's military, and assuming they enjoy a 20 percent benefit from surprise gives them a power score of about 80,000. (Dupuy uses a somewhat smaller force estimate and a somewhat larger quality advantage, and estimates U.S. power at 75,000.) For Panama, counting about 4,000 paramilitary forces, it had about 8,500 troops available; the fact that they fought on the defensive and in complex terrain is assumed to give them a doubling of capability as well, for a total power of almost 20,000.

Using these power figures to calculate relative casualties requires use of detailed, lengthy tables that reflect Dupuy's experiences with a wide body of combat data from many past battles. In essence, U.S. casualties are estimated to be the product of three main types of terms: total troop strength, times a daily maximum casualty rate, times a factor accounting for the power differentials between the two sides. Assuming a 1 percent maximum daily casualty rate for the weather and urban-combat conditions that prevailed, and a U.S. power advantage of about 4 (which shows up as the inverse of 4, or 0.25, in the first equation below), American casualties are estimated at (20,000 × 0.01 × 0.25) = 50. Over two days, U.S. casualties would be about 100, with about 20 killed. For Panama, flipping over the power ratio term, yields (8,500 × 0.01 × 4) = 340. Over two days, Panama's casualties are estimated at 680,

[40] See Robert L. Goldich, "Casualties and Maximum Number of Troops Deployed in Recent U.S. Military Ground Combat Actions," Congressional Research Service, Oct. 8, 1993; Brig. Gen. Robert H. Scales, *Certain Victory: The U.S. Army in the Gulf War* (Washington, D.C.: Brassey's, 1994), pp. 32–35; International Institute for Strategic Studies, *The Military Balance 1989–1990* (Washington, D.C.: Brassey's, 1989), pp. 26–27, 199; and Susan L. Marquis, *Unconventional Warfare Rebuilding U.S. Special Operations Forces* (Washington, D.C.: Brookings, 1997), pp. 187–201.

[41] See Statement of General James R. Harding, Director, Inter-American Region, Office of the Secretary of Defense, before the Subcommittee on Western Hemisphere Affairs of the House Foreign Affairs Committee, July 30, 1991.

with about 170 killed. These results track reasonably well with the actual outcome.[42]

Somalia

The ill-fated U.S. experience in Somalia in the early 1990s is discussed here not because U.S. forces could plausibly lose a war against Iraq, but because they could face some of the same tactical military challenges they encountered in Mogadishu. In the Somalia experience, the United States acted under broad UN auspices but American forces were under the tactical control of American commanders at all times. They faced ragtag militia opposition; Somali fighters had access to plentiful automatic weapons, rocket-propelled grenades, and mines, but not much more than that, and they were not trained in combined-arms or coordinated military operations. Nonetheless, the ferocity, ingenuity, and bravery of Somali fighters gave them opportunities to be effective enough against U.S. forces.

As is well known, the United States had 18 soldiers killed in action on the night of October 3–4, 1993, in the course of a raid on a building where leaders of the Aideed faction were meeting. Rocket-propelled grenades (RPGs) shot down two helicopters; additional American casualties were suffered in the effort to rescue any crew members who might have survived those crashes. American commanders described the RPG hits as very lucky shots, but since an RPG had downed a U.S. helicopter several days earlier, that depiction may be inaccurate.[43] American problems were compounded, at least somewhat, by poor communications and navigation practices, inattention to detail in preparation for the mission, and lack of readily available armor for sending out a rescue operation. But the main problem was the vulnerability of the Black Hawk helicopters as they flew low to allow troops to dismount.[44]

U.S. forces had totaled as many as 25,000 troops in Somalia, but had been cut before the fateful battle. Only about 2,000 U.S. forces were deployed for conducting and supporting such raids at the time they occurred. Estimates of Somali militia strength were in the many thousands, with losses on October

[42] I have simplified Dupuy's method considerably. He has factors to account for terrain, surprise, weather, and so on. More important, the way in which relative power differentials enter into his equations is not quite linear in the way I have suggested. But his method has an arbitrary quality about it at times as well; for example, he adds a "sophistication factor" in addition to mobility, firepower, and combat effectiveness coefficients to account for the quality of one military over another. It is unclear why so many different such factors are needed or how one selects the proper value for each. By contrast, his methodology for computing power is relatively straightforward. For more exact information on how power ratios enter into his calculations, see Dupuy, *Attrition*, pp. 124–27, 150.

[43] Mark Bowden, *Black Hawk Down: A Story of Modern War* (New York: Atlantic Monthly Press, 1999), p. 88.

[44] Bowden, *Black Hawk Down*.

3–4 alone estimated at 300 to 1,000 combatants.[45] Often forgotten is that a number of other American troops died in Somalia. In fact, total losses reached 29 from hostile action and 14 from "nonhostile" action such as accidents. October 3–4 represented less than half of all U.S. losses in the operation overall.[46]

Lessons for a Future Urban War in Iraq

What do these cases tell us about how a future war conducted largely in the streets of Baghdad might play out? Iraqi forces are almost surely better armed and better trained than any of the military or paramilitary organizations considered above, but also far less motivated. That said, it is important to remember that the Iraqi Republican Guard forces fought reasonably hard in Desert Storm.[47] They also enjoy a number of benefits from Saddam's regime—and they are rather heavily implicated in his rule. They would probably fear retribution from an alternative regime or from Western occupying forces much more than they would fear Iraqi opposition forces and American airpower on the battlefield. How much they would fear American invasion forces, and thus when they would choose to surrender, is difficult to determine. Whether they could be convinced to desert Saddam by an amnesty offer or a promise of protection and inclusion in a post-Saddam regime is an open question. Whether Saddam's commanders could be deterred from using WMD by American promises to hold them personally responsible should they do so is also unclear.[48]

The best analogy for a future war against Iraq is probably Operation Just Cause in Panama. Some would argue that new techniques of warfare, such as precision-strike weaponry and "effects-based operations," have radically reshaped the nature of such combat over the past 13 years. But as noted, such concepts hardly made the Mogadishu or Kosovo campaigns easy, nor have they transformed the nature of urban operations in various simulations and war-fighting experiments since then. Indeed, the outgoing commander of U.S. Joint Forces Command, where future battle concepts are developed, recently referred to the results of Operation Just Cause as the sort of outcome that the United States would do well to repeat in Iraq.[49]

[45] "U.S. Military Operations in Somalia," S. Hrg. 103–846, Hearings before the Committee on Armed Services, U.S. Senate, May 12, 21, 1994, pp. 17, 62.

[46] See Directorate for Information Operations and Reports, "Worldwide U.S. Active Duty Military Deaths," DoD, accessed Aug. 16, 2002 at http://web1.whs.osd.mil/mmid/casualty/table13.htm.

[47] See Biddle, "Victory Misunderstood," pp. 149–52.

[48] For an interesting argument along these lines, see Thomas D. Grant, "For an Iraq Amnesty," *Washington Post*, Aug. 20, 2002.

[49] Jack Dorsey, "Gen. William 'Buck' Kernan Retires Today," *Norfolk Virginian-Pilot*, Oct. 2, 2002.

In the 1989 Panama invasion, the United States faced a less-than-excellent military, but one that did fight; the United States made use of airborne operations in the early hours of combat to surprise and overwhelm the enemy and strike hard at its command-and-control assets. However, to place all faith in the Panama model would be imprudent, given that Iraq poses a number of much greater challenges not faced in Just Cause: a military literally 100 times as large, a population almost ten times as large, a land area more than five times as large and five times as distant from the continental United States, and a leader who will probably not be surprised if and when an attack occurs.

Some very crude, rough approximations follow quickly from any use of these analogies. First, simply scaling the results of Panama for the size of the Iraqi military leads to an estimate of about 2,000 Americans killed, as compared with more than 10,000 Iraqi military personnel and tens of thousands of Iraqi citizens.[50] However, if it is only the elite Iraqi forces that fight hard, numbering somewhat more than 100,000 Republican Guard, Special Republican Guard, and palace guard forces, extrapolation from the Panama case suggests that losses on all sides might be only one-fourth as great.

As for Somalia, the firefight on the night of October 3–4 can be used as a way to generate pessimistic estimates of how war in Baghdad might go. That operation involved about 160 Americans against a single objective, together with roughly a dozen ground vehicles, and more than a dozen helicopters.[51] Overall operations in Baghdad might be 50 to 100 times as large in any initial assault wave to secure key facilities. With comparable casualty rates on a per-person basis, U.S. losses could number 1,000 or more just in this phase of the fighting.

According to Dupuy's equations, optimally, the United States might only have to defeat about 100,000 elite Iraqi forces; the rest of the Iraqi military might quickly splinter or disintegrate. In that event, U.S. forces assumed to number 250,000 would have a Dupuy "power value" of about 800,000.[52] They would face Iraqis with a power of about 200,000.[53] That makes the relative power term in Dupuy's casualty equation about 0.25 for the United States and about 4 for Iraq.[54] If we assume a maximum daily loss rate of 0.01, again by analogy with Panama, then U.S. losses would be roughly (250,000 × 0.01 × .25)=600 casualties per day, and Iraq casualties would be roughly (100,000 × 0.01 × 4) = 4,000 per day. If the war finishes

[50] These loss estimates are for coalition forces overall, but it is assumed that the overwhelming majority would be American.

[51] Bowden, *Black Hawk Down*, pp. 4–5.

[52] That is, 250,000 times their quality advantage of about 3 times a benefit from surprise of 20 percent.

[53] That is, 100,000 troops times a factor of 2 advantage due to the benefits of being on the defensive and fighting within a city.

[54] As noted earlier, the relative power term would not vary quite this much from one country to the other according to Dupuy's detailed tables, but for simplicity of use and for gaining an approximate sense of the calculations, these figures are not too far off.

within about three days—just a bit longer than the intensive phase of combat in Panama—U.S. casualties might number roughly 2,000 (with some 400 killed), and Iraqi military casualties around 12,000 (with about 3,000 killed).

A more pessimistic application of the Dupuy equations would involve greater numbers of Iraqi opponents and a longer fight. If half the regular Army fights as well, Iraq would then have about 250,000 troops against a similar number of Americans. The U.S. power figure would remain the same, but Iraq's would grow to 500,000, factoring in the advantages of fighting on the defensive in urban terrain. American casualties would then be, roughly speaking, $(250{,}000 \times 0.01 \times 0.625) = 1{,}500$ a day, killed and wounded; Iraq's would be $(250{,}000 \times 0.01 \times 1.6) = 4{,}000$ a day. If the intense phase of war lasted ten days, scaling the duration of the key phase of the Panama invasion upward to account for Iraq's much greater size, that could translate into a total of 15,000 U.S. casualties, of which some 3,000 would be killed in action. The math would then predict about 40,000 Iraqi casualties, with 10,000 dead.

How can one estimate casualties after Baghdad and other major centers are in coalition hands, but many Iraqi forces remain armed in various pockets around the country? Protracted guerrilla conflict seems unlikely. Perhaps a reasonable analogy, albeit for a smaller operation, is the case of Afghanistan. Thirty-eight Americans died over the first ten months of the operation, against a hostile enemy force that might have been a quarter to half as large as Iraq's elite forces, but probably much more dedicated. This suggests an annual loss rate roughly in the dozens of troops for the early phase of the stabilization/occupation effort.

None of these methods are particularly elegant or compelling for the case of a future war against Iraq. But the notable element of the above discussion is that estimates tend to converge in the broad range of 400 to 4,000 Americans killed. Iraqi casualties would likely range from 2,000 to 40,000 soldiers killed, with civilian casualties up to several times as great.

The Effects of WMD on Troops and Civilians

One major wildcard remains: the likely consequences of any Iraqi use of chemical or biological agents. They are indeed a serious worry, especially given the unlikelihood that Saddam will be deterred from using them in a war explicitly designed to unseat him. He probably has many tens of thousands of artillery shells and rockets filled with chemical agents, and quite likely possesses biological agents as well.[55] But in most cases, either

[55] Joseph Cirincione with Jon B. Wolfsthal and Miriam Rajkumar, *Deadly Arsenals: Tracking Weapons of Mass Destruction* (Washington, D.C.: Carnegie Endowment, 2002), pp. 271–87; Director of Central Intelligence, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions," Jan. 2002, available at http://www.cia.gov/cia/publications/bian/bian_jan_2002.htm.

Saddam is likely to have difficulty delivering the agents or coalition forces and populations are likely to have countermeasures they can employ to mitigate their effects.

Consider first SCUD attacks against Iraq's neighbors. Even if using a chemical or biological agent, they seem a relatively minor threat, given the general difficulty of delivering such agents via missile and the specific limitations of the SCUD. Iraq may still have up to two dozen such missiles. But the SCUD often broke up in flight during Desert Storm and has clearly not benefited from extensive flight testing to improve its performance since then. Delivering chemical or biological agents is best done at a steady altitude by an aircraft that spreads the agent over a large area, not by a rapidly descending ballistic missile that may disperse the agent too soon or too late—and in any case, probably in far too concentrated a dose in one place. Should that one place be a sports stadium or other congregating place, results could be disastrous. But given the SCUD's inaccuracy, that would require extreme luck on the part of Iraq.[56]

Second, Iraqi attacks against civilian populations in places such as the United States could be serious, especially if they involved biological agents. But in the past Iraqi special force have not focused on preparing for such attacks. They have reportedly been more devoted to efforts to acquire technologies for producing WMD. It is also unlikely that Iraq has access to the most dangerous pathogens such as smallpox. Moreover, preparations are now well underway in countries such as Israel and the United States to handle anthrax and even smallpox attacks should that be necessary. On balance, while such attacks could in theory cause thousands of casualties, the overall probability of a successful Iraqi attack of that nature in a time of war, when U.S. intelligence would be paying special heed to the movements of any Iraqis, seems relatively low. A major caveat is that alliances between Iraq and Hezbollah or Al Qaeda could change this assessment of risks, but probably not enough to make the chances of a highly lethal attack particularly high.[57]

Third, Iraq could try to kill Kurdish or Shia populations using chemical agents, as retaliation for the participation of Iraqi opposition forces in a war to unseat Saddam. But Iraq's military could have a hard time doing so, given coalition control of the skies and the fact that the U.S.-led coalition

[56] See Theodore A. Postol, "Lessons of the Gulf War Experience with Patriot," *International Security*, vol. 16, no. 3 (Winter 1991/92), pp. 119–171; Cordesman and Wagner, *The Lessons of Modern War*, pp. 500–502; Janne E. Nolan, *Trappings of Power: Ballistic Missiles in the Third World* (Washington, D.C.: Brookings, 1991), pp. 32–62; and Office of Technology Assessment, *Proliferation of Weapons of Mass Destruction: Assessing the Risks* (1993), pp. 45–69.

[57] Office of Technology Assessment, *Proliferation of Weapons of Mass Destruction*, pp. 45–69; and Michael E. O'Hanlon, Peter R. Orszag, Ivo H. Daalder, I.M. Destler, David L. Gunter, Robert E. Litan, and James B. Steinberg, *Protecting the American Homeland: A Preliminary Analysis* (Washington, D.C.: Brookings, 2002), pp. 1–11.

would presumably make it a high priority to provide protection for such populations early in any campaign. One could also hope that threats to Iraqi commanders, pledging to hold them accountable for any WMD use, might reduce the probabilities that such attacks would be attempted.

Fourth, Iraq could increase casualty levels of coalition forces by using WMD against them. But it would probably increase casualties by no more than 10 to 20 percent, given historical precedent in conflicts such as the Iran-Iraq war; indeed, U.S. forces are much better equipped to protect themselves from such attacks than most militaries have been in the past.[58] However, Iraq might gain some advantage nonetheless, if at a huge cost to its own civilian populations (and perhaps to its own troops, should winds shift). It could oblige coalition forces to fight in protective gear, slowing operations and generally complicating the mission. If the effects of fighting in such gear were comparable to those of fighting in bad weather or difficult terrain, for example, the pace of coalition fighting and the effectiveness of coalition forces might decline 25–50 percent. Casualties could increase by a comparable amount in theory—again, not necessarily due to the direct effects of the weapons, but as a result of the protective steps taken by coalition forces to protect themselves.

Conclusion

The United States and coalition partners would win any future war to overthrow Saddam Hussein in a rapid and decisive fashion. This would not be another Vietnam or another Korea. But casualties could be significantly greater to all concerned parties than in the 1991 Persian Gulf War. The best analogy for what such combat could involve would not be Desert Storm, but instead the 1989 U.S. invasion of Panama—and on a much larger scale. More pessimistically, the U.S. experience of October 3–4, 1993 in Mogadishu, Somalia could also have some tactical relevance as an analogy, except that the United States would not flinch or lose its will if it suffered significant losses. It would also choose the time and circumstances of most engagements rather than having to attack in broad daylight with insufficient preparations and inadequate equipment or reinforcements—though on the other side of the coin, Iraq has much better weaponry than did the Somalis.

In rough terms, U.S.-led forces might suffer 100 to 5,000 forces killed in action in such a future war. The lower half of that range is perhaps the most plausible. But the higher end cannot be ruled out. Iraqi troop losses might be expected to be roughly 2,000 to 50,000, and civilian deaths could number in the tens of thousands as well. Casualties in countries such as Israel

[58] Dupuy, *Attrition*, pp. 58, 146–148; Cordesman and Wagner, *The Lessons of Modern War*, p. 518; and Victor A. Utgoff, *The Challenge of Chemical Weapons: An American Perspective* (New York: St. Martin's Press, 1991), pp. 172–81.

and the United States could number in the thousands, not so much from SCUD missiles or other military delivery vehicles as from action by Iraqi-supported terrorists or special forces, if Saddam provided them with WMD. But such losses might also be trivial in size.

Given this fairly wide range of plausible, possible outcomes, those who feel strongly that a future war against Iraq would be either a cakewalk or a debacle should be challenged to explain why. Historical data and combat models put the onus squarely on those who would make such confident predictions. A quagmire in Iraq seems extremely unlikely. But on the other hand, to count on easy victory, as many American proponents of war seem to do, is not only unsupportable by the available evidence and by the methodologies of combat prediction. It is also irresponsible as a basis on which to plan U.S. military strategy in any future war against Saddam Hussein.