[3]

Coercive Air Power

The most important instrument of modern military coercion, and the most useful for investigating the causes of coercive success and failure, is air power. This instrument has been used to execute concrete coercive strategies that correspond to the conceptual categories of punishment, risk, and denial. A fourth strategy which pursues both punishment and denial effects simultaneously is decapitation. This chapter explains how to identify coercive air strategies from the coercer's concrete military actions, how to measure their success, and how the major strategies were developed, and it evaluates the historical effectiveness of each strategy.

Identification of Coercive Air Strategies

Coercive air strategies can be identified by either of two criteria. The first criterion is a set of specific indicators, such as timing, target sets, and munitions used. A maximal punishment strategy would simply blot out whole residential and commerical areas of cities. Missions could be flown at night since high standards of accuracy are not needed. Munitions would include a high proportion of incendiaries to start fires or fire storms. The campaign would be prosecuted as intensively as possible to maximize shock effects. A somewhat more genteel punishment strategy might attack civilian sectors of the economy, such as power, water, or agricultural targets such as irrigation systems, causing hardship but fewer immediate deaths.

The ideal risk campaign would resemble punishment, except that rather than inflict as much harm as possible as fast as possible, it would smoothly and gradually increase the tempo of air operations, interrupting them only by pauses for diplomatic signaling. Civilian targets would be attacked, with a gradual progression from less painful to more critical targets.

The ideal denial campaign would attack military targets and military production centers. Targets could include fielded forces; theater-level command, communications, and logistics; weapons plants; and critical raw materials used in war production. Denial missions generally require pinpoint accuracy, and are likely to be flown in daylight if air superiority allows. Munitions would include fewer incendiaries and more high explosives, and precision-guided munitions (PGMs) might be used if available. The campaign would be prosecuted at the maximum intensity the coercer could sustain and might restrike certain critical targets many times to prevent their repair.

The ideal decapitation campaign would attack key leadership facilities and communications networks in the opponent's political centers, in addition to vital nodes in a nation's economic infrastructure such as electric power and petroleum refining. Since many leadership and communications targets are room size, PGMs are required. Because the total number of targets is very small, the campaign would take only a few days.

Although air strategies can be defined in terms of the targets to be struck and the timing of their destruction, this approach is not fully satisfactory. Co-location and multipurpose economic installations make these distinctions difficult to apply. Residential, transportation, and industrial targets may be located close together, so that—absent PGMs—any attack on one may damage the others. More important, certain economic targets, such as electric power and transportation systems, might be attacked either because of the harm this would do the civilian economy or because destroying them might reduce war production.

A second and more satisfactory criterion focuses on the mechanisms by which the destruction of a target set is supposed to translate into changed enemy behavior. Mechanisms provide the intellectual guidance for operational air planners who then translate strategy into actual campaigns with the forces at their disposal. This alternative schematic for identifying differences between coercive air strategies is based on the means-to-ends chain assumed by each, as follows: force → targets → mechanism → political change. Table 4 shows the chains developed by some major theorists. Each of the strategies described in this book depends on assumptions about how destruction of a specific set of targets (unique in each particular case) will trigger a specific mechanism (which is believed to be generally applicable) to produce a concrete policy outcome.

Measuring Effectiveness

The effectiveness of military operations can be measured as either *combat* effectiveness or *strategic* effectiveness. Combat effectiveness describes how efficiently a given force destroys a given target set, that is, how well bombs

Table 4. Coercive air strategies

Strategy	Theorist	Target set	Mechanism
Punishment	Douhet	cities	popular revolt
	Trenchard	cities	popular revolt
	Air Corps Tactical School	key economic nodes	social disintegration
Risk	Schelling	gradual civilian damage	avoid future costs
Denial	Luftwaffe	frontline forces	battlefield breakthrough
	Committee of Operations Analysts	weapons plants	equipment shortages
	Enemy Objectives Unit	POL / transportation	operational paralysis
Decapitation	Warden	leadership	leadership change or strategic paralysis

destroy targets, and strategic effectiveness focuses on whether the destruction of target sets attains political goals.[1]

The usual index of combat effectiveness is the number of sorties needed to deliver enough bombs to cripple a specific target, most often judged by visible destruction. As technology improves bombing accuracy, air power necessarily becomes more combat effective, because fewer sorties are necessary to destroy targets. At best, measures of combat efficiency are measures of how quickly or cheaply forces perform military missions. They do not gauge whether mission success will achieve political purposes.

Measuring the overall success of an air campaign only in terms of combat effectiveness can cause one futile mission to be succeeded by another, while more worthwhile missions are neglected. Against Japan, precision bombing in 1944 was condemned as a failure because it produced no visible damage to industrial plants, and incendiary attacks against Japanese cities beginning in March 1945 were hailed as a great success because burned acreage was easy to observe and quick to accumulate. However, incendiary bombing ultimately made little difference to the war's outcome. Because Japan's main industries had already been shut down by the naval blockade, their destruction merely made unused rubble bounce, and the Japanese government was willing to countenance the civilian costs that the fire bombing caused. Bombers could have contributed more to the collapse of the Japanese economy had they been dedicated to a third mission: mine laying

[1] Barry Watts has proposed a somewhat similar categorization between combat effectiveness and "second order effects." This broader concept than strategic effectiveness includes all noncombat consequences whether or not they affect political goals. Thus, they are less useful for our present purpose. James G. Roche and Barry D. Watts, "Choosing Analytic Measures," *Journal of Strategic Studies* 14 (June 1991): 165–209.

along shipping lanes. Thus, since the goal of coercion is political change, my discussion of coercive air strategies focuses on strategic effectivness, not combat effectiveness.

Coercive Air Strategies

The four main categories of coercive air strategies are punishment, risk, denial, and decapitation. Air superiority is sometimes named as a separate air strategy, but it is not. Indeed, all coercive air strategies require command of the air, for aircraft cannot systematically place bombs on any target set if air operations encounter strong opposition from enemy forces. Air superiority need not extend over the enemy's entire territory, but only over the target set the attacker intends to strike and the air corridors to it.

The importance of air superiority to coercive air power is illustrated by Germany's attempt to coerce Britain in 1940, which failed because Germany could not achieve command of the air. After the fall of France, the Germans tried to coerce Britain to accept a position of neutrality by threatening an invasion across the English Channel. The Luftwaffe was supposed to play a decisive role in this invasion both by direct support of German ground forces and, even more important, by keeping the Royal Navy, which was far superior to the German surface fleet, from wreaking havoc on German amphibious operations. Before the Luftwaffe could carry out these missions, however, it first had to eliminate the capacity of the Royal Air Force to operate over southern England and the English Channel. Accordingly, the Luftwaffe attempted to knock out the main airfields of the RAF in southern England. Initially the campaign achieved considerable success in wearing down British airfields, fighter direction systems, and pilot reserves. Later, however, the Germans shifted their attacks from these weak points in the British air defense system to bombing the city of London, allowing the air defenses to recover. As a result, the Germans never gained air superiority and so could not even begin to implement their threat to invade the United Kingdom.[2]

Air superiority is not a separate coercive air strategy but a necessary step in the pursuit of all four coercive air strategies. The central question in air strategy is what to attack once air superiority has been achieved.

[2] Len Deighton, *Fighter: The True Story of the Battle of Britain* (London: Johnathan Cape, 1977); Derek Wood and Derek Dempster, *The Narrow Margin: The Battle of Britain and the Rise of Air Power, 1930–1940* (London: Hutchinson, 1961); and John Terraine, *A Time for Courage: The Royal Air Force in the European War, 1939–1945* (New York: Macmillan, 1985). For German intentions in the Battle of Britain, see F. M. Sallagar, *The Road to Total War: Escalation in World War II*, R-465-PR (Santa Monica, Calif.: Rand Corporation, 1969), p. 7.

Punishment and the Theories of Giulio Douhet

Aerial *punishment* attempts to inflict enough pain on enemy civilians to overwhelm their territorial interests in the dispute and to cause either the government to concede or the population to revolt against the government. Air power can impose terrible costs on civilians by saturation bombing of population centers, as occurred in World War II. Or it can cause pain indirectly by wrecking the civilian economy. Destroying electric power grids, oil refineries, water and sewer systems, and domestic transportation can substantially lower a nation's ability to distribute and refrigerate food, purify water, and heat homes, thus, over time, increasing poverty, disease, and hunger in the general population.

Punishment was the first coercive strategy to be put into practice when airpower was developed. The earliest significant use of what can be called "strategic" airpower was the German air offensive of 1917, in which both Gotha bombers and Zeppelins struck British population centers. The seeds of this coercive strategy were planted in late 1914 and early 1915 once it became evident that a quick end to the war was unlikely to be won on the battlefield. In late 1914 German naval memoranda recommended air attacks against British civilians: "In general air attacks with aeroplanes and airships from the Belgian and French coasts, particularly with airships, promise considerable material and moral results. . . . We dare not leave untried any means of forcing England to her knees, and successful air attacks on London, considering the well-known nervousness of the public, will be a valuable measure." Admiral Alfred von Tirpitz himself supported these raids on the basis of their punitive effects on British civilian morale. "All available ships should be concentrated on London," he wrote, adding, "The measure of the success will lie not only in the injury which will be caused to the enemy, but also in the significant effect it will have in diminishing the enemy's determination to prosecute the war, which will be greater than if the bombs are scattered singly."[3] All together, some nine thousand German bombs totalling 280 tons were delivered in fifty-one Zeppelin and fifty-two Gotha raids against Britain. These raids killed 1,413 and wounded 3,408.[4] Although German air raids failed to compel Britain to withdraw support for the war, the British responded with their own countercity offensive in 1918 and planned for a much larger strategic air campaign in 1919.

During the interwar period, intense debates occurred in industrialized countries about the role of the bomber in a future war. Although all these debates were putatively focused on lessons learned from World War I combat experience, British, German, and American air doctrines were actually

[3] Douglas H. Robinson, *The Zeppelin in Combat* (London: Foulis, 1962), pp. 50, 52, 54.

[4] Robin Highham, *Air Power: A Concise History* (New York: St. Martin's, 1972), p. 49; George H. Quester, *Deterrence before Hiroshima* (New York: Wiley, 1966), p. 28.

shaped by a combination of experience in that war, domestic politics, interservice rivalry, and grand strategy. The nature of these factors varied from country to country as did the doctrines that emerged.[5]

One strategy, pivotal in all these debates, can be called the Douhet model, because it was first laid out in the writings of the Italian air theorist Giulio Douhet.[6] The Douhet model rests on the belief that infliction of high costs can shatter civilian morale, unraveling the social basis of resistance, so that citizens pressure the government to abandon its territorial ambitions.[7] The logic of this model proposes that civilian morale is damaged by exposing large portions of the population to the terror of destruction or by causing severe shortages of consumer goods and services (such as food, textiles, and industrial goods). "Take the center of a large city," Douhet wrote, "and imagine what would happen among the civilian population during a single attack by a single bombing unit. . . . I have no doubt that its impact on the people would be terrible." Lowered civilian morale, it is said, then produces internal turmoil: "What civil or military authority could keep order, public services functioning, and production going under such a threat?" Finally, domestic unrest causes grass-roots opposition against the home government: "A complete breakdown of the social structure cannot but take place in a country subjected to this kind of merciless pounding from the air. The time would soon come when, to put an end to horror and suffering, the people themselves, driven by the instinct of self-preservation, would rise up and demand an end to the war."[8]

The first air force to put the Douhet model into practice in its doctrine and force posture was that of Great Britain. Following Germany's punishment attacks, the Royal Air Force was born and the goal of its first chief, Hugh Trenchard, was to build a force capable of striking at the heart of German civilian morale. According to the British representatives to the Inter-Allied Aviation Committee, the effect of Trenchard's strategy "would be that the German government would be forced to face very considerable and constantly increasing civil pressure which might result in political disintegra-

[5] This discussion generally supports Walter Millis's assessment of the general pattern of the evolution of air doctrine: "Independent power came first; to attain the goal it was next necessary to develop a 'doctrine' which would make it military valid; finally, with the doctrine established, it was necessary to invent a weapon which would justify the strategy." *Arms and Men: A Study in American Military History* (New Brunswick, N.J.: Rutgers University Press, 1956), p. 231.

[6] Although historians continue to debate the influence that Douhet's writings had on American, British, and German air theorists, there is no doubt that the set of ideas contained in his writings were common knowledge. See R. R. Flugel, "United States Air Power Doctrine: A Study of the Influence of William Mitchell and Giulio Douhet at the Air Corps Tactical School" (Diss., University of Oklahoma, 1965).

[7] Giulio Douhet, *Command of the Air*, trans. Dino Ferrari (New York: Coward-McCann, 1942), esp. pp. 28, 47–48, 57–58, 309.

[8] Ibid., pp. 57–58.

tion." After the war, Trenchard lost no time in applying this thinking to conflict with Britain's most likely continental adversary, France: "I feel that although there would be an outcry, the French in a bombing duel would probably squeal before we did. . . . The nation that would stand being bombed longest would win in the end." Whether bombing the enemy population would have a long-term material effect on the enemy's industrial capacity hardly mattered, because air wars were expected to be short and intense. Rather, Trenchard believed that strategic air attack would trigger popular revolts: "The end of war is usually attained when one nation has been able to bring such pressure to bear on another that public opinion obliges the government to sue for peace."[9] He became famous for arguing that in air wars, the ratio of the "moral effect" on populations to material effect stood at twenty to one. Additionally, the possibility that the enemy might retaliate made getting in the first blows just that much more critical. National character, not battlefield forces, would determine the outcome of counterpopulation air wars, and in this respect the British were favored over their potential continental adversaries. As one senior British officer noted, "Casualties affected the French more than they did the British. That would have to be taken into consideration too, but the policy of hitting the French nation and making them squeal before we did was a vital one—more vital than anything else."[10] Such notions of the vulnerability of civilian morale to air attack sometimes also stemmed from the overt contempt that many military men felt for civilians in general and from racism. J. F. C. Fuller believed that it was the Jewish element in the East End that had panicked in the bombing of 1917.[11]

Moreover, based on their fears of how German air attack would compel British surrender, the British seemed to place their own stamp on Douhet's theory by marrying the air scare to the red scare of the 1920s. Air power, according to this logic, would bomb industrial centers, creating mass unemployment and panic, especially among the working classes, who in turn would overthrow the government. In short, air attack against populations would cause workers to rise up against the ruling classes.[12]

Douhet-style thinking had its strongest supporters in Great Britain for several reasons. First, as a result of German bombing of London in 1917, the British public generally supported the idea of an air force designed to punish an enemy's population centers. Public enthusiasm for this policy culminated in April 1918 when widespread passion to bomb German cities led the British Cabinet to push an Air Law through Parliament which estab-

[9] Williamson Murray, *Luftwaffe* (Baltimore: Nautical and Aviation, 1985), pp. 299, 301.

[10] Barry D. Powers, *Strategy without a Slide Rule: British Air Strategy, 1914–1939* (London: Croom Helm, 1976), p. 201.

[11] Malcolm Smith, *British Air Strategy between the Wars* (Oxford: Clarendon Press, 1984), p. 61.

[12] Powers, *Strategy without a Slide Rule*, pp. 124–26.

lished the Royal Air Force as an independent service equivalent to the Army and Navy.[13] In other words, the creation of the RAF was closely linked to the doctrine of bombing the enemy's population.

Second, British practical success in bombing rebellious Iraqi and Afghan tribesmen into submission during the 1920s encouraged belief in the efficacy of punishment, even though such small campaigns over relatively minor issues against primitive peoples with no means of defense had limited relevance to a future European war. The less successful RAF bombing campaign against Germany in 1918 would have been a far superior foundation on which to build an air doctrine, but no scientific investigation of it was ever undertaken.[14]

Finally, the RAF's organizational interests influenced its preferred doctrine. During the interwar years, the RAF was competing for autonomy, wealth, and size with the Royal Navy, whose first priority was to protect British interests in the Pacific, and the Army, which placed primary importance on various imperial policy duties. To succeed in this competition, the RAF needed its own mission (bombing Germany) and a doctrine that promised cheap victory, relative to World War I, if it were endowed with superiority over its continental opponents. Winning through bombing civilians was made to order for these purposes, since it promised a swift victory without the commitment of ground forces to the Continent.[15]

In contrast to the British, American air strategy aimed not at killing large numbers of civilians directly but at causing general social collapse through the precision bombing of key industrial nodes. The theory of the industrial web was developed in the mid-1930s by a group of young air officers at the U.S. Air Corps Tactical School (ACTS), then the highest educational establishment for American airmen, who later wrote *AWPD-1*, the first U.S. air strategy plan in World War II.

The key assumption embedded in the industrial web theory was that fighting modern wars would stretch an industrial state's economy so taut that small amounts of destruction, carefully concentrated on certain critical nodes, would cause the entire economic system to fold in on itself. The industrial web tied in several key producers, including basic industry and its sources of raw materials, plant machinery, power supplies, and the work force. The thread that tied workers to the web was called the industrial fab-

[13] Malcolm Cooper, *The Birth of Independent Air Power: British Air Policy in the First World War* (London: Allen & Unwin, 1986), p. 26. For an interesting argument that before World War I many British elites manipulated civilian fears of air attack to speed the growth of British air power, see Alfred Gollin, *The Impact of Air Power on the British People and Their Government, 1909–1914* (Stanford: Stanford University Press, 1989).

[14] David Divine, *The Broken Wing: A Study in the British Exercise of Air Power* (London: Hutchinson, 1966), p. 162.

[15] Barry R. Posen, *The Sources of Military Doctrine* (Ithaca: Cornell University Press, 1984), pp. 159–63.

ric: sources of food, clothing and utilities.[16] Since industrial economies were thought to be fragile, it was believed that a small number of bombers could destroy the entire economic base of an enemy, wreaking havoc on both civilian welfare and an opponent's military power. When the people witnessed the paralysis of the economy, the general will to fight would be shattered and the state would surrender. Like the British and German strategies of economic blockade in World War I, but far more efficiently, the enemy population would be attacked indirectly, as Michael Sherry puts it, "by disrupting and starving it rather than by blasting and burning."[17]

Although this strategy contained elements of both punishment and denial, the punitive elements were dominant. Advocates occasionally alluded to how strategic air attack would support a future land invasion, but air officers built this strategy precisely to avoid depending on land and sea power to achieve political goals in future wars. Because there is some dispute among historians about the essential logic of this strategy, it is useful to quote directly from three ACTS lectures, given to most of the Air Corps "best and brightest" officers, which elucidate the core of the theory.[18]

The first of these, "The Aim in War", states: "The ultimate object of all military operations, then, is to destroy the will of the people at home, for that is the real source of the enemy's national policy. . . . None of the props which bolster the soldier's morale are present to the same degree to support the will of the civilian. And yet the loss of that morale in the civilian population is far more conclusive than the defeat of the soldier on the battlefield. . . . Air forces [in contrast to land and sea forces] are capable of immediate employment toward accomplishing the ultimate aim. They can be used directly to break down the will of the mass of the enemy people."[19]

The second lecture explains how to achieve this aim by attacking an enemy's national economic structure. "Modern warfare places an enormous load upon the economic system of a nation, which increases its sensitivity to attack manifold. Certainly a breakdown in any part of this complex interlocked organization must seriously influence the conduct of war by that nation, and greatly interfere with the social welfare and morale of its nationals. . . . The application of the additional pressure necessary to cause a breakdown—a collapse—of this industrial machine . . . is the maximum contribution of which an air

[16] Thomas A. Fabyanic, *Strategic Air Attack in the United States Air Force: A Case Study*, Air University Report no. 5899 (Maxwell AFB, Ala.: U.S. Air Force, April 1976).

[17] Michael S. Sherry, *The Rise of American Air Power: The Creation of Armageddon* (New Haven: Yale University Press, 1987), p. 58.

[18] On the historical debate, see Ronald Schaffer, *Wings of Judgment: American Bombing in World War II* (New York: Oxford University Press, 1985), chap. 2, and Conrad C. Crane, "Evolution of U.S. Strategic Bombing of Urban Areas," *The Historian* 50 (November 1987): 14–39.

[19] M. S. Fairchild (instructor), "Air Force: The Aim in War," March 28, 1939, pp. 10, 12, 15, copy in United States Air Force Historical Research Agency (USAFHRA), Maxwell Air Force Base, Ala., file K248.2019A-2.

force is capable towards the attainment of *the ultimate aim in war*." If, for example, the American national economic structure is destroyed, "what happens to our capacity to wage war? Under such circumstances, what is the amount of pressure that would be applied to our civil population? Would it be sufficient to cause our capitulation before the threat of continued action? . . . if we picture section after section of our great industrial system ceasing to produce all those numberless articles which are essential to life as we know it, we can form an idea of the pressure that would be exerted."[20]

The third lecture, "New York Industrial Area," translates these ideas into actual targeting plans against New York City as "a typical great city." Three target systems are identified. Attacking aqueducts would make the distribution of water impossible, undermining sanitation, causing thirst, and raising the threat of fire, with the result that "this method of attack on the city could force its almost complete evacuation." Striking railroad bridges would make the distribution of foodstuffs equally difficult: "Feeding this great metropolitan area depends upon the continuance of uninterrupted rail communications into the area. With any interruption, shortages in various items would become apparent almost immediately. . . . the area would become untenable and the population could have to be evacuated." Bombing electric power stations would cut water distribution in half by disabling pumping stations, would cause refrigerated food to spoil, and would leave households without power.[21]

Although the official Air Force history of the period claims that the ACTS strategy aimed to destroy an enemy's "military power," these lectures hardly mentioned the effects of bombing on the capacity to produce military goods or to operate forces on the battlefield. Instead, the argument was that bombing can destroy a nation's economy and cause so much discomfort among civilians that they will demand political acquiescence regardless of any military effects.[22]

ACTS thinking is remarkably similar to ideas developed in the interwar period by the Russian turned American air theorist Alexander P. de Seversky. Rather than depend on air power's ability to sow panic throughout the population, Seversky believed in breaking civilian will "by destroying effectively the essentials of their lives—the supply of food, shelter, light, water, sanitation, and the rest. . . . Bombardment from on high must fit strictly to the pattern of aerial blockade, systematically wrecking the implements and channels of normal life until a complete breakdown of the will to

[20] M. S. Fairchild (instructor), "Air Force: National Economic Structure," April 5, 1939, pp. 8–9, USAFHRA, file K248.2019A-10.

[21] M. S. Fairchild (instructor), "Air Force: New York Industrial Area," April 6, 1939, pp. 3, 12, 14, 15–21, USAFHRA, file K248.2019A-12.

[22] Wesley Frank Craven and James Lea Cate, *The Army Air Forces in World War II* (Washington D.C.: GPO, 1948), 1: 50–52.

fight and the ability to fight is accomplished." In contrast to a naval blockade that aims to reduce the flow of goods into an area, an aerial blockade aims at the inverse, to increase the flow of people out of cities.[23]

Three factors drove the American interwar air strategy.[24] First, unlike the RAF, which was created during World War I, and the Luftwaffe, which was not created until the late interwar years, the air force in the United States fought a protracted battle for autonomy throughout the entire period and did not actually win it until after World War II. Thus, the pioneers of air doctrine had to demonstrate that air power could achieve cheaply a military purpose that the other services could achieve only at unacceptable cost. They also had to show that air power was more efficient (and therefore more worthy of resources) than sea or land power. These pressures led the pioneers of U.S. air doctrine, such as General William Mitchell and officers at the Air Corps Tactical School, to argue during the 1920s that bombing attacks on the enemy's civilian population at the beginning of a war would effectively destroy the enemy's will to resist, producing a far cheaper victory than the Army could achieve.

The choice of the industrial web approach rather than Douhet-style area bombing also helped the Air Corps in a separate resource competition with the Navy. The United States was so geographically isolated from European centers of power that American leaders believed their cities were immune from enemy bombing and that the principal threat would come across the seas. Accordingly, to win resources, proponents of air power had to argue not for the preemptive strike on enemy cities favored in Britain but that aircraft could destroy approaching ships more effectively than the Navy. Since coastal defense required precision bombing, it made sense for the Air Corps to adopt a precision-based rather than area attack approach to strategic bombing. In short, the complementarity of precision attack on the industrial web and and precision bombing of ships at sea satisfied the Air Corp's twin needs for a "strategic" function to gain independence from the Army and for tactical superiority against enemy ships to win resources from the Navy.[25]

U.S. air doctrine was also shaped by the liberal tradition in American politics and by economic conditions during the Great Depression. In essence,

[23] Alexander P. de Seversky, *Victory through Air Power* (New York: Simon and Schuster, 1942), pp. 146–47.

[24] This discussion is generally informed by Flugel, "United States Air Power Doctrine"; Schaffer, *Wings of Judgment*, chap. 2; Sherry, *Rise of American Air Power*, chap. 3; I. B. Holly, *Ideas and Weapons* (New Haven: Yale University Press, 1953); Robert Futrell, *Ideas, Concepts, Weapons: Basic Thinking in the United States Air Force* (Maxwell Air Force Base, Ala.: Air University Press, 1989).

[25] Both arguments are reflected in Mitchell's writings. If anything, he is more enthusiastic about the capabilities of aviation against ships than against any other kind of target. See, for example, William Mitchell, "Air Power vs. Sea Power," *American Review of Reviews* 58 (March 1921): 273–77. For an example of Mitchell's argument in favor of bombing cities, see *Winged Defense* (New York: Putnam's, 1925), pp. 126–27.

domestic political and economic considerations influenced how the duality in U.S. air doctrine matured into a focus on precision bombing of key points in a state's economy. By the mid-1930s, air planners ceased to favor direct attacks on civilian populations, although such attacks were never excluded as an option for the later stages of an air offensive. Attacking the enemy's will through the more humane and economical method of selective attack made sense in the 1930s because the total budgets of the Army, of which the Air Corps was a part, were in decline. Accordingly, the Air Corps required a doctrine that promised victory not only at less cost relative to the Army and Navy but cheaply in absolute terms. Greater financial scarcity also made it impolitic to affront American liberal values by advocating the mass slaughter of civilians. Thus, unlike Mitchell, who assumed that strategic air power would wipe away cities, Generals Ira C. Eaker and H. H. Arnold wrote in 1941: "Human beings are not priority targets except in special situations. Bombers in far larger numbers than are available today will be required for wiping out people in sufficient numbers by aerial bombardment to break the will of a whole nation."[26]

Thomas Schelling and the Manipulation of Risk

In the two decades after World War II, social scientists devoted considerable attention to the problem of military coercion. The most important product of this effort was the concept of manipulation of *risk*. The nuclear revolution and in particular the advent of mutual assured destruction created both new restrictions and new opportunities for coercion. Since full-scale thermonuclear war would devastate both sides, any threat to carry out a full-scale punishment campaign lost all credility. At the same time, since damage from even limited nuclear strikes would outweigh the national interest at stake in almost any dispute, the way was opened to coercion through manipulation of that risk. Later, these ideas were applied to purely conventional conflicts as well.

The idea of manipulating the risk of punishment for political purposes has largely come to be identified with Thomas Schelling's book *Arms and Influence*.[27] The heart of this strategy is to raise the risk of civilian damage slowly, compelling the opponent to concede to avoid suffering future costs.

[26] H. H. Arnold and Ira C. Eaker, *Winged Warfare* (New York: 1941), p. 134. For the impact of pacifism and antimilitarism on the U.S. Army between the world wars, see Ronald Schaffer, "The War Department's Defense of ROTC, 1920–1940," *Wisconsin Magazine of History* 53 (Winter 1969–70): 108–20.

[27] Thomas C. Schelling, *Arms and Influence* (New Haven: Yale University Press, 1966). Others also shared in the development of this idea, chief among them Daniel Ellsberg, "Theory and Practice of Blackmail," P-3883 (Santa Monica, Calif.: Rand Corporation, 1968); Morton A. Kaplan, *The Strategy of Limited Retaliation*, Center of International Studies Policy Memorandum no. 19 (Princeton: Center of International Studies, Woodrow Wilson School of

Like the Douhet model, the Schelling model focuses on population and economic targets. Civilian punishment can be inflicted both directly by killing large numbers and indirectly by destroying economic infrastructure, depriving the population of essential goods and services. There is, however, a fundamental difference. The Schelling model holds ultimate ruin in abeyance. Douhet called for immediate devastation: "Inflict the greatest damage in the shortest possible time."[28] The campaign need not be launched at the opening of a dispute to succeed, but the damage must be inflicted in a concentrated period of time. By contrast, Schelling argued that the key is not to destroy the entire target set in one fell swoop. Since coercive leverage comes from the anticipation of future damage, military action must be careful to spare a large part of the opponent's civilian assets in order to threaten further destruction: "To be coercive, violence has to be anticipated. . . . It is the expectation of *more* violence that gets the wanted behavior, if the power to hurt can get it at all."[29]

This logic calls into question the coercive usefulness of punishment strategies. Since, according to Schelling, sunk costs do not influence decisions, inflicting massive damage actually reduces the coercer's leverage. Punishment theories avoid this dilemma by assuming, explicitly or implicitly, that sunk costs do matter. In Douhet's model, for instance, victims of bombing are moved to revolt more by their emotional reaction to current suffering than by their rational consideration of future risks.

According to Schelling's view, the coercer must convince the opponent that targets will in fact be destroyed. Under this strategy, bombing is gradually escalated in intensity, geographical extent, or both. For example, a Schelling campaign might destroy targets in a sequence from demonstration targets to military targets to economic targets to population centers. The coercer must signal clearly that the bombing is contingent on the opponent's behavior and will be stopped upon compliance with the coercer's demands. "The ideal compellent action," Schelling writes, "would be one that, once initiated, causes minimal harm if compliance is forthcoming, and great harm if compliance is not forthcoming, is consistent with the time schedule of feasible compliance, is beyond recall once initiated, and cannot be stopped by the party that started it but *automatically* stops upon compliance, with all this fully understood by the adversary."[30]

Public and International Affairs, Princeton University, 1959); J. David Singer, "Inter-Nation Influence: A Formal Model," *American Political Science Review* 56 (June 1963): 420–30; and Alexander L. George, David K. Hall, and William E. Simons, *The Limits of Coercive Diplomacy: Laos, Cuba, and Vietnam* (Boston: Little, Brown, 1971). For a more recent discussion, see Richard K. Betts, *Nuclear Blackmail and Nuclear Balance* (Washington, D.C.: Brookings, 1987).

[28] Douhet, *Command of the Air*, p. 47.

[29] Schelling, *Arms and Influence*, pp. 2–3.

[30] Ibid., p. 89.

The most important instance of a risk strategy in action was the American bombing campaign against North Vietnam from 1965 to 1968, by which the United States sought to compel North Vietnam to cease supporting the insurgency in the South. The Johnson adminstration felt constrained to limit bombing of North Vietnam, both because important sectors of the American public would not support indiscriminate bombing and, even more important, because officials feared that massive bombing throughout North Vietnam would bring China into the war.[31] The aim was to coerce Hanoi by increasing the risks that existing limits would be crossed, leading to the loss of industrial production.

This campaign failed both because the political constraints on the Johnson administration ruled out indiscriminate countercivilian attacks and because the threat of limited bombing of industrial targets did not pose the risk of sufficiently brutal civilian hardship to overwhelm Hanoi's territorial interests. North Vietnam viewed the South as part of its homeland and its commitment to unify the country was based on the powerful motive of national cohesion. Threatening to destroy North Vietnam's tiny industrial base did not create sufficient risks to affect the government's political calculus.

Air attack on civilian populations, whether it seeks to kill large numbers or destroy the civilian economy, is not likely to coerce states in serious international disputes. Over more than seventy-five years, the record of air power is replete with efforts to alter the behavior of states by attacking or threatening to attack large numbers of civilians. The incontrovertible conclusion from these campaigns is that air attack does not cause citizens to turn against their government. Air power slaughtered British, German, and Japanese civilians in World War II; threatened Egyptian civilians in the 1970 "war of attrition" with Israel; and depopulated large parts of Afghanistan in the 1980s. In each case, the citizenry remained loyal to its leaders. In fact, in the more than thirty major strategic air campaigns that have thus far been waged, air power has never driven the masses into the streets to demand anything.

Although bombing economic structures can weaken an opponent's military capabilities in long wars, the first effects are generally felt by civilians. Since nearly all military and governmental facilities have backup power generation, the loss of electric power mainly shuts down public utilities (water pumping and purification systems), residential users (food refrigeration), and general manufacturing in the economy. Since the military generally has first call on oil, the effects of oil shortages fall mainly on civilians, cutting the fuel available for heating and civilian transportation (food distribution). Destroying rail and road bridges throughout the country further degrades the food distribution system.

[31] Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (New York: Free Press, 1989), pp. 39–72.

Since World War II, Western publics have shrunk from using indiscriminate means against noncombatants to pressure other states. Western air campaigns have, however, inflicted indirect punishment on civilian populations by attacking economic targets. Electric power grids, internal transportation networks, and dams were destroyed in Korea; electric power grids, oil refining, and internal transportation were also wrecked in Vietnam; and electric power, oil refining, and internal transportation were demolished in Iraq. In none of these cases, however, did civilian pressure induce governments to surrender.

The key reason is that air attack against civilian infrastructure is even less effective than direct punishment in stimulating disruptive behavior. Inadequate food, lack of transportation, poor sanitary facilities, and the breakdown of public utilities and services (gas, water, electricity, heat supply, etc.) produce less effect on civilians than direct attack. Although emotional stress increases with the amount of deprivation, the changes in morale are not as great as with personal exposure to bombing.[32]

Denial: Attacking the Enemy's Military Strategy

Using air power for *denial* entails smashing enemy military forces, weakening them to the point where friendly ground forces can seize disputed territories without suffering unacceptable losses. Denial strategies seek to thwart the enemy's military strategy for taking or holding its territorial objectives, compelling concessions to avoid futile expenditure of further resources. Accordingly, denial campaigns generally center on destruction of arms manufacturing, interdiction of supplies from homefront to battlefront, disruption of movement and communication in the theater, and attrition of fielded forces.

Coercive air strategies based on denying the enemy victory on the battlefield developed without the benefit of an air theorist to organize the ideas into a coherent set of principles, though John C. Slessor, a British airman who wrote in the 1930s, came the closest. Concerned that the Germans might capture the Low Countries, from which the Luftwaffe could attack British economic and political centers, he stressed the importance of attack-

[32] James M. Mackintosh, *The War and Mental Health in England* (New York: Commonwealth Fund, 1944); Richard M. Titmuss, *Problems of Social Policy* (London: HMSO, 1950); and Max Seydewitz, *Civil Life in Wartime Germany* (New York: Viking, 1945). Although bombing in Germany caused water shortages and widespread pollution of the water supply, it did not significantly reduce public health because personal health habits, medical services, and government emergency measures controlled the spread of disease. USSBS, *The Effect of Bombing on Health and Medical Care in Germany* (Washington, D.C.: GPO, 1947), pp. 230–37. For an analysis of the civilian and military effects of attacking electric power, see Thomas E. Griffith Jr., "Strategic Attack of National Electric Systems" (Thesis, Maxwell Air Force Base, Ala.: School of Advanced Airpower Studies, 1993).

ing theater military targets until the German army had been pushed back to its borders, after which the final "decision will only be gained by direct action against the hostile centers."[33] Several organizations developed ideas about how to use air power to enhance the prospects for victory on the battlefield and then as a way to achieve independent political effects. Though some of these strategies, such as interwar Luftwaffe air doctrine, did not consider political effects at all, they are important instances of coercive air strategies and were in some cases extremely effective. For instance, the Dutch government surrendered on 14 May 1940 although it still retained substantial military forces in the field because it was persuaded that the fronts could not be held under continued Luftwaffe bombing. There are three main kinds of denial strategies.

The first to be developed was direct support of ground forces. All the major combatants in World War I used air power for such purposes, including operational reconnaissance and attacks on enemy front lines and logistic centers immediately behind the front. These were ad hoc efforts that threw newly available capabilities at existing problems. The first attempt to articulate an integrated theory of the role of air power in land warfare occurred in interwar Germany. German thinking on air power held that bombers should support the army's ability to take and hold territory by attriting enemy frontline forces. Proponents declared that the chief purpose of air power was to contribute to a combined arms assault that would break through an enemy's front lines. Bombers would be used as "flying artillery" to strike both fixed and moving targets very close to the point of attack but out of range of army artillery. Most important, bombers would strike reinforcements in the rear areas and near the "shoulders" of breakthrough points, disrupting the ability of the enemy to counterconcentrate tactical reserves to defeat the initial penetrations of the front.[34]

The use of air power directly on the battlefield had its strongest support in Germany for three reasons. First, because the Versailles Treaty proscribed an independent German air force, the Reichswehr was forced to maintain and develop its reservoir of air power expertise clandestinely, under the tutelage of the army until 1935. Thus, airmen had no choice but to cooperate with the army and had no incentive to produce a doctrine underwriting an independent air force. Second, the Luftwaffe learned from its experience during the Spanish Civil War that counterpopulation bombing had much less effect on civilian morale than expected and that accurate bombing of in-

[33] Slessor, *Air Power and Armies* (London: Oxford University Press, 1936), p. 3.

[34] On the emergence of Luftwaffe doctrine, see James S. Corum, "The Reichswehr and the Concept of Mobile War in the Era of Hans von Seeckt" (Diss., Queen's University, Kingston, Ont., 1990); Williamson Murray, "The Luftwaffe Experience, 1939–1941," in *Cast Studies in the Development of Close Air Support*, ed. Benjamin Franklin Cooling (Washington, D.C.: Office of Air Force History, 1990), pp. 71–114; and Matthew Cooper, *The German Air Force, 1933–1945: An Anatomy of Failure* (New York: Janes, 1981).

dustrial targets was beyond the limits of their technology. As a result, early Luftwaffe operations tended to reinforce rather than challenge doctrinal preferences established under the auspices of the army.[35] Finally, strategic bombing of industrial centers did not contribute to, and indeed subtracted from, Germany's grand strategic requirements. Germany's central military vulnerability was that it possessed within its own territory insufficient raw materials to support a wartime economy. Consequently, a basic principle of Germany's grand strategy was to acquire the economic assets of the European continent. Successful achievement of this goal required the domination rather than destruction of economic structures.[36]

The second major denial strategy, strategic interdiction, involves large-scale operations either to destroy the enemy's sources of military production or to isolate them from combat theaters or fronts. Its purpose is to reduce the aggregate quantities of weapons and war materiel available to the opponent. Two forms of strategic interdiction emerged.

The first was the "critical component" theory, the first instance of which was the industrial web strategy. Although the main purpose of the strategy was to reduce civilian will to continue by inflicting punishment, complete destruction of the enemy economy would obviously impede war production as well, reducing the quantity and quality of military equipment and supplies that could be delivered to a theater of operations. The crucial assumption, however, was that there exists some small, and therefore inexpensive to destroy, target set that produces a key item or service indispensable to the economy as a whole, such as national transportation and power resources. Moreover, economic infrastructures themselves were systems with critical nodes. Thus, strategic bombing planners could bring an entire economy to a halt by researching its industrial structure to determine which supplies were used in a wide variety of industries and which of the sources of supplies could be destroyed with least effort.

The next instance of the critical component theory applied it more narrowly to military production, as opposed to the economy as a whole. The Committee of Operations Analysts, a group of leading civilians (mainly economists, political scientists, and industrial managers) and air planners (including some from the ACTS) recommended targets for strategic bombing in Germany in 1943. The COA believed it was beyond current capabilities to cause a general industrial collapse and that such a strategy would not in any case achieve decisive military effects quickly. The analysts rec-

[35] Williamson Murray, "British and German Air Doctrines between the Wars," *Air University Review* 31 (March–April 1980): 39–58; Posen, *Sources of Military Doctrine*, p. 214.

[36] On Germany's goals during the interwar years, see Williamson Murray, *The Change in the European Balance of Power, 1938–1939: The Path to Ruin* (Princeton: Princeton University Press, 1984); E. M. Robertson, *Hitler's Pre-war Policy and Military Plans, 1933–1939* (New York: Citadel, 1963); Burton H. Klein, *Germany's Economic Preparations for War* (Cambridge: Harvard University Press, 1959).

ognized that the civilian sectors of the economy could absorb so much damage that the combat power of German forces could not be reduced until the huge civilian cushion had been destroyed. Therefore, they looked instead for components early in the military production cycle, the destruction of which would make the large-scale manufacture of heavy military equipment such as tanks, aircraft, and artillery impossible: "It is better to cause a high degree of destruction in a few really essential industries or services than to cause a small degree of destruction in many industries."[37] Consequently, their targets for strategic interdiction were special primary and semifinished products such as ball bearings, machine tools, rubber, aluminum, magnesium, nickel, steel, and nitrates that are used in the assembly of finished military goods. Even after the experience of World War II, many civilian students of strategic bombing have advocated critical component theories.[38]

Another form of strategic interdiction is a "systemwide" strategy that seeks to stop flows of resources and manufacturing by attacking all parts of very large systems rather than selecting critical components within systems. This strategy also emerged from World War II, deriving mainly from operations against Japanese sea commerce and the German national railway. Transportation is an effective target set for this purpose because it is large and connects primary goods to industries and industries to each other. Since the purpose is to attack the movement of resources and goods at all stages of the production cycle (raw materials to heavy industry to intermediate industries to finished products), air attacks are directed not only against key nodes such as marshalling yards, bridges, and ports but also against moving traffic, rolling stock, and cargo vessels. In contrast to attacks on critical components this form of strategic interdiction applies pressure as widely as possible in order to affect many industries simultaneously.[39]

The third major denial strategy, operational interdiction, attacks rear-area combat support functions in a theater of operations, the most important of which are tactical supply networks, reinforcements, and command-and-control facilities. The purpose of these attacks is to induce operational paralysis, which reduces the enemy's ability to move and coordinate forces in the theater.

[37] Report of the Committee of Operations Analysts, 8 March 1943, quoted in Charles Webster and Noble Frankland, *The Strategic Air Offensive against Germany, 1939–1945* (London: HMSO, 1961), 2: 213.

[38] Bernard Brodie, *Strategy in the Missile Age* (Princeton: Princeton University Press, 1959), pp. 110, 115, 116; Stefan T. Possony, *Strategic Air Power: The Pattern of Dynamic Security* (Washington: Infantry Journal Press, 1949), pp. 48–73. The Summary Report of the U.S. Strategic Bombing Survey implicitly accepted the critical component theory by suggesting that small, key industries, such as the German tetra-ethyl lead industry, should have been attacked.

[39] The main advocate of systemwide economic attack in order to cause economic collapse is Mancur Olson Jr., "The Economics of Target Selection for the Combined Bomber Offensive," *Royal United Services Institution Journal* 108 (November 1962): 308–14.

This strategy also arose in World War II. As the date for the invasion of Europe grew nearer, the Allied air services were called upon to develop plans to support the ground offensive. It was necessary to shift away from both Douhet and strategic interdiction because these would require an uncertainly long period to translate damage inflicted on specific targets to measurable weakening of German resistance. The pressure to reduce Allied ground casualties compelled development of a strategy designed to diminish German ground force mobility and fighting capacity in the western theater with effects that Allied ground forces could immediately exploit to their advantage.

Emphasis on operational paralysis led to the development of two sets of plans. The British plan aimed to destroy the rail, road, and river communications on which the German army depended in the theater. The core target set was the French railway network, because it carried the vast majority of very heavy loads, including military vehicles and other heavy equipment.[40] Railroad marshaling yards and bridges were struck, virtually shutting down rail movement west of Paris. Since reinforcing divisions had to march by road from Paris to Normandy, it took those that came from Poland as long to move the last two hundred miles by road as it had taken to move the first thirteen hundred miles by train.[41]

In contrast, American air planners selected oil instead of transportation. Believing that German-controlled railroads had too great a cushion of capacity for civilian and long-term industrial use above the minimum required by fighting units, the U.S. Enemy Objectives Unit maintained that a determined effort against oil would quickly reduce German military capabilities by reducing tactical and strategic mobility and frontline delivery of supplies.[42] Both the British and the American plans were executed, and debate continues over which contributed more to the war's outcome.[43]

This focus on affecting the fighting effectiveness of the German army also caused tactical air doctrine to evolve along similar lines. Until 1944, tactical air forces were largely seen as most effective in direct attacks against enemy

[40] Arthur William Tedder, *With Prejudice: The War Memoirs of the Marshal of the Royal Air Force* (Boston: Little, Brown, 1966), pp. 502–4, 509, 529–40; Solly Zuckerman, *From Apes to Warlords* (New York: Harper and Row, 1978), pp. 222, 232–33, 289–90; and Alfred C. Mierzejewski, *The Collapse of the German War Economy, 1944–1945: Allied Air Power and the German National Railway* (Chapel Hill: University of North Carolina Press, 1988), pp. 81–82.

[41] Price T. Bingham, *Interdiction in Italy and France* (Maxwell AFB, Ala.: Air University M-43796-4, 1986), p. 11.

[42] Enemy Objectives Unit, "The Use of Strategic Air Power After 1 March 1944," 28 February 1944, pp. 3–4, app. 8, USAFHRA K519.3171-2. Memorandum, Carl Spaatz to General Dwight D. Eisenhower, Supreme Allied Commander, "Plan for the Completion of the Combined Bomber Offensive," 5 March 1944, USAFHRA K519.318-1.

[43] On the historical debate, see David R. Mets, *Master of Air Power: General Carl A. Spaatz* (Novato, Calif.: Presidio Press, 1988) and its review by Solly Zuckerman, "The Doctrine of Destruction," *New York Review of Books*, March 29, 1990, pp. 33–35.

ground units, albeit at deeper distances than artillery could reach. The imperative to weaken the German army in preparation for the Normandy landings and to permit the advance of Allied ground troops, however, led to the use of air power against German command posts and logistic networks throughout the theater. The purpose of this first "battlefield air interdiction" campaign was not so much to destroy reserve units deep behind the front as to prevent them from being moved to reinforce the front. Disrupting communications would keep theater commanders ignorant of the true situation of units; attacking headquarters would impair the ability of staffs to coordinate units; and bombing logistic networks would reduce the mobility and firepower of German forces.[44] The campaign succeeded, as Field Marshal Erwin Rommel, the German commander reponsible for defending the French coast, noted: "The movement of our troops on the battlefield is almost completely paralyzed, while the enemy can maneuver freely."[45] Thus, by the end of World War II, a complete set of denial strategies—from attrition of ground units to operational and strategic interdiction—had been developed.

In general, denial air strategies are more likely to succeed against conventional forces than against guerrillas. The inelastic dependence of mechanized forces on logistics and central control means that shortages can undermine the ability of organized units to take or hold the disputed territory, and the complexity of conventional war planning means that these can be anticipated in advance. In contrast, guerrilla wars depend on the willingness of overlapping small groups to continue to resist central authorities, and this type of collective action is both less sensitive to shortages and less predictable. Guerrillas should be largely immune to coercion; coercers should expect to pay the full costs of military success to extract political concessions.

American coercion of North Vietnam in 1965 to 1968 failed because U.S. bombing could not address any important vulnerability of Hanoi's guerilla strategy. During this period, the United States tried to undermine the North's strategy for unifying Vietnam by interdicting the flow of logistics from Hanoi to Communist forces in the South. Although considerable damage was inflicted on the enemy logistic system, this had little effect on the feasibility of Hanoi's military strategy because the guerrilla campaign being fought in this period required little in the way of supplies and next to nothing at all from North Vietnam. Even with well over 200,000 troops in the field, their requirements for food, ammunition, medical supplies, and POL never exceeded roughly 380 tons a day, of which only some 34 tons came from the North. Given these tiny supply requirements, aerial bombardment

[44] Alfred Price, *Instruments of Darkness: The History of Electronic Warfare* (London: Macdonald and Jane's, 1977), pp. 97–250.

[45] B. H. Liddell Hart, ed., *The Rommel Papers* (New York: Harcourt, Brace, 1953), p. 476.

could not significantly hinder the insurgency, and consequently coercion failed.

If denial is more likely to succeed against conventional than against guerrilla strategies, when are the three forms of denial—strategic interdiction, operational interdiction, and attrition of military forces—most effective?

The purpose of strategic interdiction, which destroys production of military equipment and national transportation networks, is to reduce available quantities of weapons, munitions, and other military supplies. Strategic interdiction is an effective denial strategy only in protracted wars of attrition, and even then may require the attacker to pay heavy costs before coercive success is achieved.

In short wars, attacking economic targets rarely affects battlefield capabilities. The long lead times of production and conversion of civilian to military manufacturing means that industry can hardly contribute to wars lasting less than six months or a year. Accordingly, demolishing weapons plants, and even the entire economy, is often futile. The destruction of civilian transportation also rarely matters. The transportation requirements of military units and their logistics is generally small compared to the capacity of national transportation systems. Because military transportation can receive priority passage, national transportation capacity generally cannot be reduced below the level required by the military. Moreover, destroying national power grids does not weaken military capabilities in the theater. The widespread use of backup power generation, the positioning of POL reserves, and the low power requirements of military units means that military forces do not depend on national power grids to execute their functions. Instead of weakening battlefield capabilites, the greatest effect of strategic interdiction in short wars is to punish civilians, whose welfare is always tightly linked to the health of the economy.

By contrast, in long wars of attrition strategic interdiction can be an effective denial strategy. Wars of attrition occur when states seek victory by pushing the opponent back along a broad front in a series of set-piece battles. Rather than attempt to score a single knockout punch, opponents seek to overwhelm each other with numbers, and battles are fought to wear down opposing military capabilities. Accordingly, the side with greater manpower and a larger material base will ultimately win.[46] In essence, wars of attrition are economic wars in which outcomes are determined by relative manufacturing capability.[47]

[46] John Mearsheimer, *Conventional Deterrence* (Ithaca: Cornell University Press, 1983), pp. 33–34.

[47] On the connection between the economic foundations of military power and the nature of war, see Paul M. Kennedy, "The First World War and the International Power System," *International Security* 9 (Summer 1984): 37–40.

Strategic interdiction can undermine attrition strategies, either by attacking weapons plants or by smashing the industrial base as a whole, which in turn reduces military production. Of the two, attacking weapons plants is the less effective. Given the substitution capacities of modern industrial economies, "war" production is highly fungible over a period of months. Production can be maintained in the short term by running down stockpiles and in the medium term by conservation and substitution of alternative materials or processes. In addition to economic adjustment, states can often make doctrinal adjustments. Even when production of an important weapon system is seriously undermined, tactical and operational adjustments may allow other weapon systems to substitute for it. In 1944–1945 the Germans compensated for their shortage of tanks by introducing more effective infantry antitank weapons, notably the Panzerfaust and Panzerschreck. As a result, efforts to remove the "critical" component in war production generally fail. The Allies won air superiority over Germany in World War II not because bombing aircraft engine plants caused the numbers of German aircraft to decline but because air battles killed the Luftwaffe's most highly trained pilots. Iraq's ability to disperse its nuclear weapons plants indicates that the industrial bases of even Third World countries are elastic. In addition to nuclear facilities, the Iraqis also appear to have dispersed much of the equipment for their national telecommunications network and other key industrial systems prior to the start of the air war to enable the rapid restoration of these systems after the war.[48]

Strategic interdiction is most effective when attacks are against the economy as a whole. The most effective plan is to destroy the transportation network that brings raw materials and primary goods to manufacturing centers and often redistributes subcomponents among various industries. Attacking national electric power grids is not effective because industrial facilities commonly have their own backup power generation. Attacking national oil refineries to reduce backup power generators typically ignores the ability of states to reduce consumption through conservation and rationing. Against an exceptionally import-dependent economy, such as Japan in World War II, disruption of transportation can best be accomplished by blockading sea routes, using air power less for bombing than for shipping attack and mining. If imports can be totally cut off, the target economy will collapse when domestic stockpiles are exhausted; the Japanese merchant marine was essentially destroyed by the end of 1944, leading to collapse of war production by the middle of 1945. Against a relatively resource-rich economy, such as Nazi-controlled Europe, strategic interdiction requires stopping the flow of commerce along domestic railroad, highway, and canal

[48] See the remarks by William Arkin in "Defeat of Iraq Sparks Debate on Which Air Role Was Crucial," *Aviation Week and Space Technology*, 27 January 1992, pp. 62–63.

systems by destroying key nodes (bridges, canal locks, and railroad marshaling yards), moving traffic, and rolling stock and cargo vessels. This mission is hard because commercial transportation systems are large and redundant and are rarely used to full capacity. Thus, the United States could not bring the German economy to quick collapse even though U.S. air forces were vastly superior.

The weakness of strategic interdiction as a coercive strategy is that the attacker must still pay a heavy price for victory. Strategic interdiction reduces the quantity of weapons, munitions, and supplies reaching the battlefield, but it does not thin frontline forces or rapidly reduce their effectiveness. Thus defenders can still extract a considerable toll on attacking forces. Weakened states may "deter" an opponent from pressing its advantage to final victory by threatening to exact a very high price in casualties during the final battles to overcome their still-powerful frontline forces.

The purpose of operational interdiction, which destroys logistic networks, reinforcements, and command headquarters behind the front lines, is to stop the movement and coordination of forces throughout the theater. Disrupting these combat support functions matters most when adversaries are racing to concentrate (or counterconcentrate) forces at particular decisive points. As a result, attacking rear-area military targets is likely to be most effective when fronts are fluid rather than static.

Fronts become fluid when one side either breaks though the opposing line or maneuvers around the opponent's open flank. In order to achieve a breakthrough or a flank attack, the attacker must suddenly concentrate a large amount of force against a narrow sector before the defender can react. Air power can disrupt the attacker's combat support functions, slowing the attacker's concentration and giving the defender time to counterconcentrate. Likewise, disrupting the defender's logistics, reinforcements, and command and control delays reorganization of the defense, so that the attacker can punch through before the weak point is strengthened. Once a breakthrough is achieved, the main tasks of the attacker are to penetrate deeply into the opponent's rear and annihilate the defender's rear-area logistic and communications networks; the main task of the defender is to block the breakthrough, counterattack the vulnerable flanks of the penetrating spearheads, and form a new front. For both sides, timely movement of reserve forces and lateral movement of frontline forces is crucial. Accordingly, the more air power can disrupt logistic networks, reinforcements, and command headquarters behind the front lines, the more it stops the movement and coordination of forces throughout the theater, and the more it can affect the outcome.

In contrast, efforts to achieve operational paralysis by attacking rear-area targets is much less effective when fronts are static, as they are when either natural obstacles or force concentrations are so dense that breakthroughs

and flank attacks are virtually impossible. Timely movement of reinforcements is less critical because strong fronts act as a cushion to permit even delayed forces to enter the battle in time to be effective. As a result, partial operational paralysis, which could significantly affect outcomes when fronts are fluid, weakens the opponent's ability to maintain a static front much less. For operational paralysis to matter when fronts are static, the attacker must achieve virtually complete destruction of the opponent's transportation and communications throughout the theater, completely isolating front forces from rear support. Even then, achieving a breakthrough could be costly and time-consuming.

The purpose of close air support, which attacks frontline fielded forces, is to thin the front, creating weak spots that the attacker's ground forces can exploit. Ground support is most effective when fronts are static rather than fluid.

When fronts are static, ground support is the most effective denial strategy because achieving a breakthrough is the only way to thwart the opponent's strategy without waging a costly war of attrition. In essence, air power adds additional firepower that can be used to create holes or to stop initial penetrations in a front. Air power has the advantage that it can be concentrated more easily in space and time than ground power because it ranges farther from supply bases and sees over the horizon. Thus, air power makes it more difficult for the defender to anticipate where the main weight will initially fall and, likewise, easier for the attacker to shift weight between separate axes when an advance is in progress.

When fronts are so static that breakthroughs are impossible, however, air power's ability to concentrate is less valuable than simply the aggregate firepower it adds to ground weapons. In this situation air power is likely to be less cost-effective than ground firepower, especially artillery.

When fronts are fluid, air support, while important, is less crucial to the success of a ground offensive. Once spearheads penetrate a front and head for rear areas, they no longer face solid resistance as they did at the front. The attacker seeks to reach and destroy the defender's rear logistics and communications centers, overwhelming weak enemy concentrations that may be encountered on the way and bypassing stronger ones. To defeat the attacker, the defender attempts to reestablish a continuous front to block further penetration and to counterattack the vulnerable flanks of the attacking spearheads. Thus, while air support immediately in front of spearheads is important, interdicting the movement of defending reserves is the most crucial mission. Interdiction blunts the threat to the spearheads' flanks and delays the defender's efforts to re-form a solid front. At the same time, direct support of the attacking spearheads is less effective because their rapid movement makes distinquishing friend from foe difficult. In this case, ground support merges into operational paralysis, since both are oriented toward stopping the effective movement of opposing reserve forces. Similarly, after a breakthrough, the defender's main concern is with stopping the forward advance of the attacking spearheads, by blocking their supply lines and operational reserves, after which the spearheads themselves become significantly less mobile and more vulnerable to counterattack.

In guerrilla warfare, when meaningful counterconcentration does not occur and when logistic requirements are minuscule, air power is most effectively used directly against guerrillas rather than against their combat support functions. The ability of air power to substitute for ground power is significantly constrained by tremendous difficulties in identification of friend and foe from the air, however, which can be offset only partially by increasing loiter time over the target and coordination between air and ground units.

Decapitation

The use of air power for *decapitation*—a strategy spawned by precision-guided munitions and used against Iraq—strikes against key leadership and telecommunication facilities. The main assumption is that these targets are a modern state's Achilles' heel. Regardless of the strength of a state's fielded forces or military-industrial capacity, if the leadership is knocked out, the whole house of cards comes down. These counterleadership raids also cause little collateral damage if intelligence about the targets is right. The air theorist most closely identified with decapitation is Colonel John A. Warden III, one of the principal architects of the Desert Storm air campaign. He sees leadership as the most critical element in determining a nation's will to fight:

> The command structure . . . is the only element of the enemy—whether a civilian at the seat of government or a general directing a fleet—that can make concessions. In fact, wars through history have been fought to change (or change the mind of) the command structure—to overthrow the prince literally or figuratively or to induce the command structure to make concessions. Capturing or killing the state's leader has frequently been decisive. In modern times, however, it has become more difficult—but not impossible—to capture or kill the command element. At the same time, command communications have been more important than ever, and these are vulnerable to attack. When command communications suffer extreme damage . . . the leadership has great difficulty in directing war efforts. In the case of an unpopular regime, the lack of communications not only inhibits the bolstering of national morale but also facilitates rebellion on the part of dissident elements.[49]

[49] John A. Warden III, "Employing Air Power in the Twenty-first Century," in *The Future of Air Power in the Aftermath of the Gulf War*, ed. Richard H. Shultz Jr. and Robert L. Pfaltzgraff Jr. (Maxwell Air Force Base, Ala.: Air University Press, 1992), p. 65; see also Bruce A. Ross, "The Case for Targeting Leadership in War," *Naval War College Review* 46 (Winter 1993): 73–93.

Three variants might be pursued, each with a slightly different mechanism for success. The first is leadership decapitation, seeking to kill specific leaders on the assumption that they are the driving force behind the war and that eliminating them will lead to peace, either because their successors are not as committed to the objectives of the war or because they fear that they too will become targets in turn. The second variant is political decapitation, the use of air power to create the circumstances in which domestic opposition groups overthrow the government and replace it with one more amenable to concessions. Whether the mechanism is popular revolt or a coup d'etat, air power can increase the chances of success by attacking the regime's instruments of internal control (such as counterintelligence, security forces, and loyal military units) and knocking out communications to isolate leaders from their sources of support. The last variant is military decapitation, which attacks national command and communications networks in order to isolate the central leadership from its units in the field, so that the leaders can no longer give strategic direction or adjust to enemy moves. Deprived of central direction, the enemy's field forces will collapse under even light military pressure.

According to this strategy, a nation's leadership is like a body's brain: destroy it and the body dies; isolate it and the body is paralyzed; confuse it and the body is uncontrollable. The logic of decapitation is part punishment and part denial. As a punishment strategy, it aims to overcome a key weakness in such strategies: the increased ability of governments to repress dissent in war. As a denial strategy, it aims to extend the logic of operational paralysis to "strategic" or national decision makers.

Although there have been sporadic efforts to attack leaders or their national communications, only recently has this strategy became the cornerstone of air campaigns. Government buildings were bombed in Berlin and Pyongang and Hanoi's radio station was attacked, but the inaccuracy of bombing limited the ability of air strikes to destroy targets. With the Libya raid, however, which just missed Moamar Qaddafi, and the inclusion of Saddam Hussein's palaces and command bunkers on Desert Storm's target lists, decapitation is gaining attention.[50] The main attraction of targeting political leadership with conventional weapons is that it offers the possibility of successful coercion with minimal commitment of resources and risk of life, and it can be justified on the grounds that national command and control should be a legitimate target in conventional war, just as political leadership became a legitimate nuclear target in the 1970s.

Political leadership targeting is not likely to produce coercive leverage, however, for three reasons. First, it is very hard to find individuals and kill them. National leaders often have domestic enemies and so are well protected even in peacetime. The outbreak of war is generally accompanied by the tightening of security measures throughout society, especially those de-

[50] Ross, "Case for Targeting Leadership."

signed to protect the lives of government and military leaders. To circumvent the security surrounding leaders requires extremely detailed intelligence about their movement patterns, which can change without warning.[51] It took American troops days to find General Manuel Noriega after the Panama invasion, and they were looking for him on the ground. In fact, there has been only one successful wartime assassination by military forces of an important enemy military or political leader (Japanese Admiral Isoroku Yamamoto in World War II), and it had no effect on the outcome of war.[52] Moreover, success resulted more from opportunity than from planning. On 13 April 1943 Yamamato planned a series of morale-building visits to frontline bases. On 18 April United States intelligence intercepted a radio message indicating his flight schedule and an air attack destroyed his aircraft.[53] Of all possible instruments, air power is among the least effective at such work because there is likely to be a significant time delay between locating a leader and sending an aircraft to attack him, a delay that is all the more critical in today's era of mobile command posts. Thus, using air power to strike at leaders probably requires reflex targeting, which assumes that the first attack will be unsuccessful but will drive the leader to his favorite hideout, which is subjected to a a follow-on attack. This strategy multiplies the uncertainty.[54]

Second, truly idiosyncratic wars are rare in modern times. It is common for states to mobilize public support for war by demonizing their opponents, and personalizing conflicts (Churchill vs. Hitler, Reagan vs. Qaddafi, Bush vs. Saddam) plays an important role in these efforts. Outsiders frequently exaggerate the degree to which enemy leaders' policies express their personal preferences rather than those of the larger society. This tendency is exacerbated by intelligence provided by internal dissidents who have an interest in minimizing the degree of popular support for the leader's policies. In fact, the death of a leader in war commonly brings less change in policies than outsiders expected. The German general staff and the Nazi leadership continued to fight for months after Hitler removed himself from public view and for weeks after his suicide.

Third, succession in most states is highly unpredictable in war, the more so in closed societies. The problem is not intelligence but that tools for forecasting succession are indeterminate. In democratic systems, predictions of suc-

[51] Roger G. Herbert, "Bullets with Names: The Deadly Dilemma" (Monterey, Calif.: Naval Postgraduate School, 1992), pp. 93–99.

[52] The many instances in European colonial wars and in America's Indian wars in which native military leaders were captured by military forces and then killed in captivity are not comparable to decapitation in the context of coercion, since the native leaders' forces had to be defeated before the leader could be captured. See Dee Brown, *Bury my Heart at Wounded Knee* (New York: Rinehart and Winston, 1970); and Thomas Pakenham, *Scramble for Africa* (New York: Random House, 1991).

[53] R. Cargill Hall, *Lightning over Bougainville* (Washington, D.C.: Smithsonian Institution, 1991), p. 7; and John Dean Potter, *Yamamoto* (New York: Viking, 1965), pp. 303–4.

[54] John T. Stark, "Unconventional Warfare—Selective Assassination as an Instrument of National Policy" (Maxwell AFB, Ala.: Air University, n.d.).

cession are difficult because of the vagaries of public opinion. In authoritarian states, successions are even more uncertain because lieutenants commonly mute their voices and opinions, making it particularly difficult to know the political power they would have in a succession crisis or the direction in which they would move the country once in power. Efforts to predict the Soviet leadership succession in the late 1970s are an important case in point. Brezhnev's actual successor, Yuri Andropov, and his successor, Konstantin Chernenko, and his successor, Mikhail Gorbachev, are hardly mentioned, let alone predicted as future rulers, by the most detailed treatment at the time.[55] Similarly, few would have known that Saddam Hussein was the strong man in Baghdad before he replaced Ahmad Hasan al-Bakr in 1979.

Another variant on decapitation is to use air power to create the circumstances in which local groups overthrow the government, either by popular revolt or a coup, replacing it with one more amenable to concessions. Decapitation, however, has never toppled a government. The only attempt to execute such a strategy occurred during the air campaign against Iraq, in which some air planners hoped that strikes against Baghdad would weaken Saddam's political control and permit the overthrow of his government.[56] Nonetheless, after the most ambitious decapitation air campaign in history, in which over 44 leadership and 156 command-and-control facilities were attacked, and despite the fact that Iraq, with a long history of coups and an unpopular leader, was an ideal case for this strategy, Saddam did not fall.

Decapitation, like punishment, is not likely to topple governments, by fomenting either popular rebellion or a coup. Air attack is a weak instrument for producing popular rebellions, mainly because conflict with a foreign power typically unleashes political forces (such as nationalism and fear of treasonous behavior) which make collective action against even unpopular regimes unlikely until the opportunity for military victory has been lost.

Although decapitation might reduce a regime's ability to monitor and communicate with the population, it is unlikely to disrupt these functions for long unless the country is also occupied. The redundancy and miniaturization of modern telecommunications (telephone, television, and radio) makes it practically impossible to cut all the communication links between elites for any appreciable time. The destruction of civilian telecommunications can be hampered by housing transmitters in facilities that that attackers may want to avoid (hospitals, schools, and churches). Even if air power destroys the telecommunication network, it is not clear that a leader's ability to talk to his population would be limited in any meaningful way. Newspapers alone could keep communication open. Nor would the destruction of telecommunications free the population from fear of surveillance or

[55] Seweryn Bialer, *Stalin's Successors: Leadership, Stability, and Change in the Soviet Union* (New York: Cambridge University Press, 1980).

[56] Gulf War Air Power Survey, *Summary Volume* (Washington, D.C.: U.S. Air Force, 1993), p. 20.

reprisal, because the visibility, brutality, and perhaps even size of domestic security services can be increased.

Decapitation is also not likely to provoke coups, which, like popular revolts, are rare in wars and never occur in the early stages. When they happen, as when Mussolini was successfully overthrown in July 1943 or the famous attempt was made on Hitler in July 1944, they occur in the later stages, after battlefield defeats. The reason is that coup plotters want to control the country, not just remove the old guard. Unless the war is already clearly lost, the successor regime could be blamed for losing the war and quickly deposed in turn.[57]

More specifically, coups generally require the cooperation of the army, for only the army has the power to overcome the ruler's security forces. At a minimum, a segment of the army must actively participate and the rest must tacitly cooperate. In a conflict with a foreign power, such cooperation is unlikely. Armies are typically among the most patriotic national institutions and especially unlikely to cooperate with the enemy. Moreover, armies are responsible for winning wars. Since a coup will interfere with that goal, it is not surprising that armies have been interested in coups only when war is clearly lost and their leaders can blame the government for losing it.

Even if a state is ripe for a coup, moreover, disabling communications is not sufficient to provoke one or to ensure its success. Knowing the leader's location and overcoming his security forces are far more important. Successful coups always involve the arrest or murder of the top leader because rulers can commonly summon loyal forces to oppose the coup by meeting with them face-to-face. Thus, coup attempts do not pose significantly easier intelligence problems for foreign powers than assassinations. Indeed, air attack against national telecommunications can complicate the mission of coup plotters because they too are denied access to communication networks as they plan and execute operations.[58]

Finally, coups backed by the opponent in a serious international conflict are among the least likely to succeed. International enmity makes foreign cooperation with the indigenous military difficult before the coup and provokes resistance to the insurgents by the people and army during it, which is why the Iranian-backed coup in Iraq (1970) and the Libyan-backed coup in the Sudan (1976) failed. Indeed, unless foreign ground troops are committed, the key predictor of the success of a foreign-backed coup is the degree of po-

[57] Some of the standard works on coups are Samuel E. Finer, *The Man on Horseback: The Role of the Military in Politics* (New York: Praeger, 1962); Eric A. Nordlinger, *Soldiers in Politics: Military Coups and Governments* (Englewood Cliffs, N.J.: Prentice-Hall, 1977); Samuel P. Huntington, *Political Order in Changing Societies* (New Haven: Yale University Press, 1968); and Amos Perlmutter, *The Military and Politics in Modern Times* (New Haven: Yale University Press, 1977).

[58] For the mechanics of coup operations, see Edward Luttwak, *Coup d'Etat: A Practical Handbook* (Cambridge: Harvard University Press, 1979); and Gregor Ferguson, *Coup d'Etat: A Practical Manual* (Dorset, England: Arms and Armour Press, 1987).

litical affiliation between the foreign state and local regime. If the survival of the targeted regime already depends on the outside power backing the coup, as in the case of the United States in South Vietnam (1963–1965) or the French in the Central African Republic (1981), the chances of success are high. If the foreign power's influence is weak compared to the indigenous political base of the existing regime, as with the Soviet Union in the Sudan (1971), the chances of success are low.[59]

In theory, the growing centralization of military operations could mean that attacks against the most senior military commanders and their communication links to the theater could paralyze military forces. If the leaders cannot communicate with theater commanders, they cannot coordinate any meaningful national strategy, nor can they adjust strategy to meet enemy moves. In short, if attacking military headquarters in the theater causes operational paralysis, then attacking national military headquarters should be even better because it causes "strategic" paralysis.[60]

Strategic paralysis is virtually impossible to achieve, however, for three reasons. First, strategic direction does not demand high-volume real-time communication. The sheer size, spatial dispersion, and complexity of modern forces makes it impossible for national leaders to direct units in battle. The complexity and speed of modern operations means that the flow of information to and from units cannot be sufficiently detailed or arrive sufficiently fast to allow close control by a commander sitting at the seat of government, modern communications notwithstanding; control over actual combat must be exerted in the theater.[61] Lyndon Johnson did involve himself in picking air targets for strategic bombing (a type of operation more easily centrally planned than most), but he could not and did not get involved in the enormous number of decisions required for day-to-day management of land, tactical air, and naval operations. National leaders generally give theater-wide direction (choosing when and where the main effort is to be applied), sometimes authorize operational plans prepared by lower echelons to implement these broad decisions, and only sporadically intervene in decisions about how to coordinate forces, and then on an ad hoc basis. Characterizations of military command and control systems as centralized and decentralized can be misleading. These terms generally relate to the discretion given tactical unit commanders (e.g., divisions and brigades) by theater commanders (e.g., corps and armies). Even in militaries famous for centralized command styles and major roles for political leaders in operational affairs, national leaders are

[59] For an excellent analysis of foreign-backed coups, see Steven R. David, *Third World Coups d'Etat and International Security* (Baltimore: Johns Hopkins University Press, 1987), pp. 138–52.

[60] Jason B. Barlow, "Strategic Paralysis: An Air Power Strategy for the Present," *Airpower Journal* 7 (Winter 1993): 4–15.

[61] Hans Rosenberg, *Bureaucracy, Aristocracy, and Autocracy* (Boston: Beacon Press, 1958); and Martin Van Creveld, *The Transformation of War* (New York: Free Press, 1991).

still mainly concerned with broad decisions regarding fronts to be defended and attacked and not the orchestration of tactical units or their battlefield support to execute those decisions. Except in smallest contingencies, national leaders normally cannot plan and coordinate in-theater military operations.[62]

Thus, communication between national and theater commanders need not be voluminous and instantaneous. Major changes in strategic direction involve so much planning and logistic effort that they take days or weeks to implement theaterwide. Accordingly, short delays in receiving such orders rarely matter.

Second, strategic communications cannot be cut for long. Since national orders can be extremely short messages, many means can be used to send them effectively (land lines, radio transmissions, couriers, and face-to-face meetings). Moreover, disruptions of any of these methods is easily repaired because breaking strategic communication does not cause the same traffic jams that breaking intratheater communication does. Because theater warfare is analogous to railroad management—that is, it must dispatch large loads along a limited number of high-capacity routes on a tight schedule—traffic jams make it necessary to plan new routing, and therefore they have major and long-lasting effects. Strategic direction is more like a car trip. If the car does not start, one can borrow or rent another; if the road is closed or there are traffic jams, one can take a different route; if the weather is bad, one can go another day.

Third, theater commanders frequently are predelegated to act without higher authorization in emergencies. Although the normal practice in the United States is for unified commanders to seek authorization from the Joint Chiefs of Staff to implement measures beyond basic peacetime routines, the unified commanders have discretionary power to take whatever measures they consider necessary to preserve the security of the forces under their command, including moving them to locations anywhere in their area of responsibility.

Delegation of authority occurs even in authoritarian regimes. In principle, the tendency of authoritarian leaders to limit decision making to a very few and to avoid predelegation of authority could make them more vulnerable to strategic paralysis. In practice, however, centralization is limited by the extreme complexity of modern military operations. Even if they would like to, central authorities cannot micromanage all the command and logistic coordination that occurs in the theater. Militaries of authoritarian regimes often do perform poorly, but for a different reason. Such regimes often select and train officers primarily for political loyalty, not military skill. Thus, their most important battlefield weakness is simply poor generalship, not excessive dependence on strategic communications.

[62] Martin Van Creveld, *Command in War* (Cambridge: Harvard University Press, 1985); Paul Stares, *Command Performance* (Washington, D.C.: Brookings, 1991), pp. 112–13.

Table 5. Success and failure of coercive air strategies

Cases	Punishment	Risk	Denial		
			Strategic interdiction	Operational interdiction, close air support, ground threat	Decapitation
Japan, 1944–45	failure	uncertain*	failure	success	—
Korea, 1950–51	failure	—	—	success	—
Korea, 1952–53	failure	success*	—	failure	—
Vietnam, 1965–68	failure	failure	—	failure	—
Vietnam, 1972	—	failure	—	success	—
Iraq, 1991	—	—	—	success	failure
Germany, 1942–45	failure	—	failure	failure	—

* Instances of nuclear coercion.

Stalin's command of the Soviet military in World War II illustrates how the limits of centralization limit the potential for causing strategic paralysis by interrupting communications between the rear and the front. Stalin formed his own supreme command body, called the Stavka, which in principle had the authority to intervene in local decisions anywhere. In practice, however, its members recognized that, being in the rear, they could not obtain enough timely information for detailed operational direction to be useful in many circumstances. As a result, the Stavka developed a procedure to exert close control over a local battle by sending a member with plentipotentiary authority to the front to issue orders to local commanders in the name of the Stavka. For instance, when Stalin could not obtain information about the course of the battle for Moscow in September 1941, he sent Marshal Georgi K. Zhukov to the front, not only to collect information but also to issue orders on the spot.[63]

Strategies and Cases

All the coercive air strategies I have described were used in one or more of the cases studied in Chapters 4 through 8 (see Table 5). In most cases the coercer pursued several different strategies either in series or in parallel. The case studies detail the effects of each strategy on the target state's willingness to make demanded concessions in order to determine which strategies were responsible for coercive successes.

[63] Georgi K. Zhukov, *Marshal Zhukov's Greatest Battles* (New York: Harper and Row, 1969), p. 44.