

INTRODUCTION

ON OCTOBER 3, 1973, the renowned British military historian Michael Howard presented a Chesney Gold Medal Lecture entitled “Military Science in an Age of Peace.” Referring to the innovative use of technology in the battlefield, Howard stated:

It is this flexibility both in the minds of the Armed Forces and in their organization, that needs above all to be developed in peace time . . . This is the aspect of military science which needs to be studied above all others in the Armed Forces: the capacity to adapt oneself to the utterly unpredictable, the entirely unknown.¹

Three days later, October 6, the Yom Kippur War broke out with an Egyptian-Syrian, two-pronged surprise attack. The Israeli army was suddenly forced to adapt itself to harsh battlefield realities that it was unprepared for: anti-tank and anti-aircraft layouts specifically designed to neutralize its armor and air force superiority.

This book addresses one of the basic questions in military studies: how do armies cope with technological and doctrinal surprises that render them vulnerable to unexpected weapons systems and/or combat doctrines?

Armed forces must develop the ability to overcome technological and doctrinal surprise in order to prepare themselves for future confrontations. This may be the most urgent challenge facing military forces today. In the past, armies made every effort to reduce being caught by surprise. Nevertheless, history offers many cases in which surprise was the key factor in determining battlefield victory or defeat.

Military research has generally focused on strategic surprise attacks while paying less attention to technological and doctrinal surprise, although the latter's importance is constantly increasing. Traditional research states that the main solution for a surprise attack lies in improving the intelligence layout.

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Decisions regarding force planning are still based on intelligence reports of the enemy's specific capabilities and estimates of the future battlefield, especially its technological and doctrinal aspects.

This book proposes an innovative track for dealing with technological and doctrinal surprise: preparing military forces, but with only minimal dependence on predictions of the future battlefield and information on the enemy's capabilities. The book presents a force planning process that enables armies to cope with the uncertainties of future wars by employing optimal flexibility and adaptability.

The underlying assumption is that the continuous effort to meet the challenge of technological and doctrinal surprise often fails because of various factors that increase the likelihood of surprise occurring, the main one being *a force planning concept overly dependent on intelligence reports that tries too hard to predict the future battlefield*. My main argument is that the solution to technological and doctrinal surprise lies not in predicting the nature of the future battlefield or obtaining information about the enemy's preparations for the coming war, *but in the ability to recuperate swiftly from the initial surprise*.

The following research question is intensely scrutinized: given the difficulties created by overreliance on prediction and intelligence in force planning, and its too common failure to avert technological or doctrinal surprises, how have armies managed to cope with surprises once they occurred?

I contend that armies have quickly recovered from technological and doctrinal surprises by using a variety of abilities that come under the general heading of flexibility. Flexibility combines doctrinal, cognitive, command, organizational, and technological elements that, if properly applied, can eliminate most obstacles in the current paradigm that stem from biases caused by: overdependence on a specific concept, group-think, problems inherent in large organizations, relations between intelligence agencies and decision makers, failure to learn from mistakes, and so forth. The study shows that when armies markedly improve their response skills and reaction time to technological and doctrinal surprise, most of the obstacles based on prediction and intelligence solutions become superfluous. The theory of flexibility-based force planning envisions transferring the solution onto the battlefield in real time in order to overcome peacetime obstacles. This theory is built on four strata.

The first stratum is conceptual and doctrinal (Ch. 2). Conceptual and doctrinal flexibility occurs when senior civilian officials and military officers create an organizational atmosphere that encourages lower-ranking

commanders to broach *ideas that challenge the official doctrine*. Officers (and enlisted men) who come forth with original ideas augment the number of options, thus enabling the army that has been caught by surprise to modify its doctrine and tactics. (In this chapter, German open-mindedness to the idea of armor maneuver is contrasted with British dogmatism.) A doctrine based on such an approach presents a *balanced view of all forms of war* and reduces the danger of getting stuck in a dogmatic rut. Without the conceptual stratum, the other strata cannot develop.

Two examples of balanced and imbalanced doctrines are given:

Israel's ground forces in the Yom Kippur War exemplify the consequences of an inflexible doctrine. For years Israel's "cult of the offensive" dominated unit training and war games, rendering the army unprepared for waging defensive battles. The need to fight defensively came as a shock to the majority of Israeli commanders. And although the army recovered from the surprise, the "one-dimensional" doctrine stymied its ability to respond quickly and effectively to the surprise of massive anti-tank missiles.

An example of a balanced doctrine that enabled an army to recover from an unexpected situation is Germany's pre-World War II (WW II) doctrine. Like Israel, Germany emphasized the offensive; but in contrast to the Israeli doctrine, the German one did not neglect defensive training and the development of defensive weapons. In late 1941, when the Wehrmacht realized it would have to wage a defensive war in Russia, its "multi-dimensional" doctrine enabled it to recuperate quickly from this surprising reality.

The second stratum is organizational and technological (Ch. 3). Flexibility in these fields is obtained by: a *balance* among basic military capabilities (attack and defense, firepower and maneuvering, assault and logistics layouts). At the unit and weapon levels, *organizational diversity* is based on the realization that "super weapons," no matter how dazzling their potential, eventually will be confronted with countermeasures and will have to be supplemented with other weapons. When dealing with a major operational challenge, *redundancy* is of utmost importance. Israel's development and deployment of its bridging equipment on the Suez Canal during the Yom Kippur War illustrates this. *Technological versatility and changeability* add another stratum of flexibility to combat units, best exemplified by Germany's use of the 88-mm anti-aircraft gun against Allied tanks in WW II.

The third stratum, flexibility in command and cognitive skills (Ch. 4), is currently considered of supreme importance in modern military organizations,

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notwithstanding the inordinate difficulty of its implementation. *Mental flexibility* is an acquired cognitive trait of commanders who have learned and operated in an environment that encourages questioning and creativity. In the volatile conditions of the battlefield, it enables a commander to adapt quickly and keep his wits. *Flexible command* expects junior commanders to take the initiative. The wide berth of action should enable them to generate original solutions in surprise situations and receive their superiors' backing. Conceptual and doctrinal flexibility is essential for the development of this stratum; otherwise conditions will not exist that cultivate mental elasticity and decentralized command and control (C2) methods.

German commanders displayed an outstanding capacity for improvisation. Two brief case studies illustrate German C2 decentralization: Rommel's use of 88-mm anti-aircraft guns in Arras (northern France) during the British counterattack in 1940 and Manteuffel's response to the Soviet introduction of Stalin tanks in the Battle of Târgul-Frumos (Romania) in May 1944. The Soviet centralized, rigid C2 system is presented as the source of recovery delay.

The fourth stratum (Ch. 5) is the mechanism that facilitates *fast learning* and *rapid circulation of lessons* so that the entire military system is updated on surprises and informed of their solutions. This stratum takes into account the need to link past, present, and future, and to rely on communications measures that permit a swift flow of information. Britain's failure to utilize all available data on Japanese Zero fighters prior to the battle of Singapore, and American shortsightedness in not implementing the operational experience of the Flying Tigers in China before the Japanese attack on Formosa, are classic examples of what happens when the fourth element is ignored. The arms industry is another area that can provide swift feedback enabling recovery from technological surprise. Close working relations between the military and arms industry can counter surprises by modifying existing equipment even while the battle is still in progress.

In conclusion, these strata constitute flexibility. The order in which they are presented goes from the general to the particular. Concept and doctrine predicate C2 method, organization, and weapons systems. The strata are mutually dependent. Unless uncertainty is recognized as a major problem, the other strata designed to cope with uncertainty will remain undeveloped. In the current state of research, the first, second, and fourth strata receive minimal attention in comparison to the third. The main innovation of this book is the integration of all four strata into a unified theory.

Part Two discusses the four strata and adds brief historical examples to substantiate the arguments. Flexibility or its lack is in many cases the result of the military culture. Various aspects of military culture that encourage or hamper flexibility will be analyzed and presented throughout the theoretical and historical parts.

THE CURRENT STATE OF RESEARCH

Studies on technological and doctrinal surprise and attempts to deal with it can be divided into three parts.

The first part—studies on technological and doctrinal surprise—has been unsatisfactory to date. As a result, most of the material is derived from works that focus on theory, historical analysis of strategic surprise, and the intelligence systems intended to cope with it. The authors are university professors, members of the intelligence community, many of them Israel Defense Forces (IDF) officers (who often provide their own views of surprise in the Yom Kippur War and general conclusions on how to cope with surprise).

Studies on technological and doctrinal surprise as a research subject are few and far between. Michael Handel noted this in an article published in 1987 when he tried to clarify its definition, types, conditions and best times for employment, repercussions, and place in future wars. “Yet while strategic surprise has been studied extensively as a strategic and intelligence problem, technological surprise has received only scant attention in the open literature.”² The few works that intelligence analysts have published focus on the definition and description of the field rather than on solutions to the problem, or concentrate on improving intelligence work as a solution. Richard Betts discussed the influence of surprise (that resulted from technical and doctrinal innovation) on creating a strategic surprise and briefly reviewed the typology of these surprises.³ Thomas G. Mahnken’s *Uncovering Ways of War* deals with doctrinal and technological surprise and the challenge posed to intelligence organizations to identify military innovations in the interwar periods.⁴ An article in the IDF monthly *Ma’arachot* by Eado Hecht, an Israeli intelligence expert, deals with the growing status of technological deception.⁵ George Heilmeier, the Director of the Defense Advanced Research Projects Agency (DARPA), analyzed the importance of confronting technological surprise and offered some cogent points for coping with it by integrating intelligence and flexibility.⁶

Another related topic is the impact of technology on combat. This field

has long been researched from both the theoretical and historical perspectives, but it does not concentrate specifically on technological and doctrinal surprise. The writers come from academic as well as military backgrounds in doctrinal research. The following reasons may explain why technological and doctrinal surprise has not been studied intensively:

Strategic surprise is of greater interest because of its role in historical analysis and its general engrossment (Operation Barbarossa, Pearl Harbor, the Yom Kippur War).

When analyzing a combat environment, trying to isolate the influence and uniqueness of technological and doctrinal surprise often proves an elusive task.

For security reasons military establishments are loath to discuss their reactions to such surprises.

The second type of professional literature deals with the way flexibility provides a solution to technological and doctrinal surprise (see Part Two on flexibility theory). Unfortunately, professional literature has dealt neither profoundly nor comprehensively with this subject.

Military thinkers have paid relatively little attention to the use of flexibility as a solution to the uncertainty challenge. In fact, excluding the British military theorist B. H. Liddell Hart, all academic discourse has been limited to the general framework of battlefield uncertainty and has concentrated on the optimal command method for dealing with change. The term *flexibility* rarely appears in military literature except as a synonym for related concepts such as mobility, adaptability, and so forth.

Specialists in air war and logistics deal with the matter in greater depth; theoreticians of the future battlefield treat the subject only superficially; and the military doctrines discuss mainly mental and command flexibility.

Students of force planning discuss flexibility, but rarely elaborate on its outcome. Their concern is with flexibility in development and acquisition so that the most effective, up-to-date equipment will be employed on the battlefield. One searches in vain for details on the composition of weapon systems or unit structure that are supposed to provide battlefield flexibility.

Experts in the field of military organization generally stress the importance of combined-arms warfare, in which units from different branches participate, but they do not elaborate on the composition and balance needed to create flexibility.

My book presents the findings of political scientists (who deal with flexibility-related factors that contribute to military success and effectiveness), academic scholars, members of the RAND Corporation, and Israeli engineers in the arms industry (who have studied the feasibility of military innovation and the conditions under which it can be implemented).

In summary, organizational and technological flexibility and the related information flow are discussed in military research, but until now have not been analyzed in detail, nor has a comprehensive theoretical framework of flexibility been proposed.

The empirical literature presented in Part Three is divided into three relatively clear categories. The first consists of operational reports and the lessons of units that have been caught in surprise situations. This part consists mainly of raw material, void of scientific analysis. The second category contains works on technological responses to surprise—from a broad perspective (e.g., radar technology) to specific weapons systems. The authors of this literature are academic scholars and designers of weapons systems who endeavor to improve development and acquisition processes. The third category is literature that describes warfare from a personal, non-academic viewpoint, reflecting the way individuals and military units coped with surprise.

In the absence of a theory that offers a flexibility-based solution for overcoming battlefield surprise, the empirical literature deals almost exclusively with surprise itself and not with recovery. Thus, most of this part is based on two types of literature. The first consists of stories about military units and combatants. Books in this category are not the fruit of academic research, but they provide the facts that enable a story to be woven about the way battlefield surprise can be dealt with. From the other type of literature, which describes technical and technological layouts, we can learn how lessons were learned, and how weapons systems were developed in response to surprise.

In conclusion, the basic problem is that to date all of the studies on battlefield surprise have been lacking a theory that integrates the various types of flexibility into a comprehensive solution, especially for technological and doctrinal surprise. Empirical literature contains reports on force employment; but unless backed by a viable theory, it fails to link cases where flexibility worked, with a meaningful *modus operandi* that an army can adopt to meet the challenge of battlefield surprise.

THE CONTRIBUTION OF THE PRESENT STUDY TO THE FIELD OF MILITARY SURPRISE

This book is a part of ongoing academic and pragmatic efforts to deal with military surprise. As stated, the book's theory relates to three basic areas:

First, it introduces a detailed analysis of technological and doctrinal surprise. Second, it offers a comprehensive theoretical and historical approach to intensive battlefield "under fire" innovations, which in this case are meant to counter the enemy's interwar or wartime innovations. This is different from other works that deal with interwar innovation, such as Williamson Murray's and Allan Millett's *Military Innovation in the Interwar Period*,⁷ or interwar innovation as a reaction to the other side's innovation as Kimberly Marten Zisk's *Engaging the Enemy*,⁸ or long-term wartime innovations as described in Stephen Rosen's *Winning the Next War*.⁹ Third, the book presents the universal principles of force planning. Although many studies examine the principles of war, this work is one of the very few that attempts to lay down the principles of *preparing* for war.

THE RESEARCH METHOD

The book is a deductive inquiry into the proposed theory based on a number of events in twentieth-century military history.

Two criteria were used to determine the extent of recovery: the time needed to recover (which is relatively easy to measure) and the assessment of battlefield effectiveness (which is the more difficult to gauge because of the difficulty in any analysis of military events to separate the effects of various factors on the outcome of combat). This difficulty notwithstanding, whenever the size of the forces and their weapons systems are known, the components can be isolated and conclusions reached regarding the relative importance of doctrine, C2 method, and so forth. Examples of this are the studies carried out by the American military historian T. N. Dupuy on the German army's successes and the Israeli historian Martin van Creveld on the effectiveness of the German, British, and American armed forces in WW II.¹⁰ My book analyzes the available data on rival armies, which, I argue, is sufficient to identify with relative certainty the factors that contributed to recovery. The effectiveness of the response is based on a graded criteria scale: the best solution results in complete recovery and generates a new problem for the enemy; the second level of solution neutralizes the problem without causing the enemy an operational counter-challenge; the third solution minimizes the amount of dam-

age inflicted by the surprise; and the lowest level of effectiveness is a failure to recover from surprise.

The independent variable—flexibility—is measured according to the number of strata involved in each case study. Thus, C2 flexibility, unless accompanied by other flexibility elements, constitutes low-level flexibility. A military organization where flexibility in command, organization, and “lesson learning” are significant is defined as highly flexible. In addition to the quantitative measurement of the elements employed, great importance is attached to the extent to which the basic stratum—conceptual and doctrinal flexibility—is employed.

The test cases were chosen according to four criteria. The first is the solution’s effectiveness. In some cases one party was caught by surprise, but after it recovered, an operational problem was created for the other party; in other cases, recovery failed altogether. The second criterion is the number of flexible or inflexible elements discernable in the recovery. Each example illustrates several elements. The third criterion is surprise at various levels of war: from the technical-tactical level (the German reaction to the Soviet T-34 tank) to the strategic level (the German response to the challenge of British chaff). It is important to show the effect of surprise at a variety of levels of war to demonstrate that the thesis is valid for all manifestations of warfare, despite the commonly held—but mistaken—opinion that technological and doctrinal surprise is limited to the tactical level and, therefore, is relatively unimportant. A distinction must be made between the level at which the surprise occurs and the level at which its consequences have the greatest impact (see Ch. 1). The fourth criterion is the various reasons for surprise. Thus in some cases, the enemy intentionally planned the surprise, whereas in others, it was unintentional and occurred because of the victim’s overconfidence or failure to understand the enemy.

In the empirical part of the book, the examples of successful recuperation are limited to the German and the Israeli armies; both share a common basis, especially regarding C2 and commanders’ mental flexibility. Specific armies were not chosen a priori or at random, but through the process of elimination based on the abovementioned criteria (especially the first criterion—solution effectiveness).

The American scholar Williamson Murray arrives at the same conclusion and argues that although recent studies have shown that throughout the twentieth century, there were many cases in which military doctrine made

innovation possible in the course of a war, this was true mainly in WW II for Germany, whose armed forces exhibited considerable ability to respond to battlefield events by adapting and innovating within their doctrinal framework. Murray regards this as a unique example, with the possible exception of the Israeli response in 1973.¹¹ On the other hand, failure due to lack of flexibility can be found in many armed forces. The reader, however, should keep in mind that the military organizations discussed in the book have undergone significant change since the time of the events described. Debriefings and lesson-learning mechanisms in the United States Army and Marine Corps are examples of the transformation that the American armed forces have undergone since WW II.¹²

The parameters for determining the degree of recuperation from surprise are defined for the purpose of analyzing the events. The time dimension is the easiest parameter to measure. Many armies have come up with solutions to technological and doctrinal surprises that they implemented in a different war from the one in which the surprise occurred or, in the case of drawn-out conflicts like WW I and WW II, after a number of years. My study does not deal with this kind of situation. All of the solutions discussed in the book were implemented during the war itself, from the moment the surprise was sprung to the months following it (in cases of an extended war); and the time dimension is classified according to immediate (hours or days), short-term (days to weeks), or long-term (weeks to months) solutions. The exception is the Russians' slow recovery from guerrilla warfare in Afghanistan, where the time span was measured in years.

Seven test cases are meticulously analyzed. The first four illustrate recovery based on flexibility; the last three demonstrate recovery failure because of inflexibility. The cases are presented in descending order according to the application of flexibility.

The first case (Ch. 6) deals with the Luftwaffe's recovery after Britain's surprise use of chaff (metal foil released in the air to obstruct radar detection). Recovery commenced with a preliminary tactical response just days after the British bombed Hamburg in late July 1943 and lasted until the Allies' final attempts to defeat Germany by bombing Berlin in March 1944. It included a combination of all four elements of flexibility. The German doctrine stressed the uncertainty factor on the battlefield and as a result, it encouraged a form of C2 that emphasized initiative and independence. Added to this were: cognitive flexibility of officers and soldiers that was realized in the form of two new,

night interception tactics (the “Wild Boar” and the “Tame Boar”); a variety of means capable of serving as the basis of improvised solutions (such as the Naxos radar); the ceaseless effort to improve and learn from mistakes; and the close ties between the Luftwaffe and the arms industry. In this case, the Germans quashed a strategic operation whose purpose was to bring the war to a quick end. This case meets the criterion of total recovery plus the boomerang effect—that is, it posed a new problem for the enemy. It also constitutes a classic example of technological surprise with repercussions at the strategic level.

The second case (Ch. 7) concerns the German ground forces’ recovery from the surprise introduction of Soviet T-34 tanks—from their first appearance on the battlefield at the start of Operation Barbarossa in the summer of 1941 until the Germans introduced their new Panther and Tiger tanks in August–November 1942. The T-34 was superior to the German tanks in firepower, survivability, and maneuverability. Its entry into the battle zone caught the German commanders by surprise. The effectiveness of German recuperation significantly reduced the damage caused by the Russian surprise so that the impact of the blow was only at the tactical level. In this case, surprise was the result of German conceptual failure rather than the Soviet intention to spring a surprise.

Recovery occurred through the combination of conceptual and doctrinal flexibility (see Ch. 2), cognitive and C2 flexibility (see Ch. 4), organizational flexibility, and fast learning. The Wehrmacht Panzer divisions were probably the most diverse military formations of their time, integrating armor, artillery, infantry, engineers, and anti-aircraft units—together with close air support. When confronted with the superior T-34 Russian tank in the early days of Operation Barbarossa, the Wehrmacht used its branch integration for fast recovery. For example, German armored units had infantrymen fasten anti-tank mines to the chassis of Russian tanks; and anti-aircraft and artillery flat trajectory fire was used against the T-34s, whose heavy armor plating had been practically impenetrable to German tank and anti-tank guns.

The German army also illustrates what modern military thinking refers to as “learning organization,” that is, an emphasis on post-action reports and unit training, even in wartime, according to the most recently learned lessons. The product of close military-industry cooperation was the replacement of the Panzer III’s short 50-mm gun with a longer gun of the same caliber so that the shells could penetrate the Russian armor. The long-term (one year) response to the T-34 was the design and production of Panther and Tiger tanks.

The third case (Ch. 8) discusses how IDF ground units recovered from the Egyptians' massive use of anti-tank weapons in Sinai in the Yom Kippur War of 1973. Although nineteen prewar intelligence publications had noted the danger of Sagger missiles, and a number of Israeli tanks had been hit by them in the Golan Heights a few months before the war, the IDF ignored the enormity of the threat. The shock was felt mainly in the armored corps, whose commanders and soldiers had been reared on the glory of the Six-Day War's lightning victory.

Despite Israel's obsession with the "cult of the offensive" (see Ch. 2), what eventually saved the day was cognitive and C2 flexibility based on the Israeli civilian culture's extensive use of improvisation. Numerous cases of tactical improvisation occurred on the battlefield. Organization was another area of flexibility that came to expression. Branch uniformity at the divisional level partially accounted for Israel's tribulations in the first days of the war. Lacking sizable artillery and infantry support, Israeli armor divisions were at a loss to respond effectively. When artillery and infantry units finally entered the battle zone, they provided invaluable assistance in recovering from the surprise. The IDF's recuperation almost neutralized the initial damage and had a major impact on the tactical and operational levels. In this case, Israel's conceptual limitation had been the cause of the surprise, not Egypt's attempt to gain a technological or doctrinal surprise.

The fourth case (Ch. 9) deals with the Israeli Air Force (IAF) recovery from the unsuccessful October 7, 1973 attack against the Arab surface-to-air missile layout. The IAF was caught short because of an intelligence omission regarding the latest Soviet SAM-6s (surface-to-air missiles) and the IAF's failure to implement its combat doctrine, which was predicated on near-perfect conditions, such as a preemptive strike (the Israeli government refused to authorize it) and clear skies (the Golan Heights were overcast on the morning of October 7). The inability of the air force to assist the ground forces had dire operational—even strategic—consequences. Air squadrons developed flexible responses based on their commanders' initiatives and the squadrons' inherent cognitive flexibility and fast-learning ability. But the IAF command reacted more slowly to the surprise. It took two weeks before it formally changed its fighting methods. Close cooperation between the military and the arms industry also helped. In this case, recovery minimized the damage wrought by the surprise.

Three additional cases demonstrate with considerable plausibility that inflexibility was at the root of the military's inability to overcome technological and doctrinal surprises.

The first case (Ch. 10) analyzes British slowness in developing an effective response to German anti-tank warfare in the Western Desert between 1941 and 1942. The delay had repercussions at the operational and strategic levels. In this case, surprise was not the result of a German decision, but occurred because the British failed to comprehend the nature of the battlefield, namely the lethal combination of a concealed anti-tank (50- and 88-mm) gun layout and tank maneuvers that tricked the British into thinking that the latter were of primary importance. The absence of British flexibility can be ascribed to conceptual, organizational, and technological deficiencies.

A classic example of British low-level cognitive flexibility is the 3.7-inch aircraft gun. This weapon—the potential equivalent to the German 88-mm—was not exploited as an anti-tank gun because of the British fixed mindset and centralized C2 that restricted the junior commanders' freedom of action. Low-level organizational diversity was another shortcoming. The British regimental system frowned upon close cooperation between infantry, armor, and artillery. The absence of anti-personal explosive ammunition in British tanks was also a factor in their slow recovery. It took an entire year, from the time of the German invasion of North Africa to the appearance of American Grant tanks on the battlefield, for the British to upgrade their ability to deal with German anti-tank guns (and even then, improvement was only minimal).

The second case (Ch. 11) involves the Soviets' lack of flexibility and delayed response to the doctrinal surprise of the guerrilla warfare waged by the Afghan Mujahideen, a type of fighting that the Soviets were totally unprepared for. The Soviets began adapting to these conditions in the first years of conflict (1979–1984), but because Afghanistan was a protracted, low-intensity conflict, it is difficult to determine precisely the extent of recuperation even though the adjustment had considerable influence on the level of Soviet success. This appears to be a case of “self-surprise.” The low level of Soviet flexibility may be explained by doctrinaire dogmatism that was blind to the differences between high-intensity conflict against a conventional enemy and low-intensity conflict against guerrilla forces. The Soviets emphasized the operational level in warfare but lost sight of the importance of tactical operations. This may have been applicable to the vast open plains of central Europe, but not for the mountainous terrain and guerrilla warfare of Afghanistan. The Soviets' “Afghani concept” evolved slowly, going from division-size operations (armored-column attacks preceded by massive artillery bombard-

ments) to battalion-size, airborne assaults accompanied by new methods of employing armor and artillery in mountainous terrain. The change involved experimenting in unit reorganization in the course of almost three years of combat. The intrinsic low-level cognitive flexibility, which stemmed from the Soviet system of centralized C2, was a key factor in the inchmeal rate of adaptation and especially in the resistance to decentralizing authority so that junior commanders could function more freely.

The third case (Ch. 12) discusses the French failure to cope with the German blitzkrieg in May 1940. The surprise came not from the German tanks but from the inability of France to confront the German concept of dynamic, fluid operations. The French were stunned by the German forces' lightning speed and their ability to fight unremittingly, without bringing the artillery forward (which, according to the French doctrine, was essential in preparing for attack). Low flexibility on the part of the French was a key element in the ensuing strategic fiasco. Here, too, the Germans did not intend to surprise the enemy. Indeed, the French were caught off-guard, at least partially, because of their insistence on adhering to erroneous concepts and C2 methods.

In the interwar period, French doctrinal dogmatism went from the "cult of the offensive" to the "cult of the defensive." Having been bled white in WW I by futile attacks against concentrated firepower, the French operational concept emphasized the defense and when attacking, advancing slowly under cover of artillery fire. This *modus operandi*—the methodical battle—stressed strict operational phases, tight control, and obedience. Over the years, French commanders lost the aptitude to improvise; so, when faced with a blitzkrieg, they were at a loss how to respond.

French dogmatism also inhibited original thinking among those officers who warned that an enemy armored attack could seriously upset France's defensive preparations. Despite the urgency of this issue, articles on it were denied publication in military journals. Charles de Gaulle, the main advocate of a mechanized, armored army, was harshly criticized and his promotion held in abeyance. The refusal to even discuss the possibility of rapid armor maneuvers was a key factor in the French army's failure to respond effectively to Germany's invasion in May 1940.

The absence of case studies of low-intensity conflict (except for the war in Afghanistan in the 1980s) is not because this type of conflict is unimportant but because in these instances, the need for flexibility is less severe due to the reduced influence of battlefield surprise on the total result of the confronta-

Table 1.1 Historical events demonstrating successful recuperation from surprise

<i>Surprise, extent of recuperation, level of warfare</i>	<i>Speed in devising solution; main strata at each stage</i>		
	<i>Immediate (hours to days)</i>	<i>Short-term (days to weeks)</i>	<i>Long-term (weeks to months)</i>
<i>British chaff ("Window") in WW II. Surprised party: Germany Extent of recuperation: Full, creating a problem for the enemy Level of warfare: Strategic</i>	<i>Cognitive, command: Changes in bomber interception techniques and tactics</i>	<i>Technological: Introduction of steep- angle-firing guns; attacking bomber blind spots</i>	<i>Technological: Development of "Nexus" receiver, homing in on British airborne radar; development of "Lichtenstein SN2" radar, unaffected by chaff</i>
<i>Soviet T-34 tank in WW II. Surprised party: Germany Extent of recuperation: Damage minimization Level of warfare: Tactical</i>	<i>Conceptual, command, organizational: Use of diverse means; development of innovative combat techniques</i>	<i>Technological: Versatility in weapons systems (replacing the main gun in the Panzer MK III tank)</i>	<i>Technological: Military- industrial coordination— swift development of Tiger and Panther tanks</i>
<i>Egyptian anti-tank warfare in the Yom Kippur War Surprised party: Israel Extent of recuperation: Between minimization and neutralization of damage</i>	<i>Cognitive, command: Development of combat techniques in tank battalions</i>	<i>Organizational: Rebuilding of unit diversity</i>	
<i>Arab anti-aircraft warfare in the Yom Kippur War Surprised party: Israel Extent of recuperation: Damage minimized Level of warfare: Operational and strategic</i>	<i>Cognitive, command, technological: Development of combat techniques in squadrons; reduction of aircraft thermal signature</i>	<i>Cognitive, command, technological: Changes in air attack doctrine; military-industrial cooperation; deciphering SA-6 electronic data by RAFAEL by the end of the war</i>	

tion and because of the relatively longer time frame that the surprised party has to recuperate.

The cases in the book date from WW II and later, which is not to say that technological and doctrinal surprises did not occur earlier. The choice of events was dictated by the fact that the study deals with modern warfare, where technology is recognized as a major element of military power.

The analysis of the German response to British chaff is based mostly on secondary sources (though also on primary sources, such as the accounts of German pilots). The analysis of the German response to the Soviet T-34 tanks is based mainly on primary sources dealing with lessons learned at the

tactical level, chiefly in the form of English translations of operational diaries and unit reports on lessons learned. The analysis of the IDF's response to the surprise use of anti-tank and anti-aircraft weapons in the Yom Kippur War is based on unclassified primary sources (mainly lessons learned from the fighting and unit battle descriptions). This source material comes from IDF libraries (the armored corps, IAF, the Defense Ministry's R&D Administration) and interviews.

The material for the British response to German anti-tank warfare in the Western Desert comes from primary sources (memoirs by soldiers and commanders) and secondary sources (analyses of the fighting). The chapter on Soviet warfare in Afghanistan is based mainly on secondary sources that analyzed the nature of the fighting. The French failure to cope with the blitzkrieg has been examined using battle accounts and an inquiry into France's prewar doctrine.

THE ORGANIZATION OF THE BOOK

The book consists of three main parts.

Part One contains one chapter and appendixes. It defines and analyzes technological and doctrinal surprise and the process that should produce the solution, namely, military force planning. Then it presents the traditional paradigm for solving the uncertainty dilemma: prediction and intelligence. It then discusses the reasons for the failure of the traditional paradigm and argues that technological and doctrinal surprise is constantly on the rise and constitutes the main challenge to force planning, and that any intelligence attempt to predict the nature of the future battlefield and discover the enemy's intentions will be only partially successful at best.

Part Two discusses flexibility as the general solution for uncertainty. It analyzes the issue through the eyes of military theorists and looks at the command structures, military organizations, and the military technologies and doctrines of various armed forces. It describes in detail the various components of flexibility—conceptual and doctrinal, organizational and technological, cognitive and command, and the military system's mechanisms for lesson learning and information flow (Chs. 2–5). The cognitive and command element is more familiarly known as mission-oriented command. Since this kind of flexibility has been treated exhaustively, it is discussed only when relevant to technological and doctrinal surprise. In developing the book's theory, brief historical illustrations are presented to clarify abstruse points.

Part Three furnishes an in-depth analysis of the seven abovementioned historical test cases. After defining the nature of the surprise that the forces encountered, a discussion ensues on the level of recovery, its effects at the various levels of warfare, and the elements of flexibility that made it possible: the basic warfighting concept of armies that either succeeded or failed in the confrontation with surprise; the combat doctrine derived from this concept; and the concept's connection to the command system, force organization and structure, weapons system development, and the circulation of information to other units. Each case appears in a separate chapter.

The last part, Summary and Conclusions, offers a number of suggestions for theory implementation.