Weapons of Mass Destruction

Weapons of mass destruction include three general types: nuclear, chemical, and biological weapons. They are distinguished from conventional weapons by their enormous potential lethality, given their small size and modest costs, and by their relative lack of discrimination in whom they kill. When deployed on ballistic missiles, they can be fired from the home territory of one state and wreak great destruction on the home territory of another state. Until now this has never happened. But the mere threat of such an action undermines the territorial integrity and security of states in the international system. Of central concern today are the potentials for proliferation—the possession of weapons of mass destruction by more and more states and nonstate actors.

Nuclear Weapons

Nuclear weapons are, in sheer explosive power, the most destructive weapons available to states. A single weapon the size of a refrigerator can destroy a city. Defending against nuclear weapons is extremely difficult at best.

To understand the potentials for nuclear proliferation, one has to know something about how nuclear weapons work. There are two types. *Fission* weapons (atomic bombs or A-bombs) are simpler and less expensive than **fusion weapons** (also called thermonuclear bombs, hydrogen bombs, or H-bombs).

When a fission weapon explodes, one type of atom (element) is split into new types with less total mass. The lost mass is transformed into energy according to Albert Einstein's famous formula, $E = mc^2$, which shows that a little bit of mass is equivalent to a great deal of energy. In fact, the fission bomb that destroyed Nagasaki, Japan, in 1945 converted to energy roughly the amount of mass in a penny.

The two elements that can be split in this way, uranium-235 (U-235) and plutonium, are known as **fissionable material.** Fission weapons work by taking subcritical masses of the fissionable material—amounts not dense enough to start a chain reaction—and compressing them into a critical mass, which explodes. In the simplest design, one piece of uranium is propelled down a tube (by conventional explosives) into another piece of uranium. A more efficient but technically demanding design arranges high explosives precisely around a hollow sphere of plutonium so as to implode the sphere and create a critical mass.

Although these designs require sophisticated engineering, they are well within the capabilities of many states and some private groups. The obstacle is obtaining fissionable material. Only 10 to 100 pounds or less are required for each bomb, but even these small amounts are not easily obtained. U-235, which can be used in the simplest bomb designs, is especially difficult to make. Extracting the fissionable U-235, referred to as enriching the uranium up to weapons grade (or high grade), is slow, expensive, and technically complex—a major obstacle to proliferation. But North Korea, Iran, Iraq, and Libya all built infrastructure to do so, with Pakistani help. North Korea was still actively pursuing this route in 2006. In 2004, Iran agreed to suspend its uranium enrichment, but later broke the deal, resumed enrichment, and was referred to the UN Security Council in 2006. After the U.S. invasion of Iraq, American inspectors discovered that Iraq had shelved its nuclear program years earlier.

How to Make Nuclear Weapons

Plutonium is more easily produced, from low-grade uranium in nuclear power reactors. But a plutonium bomb is more difficult to build than a uranium one—another obstacle to proliferation.

Fission weapons were invented 60 years ago by U.S. scientists in a secret World War II science program known as the *Manhattan Project*. In 1945, one uranium bomb and one plutonium bomb were used to destroy Hiroshima and Nagasaki, killing 100,000 civilians in each city and inducing Japan to surrender unconditionally. By today's standards, those bombs were crude, low-yield weapons. But they are the kind of weapon that might be built by a poor state or a nonstate actor.

Fusion weapons are extremely expensive and technically demanding; they are for only the richest, largest, most technologically capable states. In fusion weapons, two small atoms (variants of hydrogen) fuse together into a larger atom, releasing energy. This reaction occurs only at very high temperatures (the sun "burns" hydrogen through fusion). Weapons designers use fission weapons to create these high energies and trigger an explosive fusion reaction. The explosive power of most fission weapons is between 1 and 200 kilotons (each kiloton is the equivalent of 1,000 tons of conventional explosive). The power of fusion weapons is typically 1 to 20 megatons (a megaton is 1,000 kilotons). In the post–Cold War era, fusion weapons have become less important.

Ballistic Missiles and Other Delivery Systems

Delivery systems for getting nuclear weapons to their targets—much more than the weapons themselves—are the basis of states' nuclear arsenals and strategies (discussed shortly). Inasmuch as nuclear warheads can be made quite small—weighing a few hundred pounds or even less—they are adaptable to a wide variety of delivery systems.

During the Cold War, nuclear delivery systems were divided into two categories. *Strategic* weapons were those that could hit an enemy's homeland. Once carried on long-range bombers, they now are mainly on missiles. *Tactical* nuclear weapons were those designed for battlefield use. Both superpowers integrated tactical nuclear weapons into their conventional air, sea, and land forces using a variety of delivery systems—gravity bombs, artillery shells, short-range missiles, land mines, depth charges, and so forth.

However, the tens of thousands of nuclear warheads integrated into superpower conventional forces posed dangers such as theft or accident. Their actual use would have entailed grave risks of escalation to strategic nuclear war, putting home cities at risk. Thus, both superpowers phased out tactical nuclear weapons almost entirely when the Cold War ended. The tactical weapons deployed in the former Soviet republics were shipped back to Russia for storage and eventual disassembly.

The main strategic delivery vehicles are **ballistic missiles;** unlike airplanes, they are extremely difficult to defend against. Ballistic missiles carry a warhead up along a trajectory—typically out of the atmosphere, at least 50 miles high—and let it drop on the target. A powerful rocket is needed, and a guidance system adjusts the trajectory so that the warhead drops closer to the target. Various ballistic missiles differ in their range, accuracy, and throw weight (how heavy a warhead they can carry). In addition, some missiles fire from fixed sites (silos), whereas others are mobile, firing from railroads or large trailer trucks (making them hard to target). The longest-range missiles are **intercontinental ballistic missiles (ICBMs)** with ranges over 5,000 miles.

Of special interest today are short-range ballistic missiles (SRBMs) with ranges under 1,000 miles. The modified scud missiles fired by Iraq at Saudi Arabia and Israel during the Gulf War were (conventionally armed) SRBMs. In regional conflicts, the long range of more powerful missiles may not be necessary. The largest cities of Syria and Israel are only 133 miles from each other; the capital cities of Iraq and Iran are less than 500 miles apart, as are those of India and Pakistan (see Figure 4.5). All these states own ballistic missiles. Short-range and some medium-range ballistic missiles are cheap enough to be bought or made by small middle-income states. Table 4.3 lists the 33 states with ballistic missiles.

Many short-range ballistic missiles, including those used by Iraq during the Gulf War, are highly inaccurate but still very difficult to defend against. With conventional warheads, they have more psychological than military utility (demoralizing an enemy population). With nuclear, chemical, or biological warheads, however, these missiles could be deadlier. The **cruise missile** is a small winged missile that can navigate across thousands of miles of previously mapped terrain to reach a target. Cruise missiles can be launched from ships, submarines, airplanes, or land.

The proliferation of ballistic missiles has been difficult to control. There is a **Missile Technology Control Regime** through which industrialized states try to limit the flow of missile-relevant technology to states in the global South. Short- and medium-range missiles (ranges up to about 2,000 miles) apparently are being developed by Iran, Israel, Saudi Arabia, Pakistan, India, North Korea, and possibly Argentina and Brazil. Soviet-made short-range ballistic missiles are owned by a number of states in the global South. China has sold its missiles and technology in the global South—a sore point in relations with the West.

FIGURE 4.5 ■ Expanding Ranges of Indian and Pakistani Missiles, 1998–2003

Source: The Washington Post. May 29, 1999: A32. Table 4.3.

Small states or terrorists that may acquire nuclear weapons in the future could deliver them through innovative means. Because nuclear weapons are small, one could be smuggled into a target state by car, by boat, or in diplomatic pouches. Since 2001, the United States has begun a Container Security Initiative aimed at preventing weapons of mass destruction from reaching U.S. shores in seaborne shipping containers. But doing so without impeding the prosperity-inducing flow of international trade is a daunting challenge—nearly 8 million shipping containers pass through U.S. ports every year. In 2006, a bipartisan revolt in the U.S. Congress scuttled a deal, approved by the Bush Administration, that would have let a company based in Dubai, an Arab country, con-

TABLE 4.3 ■ Ballistic Missile Capabilities, 2006

Country	Range (Miles)	Potential Targets
United States[a]	13,000	(World)
Russia[a]	13,000	(World)
China[a]	13,000	(World)
Britain[a]	4,600	(World: submarine-launched)
France[a]	3,700 [4,600]	(World: submarine-launched)
North Korea[a]	800 [3,500]	South Korea, Russia, China [All Asia]
Iran[b,c]	900 [3,500]	Iraq, Kuwait, Afghanistan, Israel [Europe to Asia]
Israel[a,c]	900 [3,500]	Syria, Iraq, Saudi Arabia, Egypt
India[a,c]	1,500 [2,000]	Pakistan, China, Afghanistan, Iran, Turkey
Pakistan[a]	800 [2,000]	India [Russia, Turkey, Israel]
Saudi Arabia	1,700	Iran, Iraq, Syria, Israel, Turkey, Yemen, Egypt, Libya, Sudan
Syria	300 [400]	Israel, Jordan, Iraq, Turkey
Egypt	400	Libya, Sudan, Israel
Yemen	200	Saudi Arabia
United Arab Emirates	200	Saudi Arabia, Iran
Afghanistan	200	Pakistan, Tajikistan, Uzbekistan
Kazakhstan	200	Uzbekistan, Tajikistan, Kyrgyzstan, Russia
Turkmenistan	200	Iran, Afghanistan, Uzbekistan, Tajikistan
Armenia	200	Azerbaijan
Belarus	200	Russia, Ukraine, Poland
Libya	200	Egypt, Tunisia, Algeria
Ukraine	200	Russia, Belarus, Poland, Hungary, Romania
South Korea	200	North Korea
Vietnam	200	China, Cambodia
Taiwan	80 [200]	China
Greece	100	Turkey
Turkey	100	Greece
Bahrain	100	Saudi Arabia, Qatar
Slovakia	80	Czech Rep., Hungary, Poland
Japan[c]	—	
Number of states with ballistic missiles: 29		

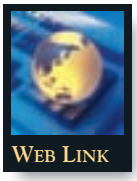
[a]States that have nuclear weapons.
[b]States believed to be trying to build nuclear weapons.
[c]States developing space-launch missiles adaptable as long-range ballistic missiles.

Notes: Bracketed range numbers indicate missiles under development. List of potential targets includes both hostile and friendly states and is suggestive rather than comprehensive. Missile ranges increase with smaller payloads. 200-mile ranges (scud-B) and 300-mile ranges (scud Mod-C) are approximate for a 3/4-ton payload. Saudi range is for a two-ton payload: South Korean range is for a half-ton payload.

Source: Carnegie Endowment for International Peace.

trol some operations at several U.S. ports (as other foreign companies already do). While the war on terrorism continues, U.S. cities remain at grave risk of destruction by nuclear weapons smuggled into the U.S.

Chemical and Biological Weapons



Chemical Weapons

A *chemical weapon* releases chemicals that disable and kill people. A variety of chemicals can be used, from lethal ones such as nerve gas to merely irritating ones such as tear gas. Different chemicals interfere with the nervous system, blood, breathing, or other body functions. Some can be absorbed through the skin; others must be inhaled. Some persist in the target area long after their use; others disperse quickly.

It is possible to defend against most chemical weapons by dressing troops in protective clothing and gas masks and following elaborate procedures to decontaminate equipment. But protective suits are hot, and anti-chemical measures reduce the efficiency of armies. Civilians are much less likely to have protection against chemicals than are military forces. Chemical weapons are by nature indiscriminate about whom they kill. Several times, chemical weapons have been deliberately used against civilians (notably by the Iraqi government against Iraqi Kurds in the 1980s).

Use of chemical weapons in war has been rare. Mustard gas, which produces skin blisters and lung damage, was widely used in World War I. After the horrors of that war, the use of chemical weapons was banned in the 1925 Geneva protocol, which is still in effect. In World War II, both sides were armed with chemical weapons but neither used them, for fear of retaliation (the same was true in the Gulf War). Since then (with possibly a few unclear exceptions) only Iraq has violated the treaty—against Iran in the 1980s. Unfortunately, Iraq's actions not only breached a psychological barrier against using chemical weapons, but showed such weapons to be cheap and effective against human waves of attackers without protective gear. This stimulated dozens more poor states to begin acquiring chemical weapons.

Chemical weapons are a cheap way for states to gain weapons of mass destruction. Production of chemical weapons can use similar processes and facilities as for

VULNERABLE

Civilians are more vulnerable to chemical weapons than soldiers are. A new treaty aims to ban chemical weapons worldwide. Here, Israeli kindergarteners prepare against a chemical warfare threat from Iraqi scud missiles during the Gulf War, 1991.

pesticides, pharmaceuticals, and other civilian products. This is a major factor in making it difficult to find chemical weapons facilities in suspect countries, or to deny those states access to the needed chemicals and equipment. In 1998, a U.S. cruise missile attack destroyed a suspected weapons facility in Sudan that may have been only a pharmaceutical factory.

The 1925 treaty did not ban the production or possession of chemical weapons, and several dozen states built stockpiles of them. The United States and the Soviet Union maintained large arsenals of chemical weapons during the Cold War but have reduced them greatly in the past decade. In 1992, a new **Chemical Weapons Convention** to ban the production and possession of chemical weapons was concluded after years of negotiation; it has been signed by all the great powers and nearly all other states with the exception of 14 states including Egypt, Syria, Libya, Iraq, or North Korea. The new treaty includes strict verification provisions and the threat of sanctions against violators including (an important extension) those who are nonparticipants in the treaty. From 1997 to 2002, the treaty organization oversaw the elimination of about one-sixth of the world's chemical weapons.

Biological weapons resemble chemical ones, except that instead of chemicals they use microorganisms or biologically derived toxins. Some use viruses or bacteria that cause fatal diseases, such as smallpox, bubonic plague, and anthrax. Others cause nonfatal, but incapacitating, diseases or diseases that kill livestock. Theoretically, a single weapon could spark an epidemic in an entire population, but this is considered too dangerous and use of less-contagious microorganisms is preferred.

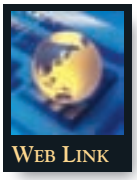
Biological weapons have virtually never been used in war (Japan tried some on a few Chinese villages in World War II). Their potential strikes many political leaders as a Pandora's box that could let loose uncontrollable forces if opened. Thus, the development, production, and possession of biological weapons are banned by the 1972 **Biological Weapons Convention,** signed by more than 100 countries including the great powers. The superpowers destroyed their stocks of biological weapons and had to restrict their biological weapons complexes to defensive research rather than the development of weapons. However, because the treaty makes no provision for inspection and because biological weapons programs are, like chemical ones, relatively easy to hide, several states remain under suspicion of having biological weapons. UN inspections of Iraq in the mid-1990s uncovered an active biological weapons program. Evidence surfaced after the collapse of the Soviet Union that a secret biological weapons program was under way there as well. In 2001, the United States pulled out of talks to strengthen the 1972 treaty, declaring the proposed modifications unworkable.

Anthrax spores were one of the main biological weapons produced by the secret Soviet program, and the U.S. military also produced them (to work on defenses). In 2001, soon after the September 11 attacks, someone sent small amounts of anthrax spores through the U.S. mail to high government and media offices, killing several people and massively disrupting mail distribution. The attack was unsolved in early 2005 but showed that deadly biological weapons are a real threat and not a futuristic worry. In 1997, the U.S. military began to vaccinate all 2.4 million U.S. soldiers against anthrax.

Today, the United States and perhaps a dozen other countries maintain biological weapons research (not banned by the treaty). Researchers try to ascertain the military

implications of advances in biotechnology. Most states doing such research claim that they are doing so only to deter another state from developing biological weapons.

Proliferation



Proliferation

Proliferation is the spread of weapons of mass destruction—nuclear weapons, ballistic missiles, and chemical or biological weapons—into the hands of more actors. The implications of proliferation for international relations are difficult to predict but clearly profound. Ballistic missiles with weapons of mass destruction remove the territorial protection offered by state borders and make each state vulnerable to others. Some realists, who believe in rationality, reason that in a world where the use of military force could lead to mutual annihilation, there would be fewer wars—just as during the arms race of the Cold War the superpowers did not blow each other up. Other IR scholars who put less faith in the rationality of state leaders are much more alarmed by proliferation. They fear that with more and more nuclear (or chemical/biological) actors, miscalculation or accident—or fanatical terrorism—could lead to disaster.

The leaders of great powers tend to side with the second group. They have tried to restrict weapons of mass destruction to the great powers. Proliferation erodes the great powers' advantage relative to middle powers. There is also a widespread fear that these weapons may fall into the hands of terrorists or other nonstate actors who would be immune from threats of retaliation (with no territory or cities to defend). Evidence captured during the 2001 war in Afghanistan showed that the al Qaeda organization was trying to obtain weapons of mass destruction and would be willing to use them. Lax security at the vast, far-flung former Soviet nuclear complex increased fears that fissionable materials could reach terrorists.

However, states that sell technology with proliferation potential can make money doing so. In the mid-1990s the United States pressured both Russia and China to stop selling nuclear technology to Iran (which apparently is trying to build nuclear weapons). But Russia and China did not want to give up hundreds of millions of dollars in sales. This is another international collective goods problem, in which states pursuing their individual interests end up collectively worse off.

Nuclear proliferation could occur simply by a state or nonstate actor's buying (or stealing) one or more nuclear weapons or the components to build one. In 2002, the G8 countries pledged $20 billion to address the problem, but in late 2003 a study by 21 research groups (focused on 100 insecure research reactors with weapons-grade uranium in 40 countries) found little had been spent and problems remained rampant. A stronger form of nuclear proliferation is the development by states of nuclear complexes to produce their own nuclear weapons on an ongoing basis. Here larger numbers of weapons are involved and there are strong potentials for arms races in regional conflicts and rivalries. The relevant regional conflicts are those between Israel and the Arab states, Iran and its neighbors, India and Pakistan, the two Koreas, and possibly Taiwan and China. India and Pakistan both have exploded nuclear devices underground, and are building arsenals and the missiles to deliver them. In addition, South Africa reported in 1993 that it had built several nuclear weapons but then dismantled them in the 1980s (during white minority rule).

Israel has never test-exploded nuclear weapons or admitted it has them, but is widely believed to have a hundred or more nuclear warheads on combat airplanes and

medium-range missiles. Israel wants these capabilities to use as a last resort if it were about to be conquered by its neighbors. Israeli leaders thus hope to convince Arab leaders that a military conquest of Israel is impossible.

The **Non-Proliferation Treaty (NPT)** of 1968 created a framework for controlling the spread of nuclear materials and expertise. The International Atomic Energy Agency (IAEA), a UN agency based in Vienna, is charged with inspecting the nuclear power industry in member states to prevent secret military diversions of nuclear materials. However, in the 1990s, Pakistan's top nuclear scientist sold bomb kits with low-grade uranium, enrichment centrifuges, and bomb designs to Libya, Iran, and North Korea. A number of potential nuclear states (such as Israel) have not signed the NPT, and even those states that have signed may sneak around its provisions by keeping some facilities secret (as Iraq and Iran did).

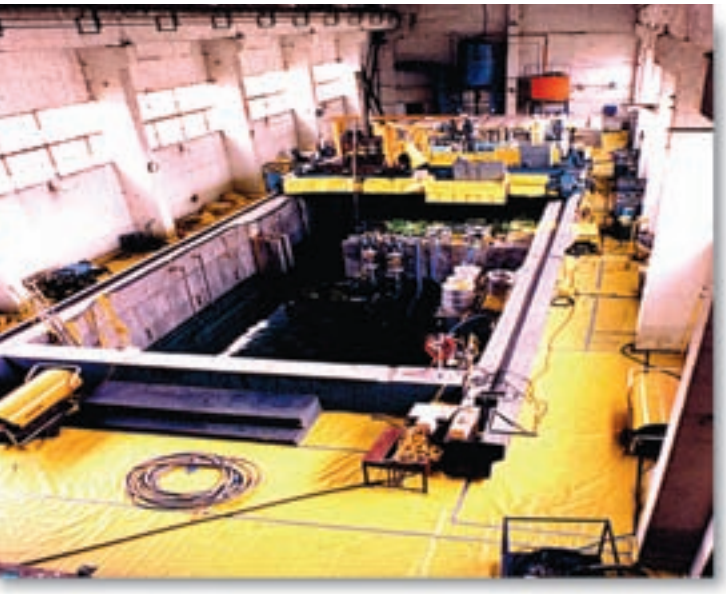
Pakistan's Nuclear Sales

North Korea withdrew from the IAEA in 1993, then bargained with Western leaders to get economic assistance, including safer reactors, in exchange for freezing its nuclear program. North Korea's leader died months later, but the compromise held up. Despite fears that its leaders were just playing for time to prop up a failed regime, in 1999 North Korea allowed inspection of a disputed underground complex and agreed to suspend missile tests, in exchange for aid and partial lifting of U.S. trade sanctions.

This hopeful picture was revealed as false, however, in 2002 when the United States confronted North Korea with evidence of a secret nuclear enrichment program, and the North Koreans confirmed it. As relations deteriorated, North Korea pulled out of the agreement and of the IAEA, restarted its nuclear reactor, and threatened to turn existing plutonium into a half dozen bombs within months. U.S. monitoring detected certain molecules indicative of plutonium reprocessing, and North Korea then announced it had finished. Although proof is lacking—unless or until North Korea tests a bomb—there is every reason to believe that North Korea is the world's ninth nuclear-weapons power. Since those bombs could plausibly be sold to the highest bidder worldwide, they posed a grave risk to the United States. The outcome of the crisis was still uncertain as of spring 2006.

A number of middle powers and two great powers (Japan and Germany) have the potential to make nuclear weapons but have chosen not to do so. The reasons for deciding against "going nuclear" include norms against using nuclear weapons, fears of retaliation, and practical constraints including cost.

HOT STUFF



The most important hurdle in making nuclear weapons is access to fissionable materials (plutonium and uranium). In 2003, North Korea restarted its plutonium-producing reactor at Yongbyon, shut down since 1994 under an agreement with the United States, and apparently produced a half-dozen bombs from it, becoming the world's ninth nuclear-armed state. This 1996 photo, released in 2003, shows the nuclear fuel rods in a cooling pond at Yongbyon.

At present, undeclared nuclear powers include Israel (with perhaps a hundred warheads) and North Korea (with perhaps a half dozen). Declared nuclear states are the "big five" and India and Pakistan (with dozens each, and growing). Iran denies, but appears to be, working to develop nuclear weapons (as it had begun to do under the shah in the 1970s). Since 2003, Iran first agreed to suspend its uranium enrichment program and allow surprise IAEA inspections, then restarted enrichment, suspended it again, and restarted it again. In 2005, U.S.-backed efforts by Europe to offer Iran economic incentives to dismantle its program, and by Russia to enrich Iran's uranium on Russian soil with safeguards, both broke down. In 2006, the IAEA referred the issue to the UN Security Council, which condemned Iran's actions but could not agree on sanctions. Iran insisted on its sovereign right to enrich uranium for what it called peaceful purposes.

Brazil and Argentina seemed headed for a nuclear arms race in the 1980s but then called it off as civilians replaced military governments in both countries.

Nuclear Strategy

The term *nuclear strategy* refers to decisions about how many nuclear weapons to deploy, what delivery systems to put them on, and what policies to adopt regarding their possible use. The main reason for possessing nuclear weapons is to deter another state from a nuclear or conventional attack by threatening ruinous retaliation. Under **mutually assured destruction (MAD)** neither side can prevent the other from destroying it. The acronym implies that the strategy, though "rational," is actually insane (mad) because it could destroy both sides.

Defense has played little role in nuclear strategy to date because no effective defense against missile attack exists. However, the United States is spending billions of dollars a year to try to develop defenses that could shoot down incoming ballistic missiles. The program is called the **Strategic Defense Initiative (SDI),** or "star wars."

In 2004, the United States began deploying both a prototype missile intercept system based in Alaska and a destroyer in the Sea of Japan, off North Korea, that could try

THE RACE IS ON

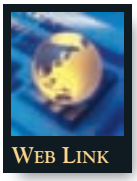
India and Pakistan are building arsenals of nuclear-tipped missiles that could devastate each other's main cities. Their current arms race follows that of the superpowers during the Cold War. Superpower arms control agreements helped develop norms and expectations about the role of nuclear weapons, but did not stop a buildup of tens of thousands of nuclear weapons. Here, India shows off its new intermediate-range ballistic missile, 2002.

Ballistic Missile Defense

to shoot down a North Korean missile in its boost phase. It also moved to put in place—against strong Chinese opposition—a missile-defense collaboration in Asia that would include Japan, Australia, possibly India, and Taiwan. Four Japanese destroyers are to join the U.S. one, and Patriot missiles based in Japan would try to shoot down incoming missiles. But North Korea has more than 600 ballistic missiles capable of hitting Japan. Other technologies are also being tested, including lasers fired from either space or ships to disable ballistic missiles in the boost phase after launch (when their engines make them easy to detect, and warheads and decoys have not yet deployed). Overall, no reliable defense against ballistic missiles exists, and experts disagree on whether such a defense is just a few or many years away. Several tests of the U.S. system failed in 2004.

In addition to the technical challenges of stopping incoming ballistic missile warheads, a true strategic defense would also have to stop cruise missiles (possibly launched from submarines), airplanes, and more innovative delivery systems. If a rogue state or terrorist group struck the United States with a nuclear weapon, it would probably not use an ICBM to do so.

Nuclear Arsenals and Arms Control



Superpower Arms Race

During the Cold War, the superpowers' nuclear forces grew and technologies developed. These evolving force structures were codified by a series of arms control agreements. *Arms control* is an effort by two or more states to regulate by formal agreement their acquisition of weapons. Arms control is broader than just nuclear weapons—after World War I the great powers negotiated limits on sizes of navies—but in recent decades nuclear weapons have been the main focus. Arms control agreements typically require long formal negotiations with many technical discussions, culminating in a treaty. Some arms control treaties are multilateral, but during the Cold War most were bilateral (U.S.-Soviet). Some stay in effect indefinitely; others have a limited term.

Several treaties in the 1970s locked in the superpowers' basic parity in nuclear capabilities under MAD. The U.S. arsenal peaked in the 1960s at more than 30,000 warheads; the Soviet arsenal peaked in the 1980s at more than 40,000. More recent arms control agreements substantially reduced nuclear forces after the end of the Cold War. Under the 2002 U.S.-Russian Strategic Offensive Reductions Treaty, each side is to reduce deployed war heads from about 6,000 to 2,200.

A **Comprehensive Test Ban Treaty (CTBT)** to halt all nuclear test-explosions was signed in 1996 after decades of stalemate. It aims to impede the development of new types of nuclear weapons. However, the treaty does not take effect until signed and ratified by all 44 states believed capable of building at least a crude nuclear weapon. India did not sign the CTBT, and defied it in 1998 with five nuclear tests. Pakistan followed suit with its own tests. The U.S. Senate voted in 1999 against ratifying the CTBT, and the Bush administration opposes it. Russia ratified it in 2000. No nuclear tests occurred worldwide in 1999–2004.

China, France, and Britain each have several hundred weapons. Britain tends to use U.S.-built nuclear weapons systems; China and France rely on their own efforts. Britain's arsenal includes 185 warheads on long-range submarine-launched missiles and tactical aircraft. France has about 400 warheads on submarine-launched long-range missiles and

50 on aircraft; it dismantled its 18 land-based missiles in 1996. China is thought to have 7 warheads on long-range land missiles, 100 on intermediate-range missiles, 12 on submarines, 150 on long-range bombers, and more than 100 on artillery and rockets.

Efforts to control conventional arms trade through arms control treaties have had no success. After the Gulf War, the five permanent Security Council members, which sell most of the weapons to the Middle East, tried to negotiate limits on the supply of weapons to that region. But no participant wanted to give up its own lucrative arms sales in the region, which each naturally saw as justified.

All the weapons of mass destruction are relatively difficult and expensive to build, yet they provide only specialized capabilities that are rarely if ever actually used. As a result, a number of states have decided that such weapons are not worth acquiring, though it would be technically possible to do so. Such cost-benefit thinking also applies more broadly to states' decisions about the acquisition of all kinds of military forces.

States face complex choices regarding the configuration of their military forces in the post–Cold War era. Not only have the immediate contingencies and threats changed drastically, but the nature of threats in the new era is unknown.

Despite the threat of conflict or war and the importance of security concerns, trade, money, and business are playing a more and more powerful role in international relations. In the next chapter we move to a discussion of the politics of international economic activities, the world monetary system, and the role of private companies as nonstate actors in the world economy.

THINKING CRITICALLY

1. How many of the six types of international conflict discussed in this chapter can you connect with the phenomenon of nationalism discussed on pp. 28–29? What are the connections in each case?
2. The rise of fundamentalism among the world's major religions challenges traditional notions of state sovereignty. How might this trend strengthen, or weaken, the United Nations and other attempts to create supranational authority (which also challenge state sovereignty)?
3. Most of the great powers are reconfiguring their military forces in the post–Cold War era. What kinds of capabilities do you think your own country needs in this period? Why?

CHAPTER SUMMARY

- Many theories have been offered as general explanations about the causes of war. Contradictory theories have been proposed at each level of analysis and, with two exceptions, none has strong empirical support. Thus, political scientists cannot reliably predict the outbreak of war.

- The two exceptions are: (1) that there are virtually no societies in which war and intergroup violence as means of leverage are unknown, and (2) that democratic states almost never fight wars against other democracies.
- Territorial disputes are among the most serious international conflicts because states place great value on territorial integrity. With a few exceptions, however, almost all the world's borders are now firmly fixed and internationally recognized. Economic conflicts lead to violence much less often, because positive gains from economic activities are more important inducements than negative threats of violence.
- Drug trafficking creates several kinds of conflict that draw in state and nonstate actors alike.
- Ethnic conflicts, especially when linked with territorial disputes, are very difficult to resolve because of psychological biases.
- Fundamentalist religious movements pose a broad challenge to the rules of the international system in general and state sovereignty in particular.
- When violent means are used as leverage in international conflicts, a variety of types of war result. These vary greatly in size and character, from guerrilla wars and raids to hegemonic war for leadership of the international system.
- Like other violent means of leverage, terrorism is used to gain advantage in international bargaining situations.
- The 2001 attacks differed from earlier terrorism both in their scale of destruction and in the long reach of the global al Qaeda terrorist network.
- Military spending tends to stimulate economic growth in the short term but reduce growth over the long term. In the 1990s, military forces and expenditures of the great powers—especially Russia—were reduced and restructured.
- Military forces include a wide variety of capabilities suited to different purposes. Conventional warfare requires different kinds of forces than those needed to threaten the use of nuclear, chemical, or biological weapons.
- Except in time of civil war, state leaders—whether civilian or military—control military forces through a single hierarchical chain of command.
- Control of territory is fundamental to state sovereignty and is accomplished primarily with ground forces.
- Air war, using precision-guided bombs against battlefield targets, proved extremely effective in the U.S. campaigns in Iraq in 1991, Serbia in 1999, Afghanistan in 2001, and Iraq in 2003.
- Small missiles and electronic warfare are increasingly important, especially for naval and air forces. The role of satellites is expanding in communications, navigation, and reconnaissance.
- Weapons of mass destruction—nuclear, chemical, and biological—have been used only a handful of times in war.
- The production of nuclear weapons is technically within the means of many states and some nonstate actors, but the necessary fissionable material (uranium-235 or plutonium) is very difficult to obtain. Most industrialized states, and many poor ones, have refrained voluntarily from acquiring nuclear weapons. These states include two great powers, Germany and Japan.

- Chemical weapons are cheaper to build than nuclear weapons, and their production is harder to detect. More middle powers have chemical weapons than nuclear ones. A treaty bans the possession and use of chemical weapons.
- Several states conduct research into biological warfare, but by treaty the possession of such weapons is banned.
- Slowing the proliferation of ballistic missiles and weapons of mass destruction in the global South is a central concern of the great powers.
- The United States is testing systems to defend against ballistic missile attack, although none has yet proven feasible, and withdrew from the ABM treaty with Russia to pursue this program.
- The United States and Russia have arsenals of thousands of nuclear weapons; China, Britain, and France have hundreds. Israel, India, and Pakistan each have scores.
- North Korea apparently has a half dozen nuclear weapons, and Iran appears to be moving forward to develop them. Iran's case was referred to the UN Security Council in 2006.

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