Grasping geopolitical theory's understanding of the nature of change in world politics is particularly difficult because of the atrophy of geopolitical theory in the contemporary study of international relations. Among the traditions of international relations theory, geopolitics is among the most ancient and extensive. In one of the earliest extant Western works on politics the Greek geographer Strabo observed that "the greater part of geography suberves the needs of states."¹ Despite its antiquity, geopolitics has largely disappeared as a distinct theoretical position in contemporary international relations theory.

The decay and eclipse of geopolitical theory is puzzling because of the close relationship between geopolitics and realism, the currently dominant school of international relations theory. Most forms of geopolitics are types of realism, and many of the insights of realism were articulated by geopolitical theorists before the term "realpolitik" was coined in the nineteenth century. But within the classic realist accounts of the origins and evolution of realist and international relations theory, the early literature of geopolitics is almost invisible. Martin Wight, widely regarded as a founder of the English school of realism, made no mention of this geopolitics in his essay "Why Is There No International Theory?"² Similarly, E. H. Carr's complaint in The Twenty Years' Crisis that the study of international affairs had been dominated by idealistic approaches completely ignored the vast outpouring of literature produced by German writers associated with the Institute for Geopolitics in Munich, by far the single largest body of theoretical and scholarly writing on international affairs produced during the first forty years of the twentieth century.³ Hans Morgenthau's vision of an

in Michael W. Doyle and G. John Ikenberry, eds., New Thinking in International Relations (Boulder: Westview, 1997)
epic struggle between realism and idealism also effectively wrote geopolitical theory into oblivion.⁴ And Kenneth Waltz’s widely employed “three-image” typology of international relations theories made no reference to these approaches.⁵

Change is one of the major topics in international relations theory about which there is a widespread sense of inadequacy for theorists of all schools.⁶ Neorealism, which has occupied center stage in American international relations theory during the 1980s, has been criticized for its inadequate ability to conceptualize and explain change. In particular, the widely influential theories of structural or neorealism of Kenneth Waltz have come under vigorous attack by John Ruggie, Friedrich Kratochwil, Richard Ashley, R.B.J. Walker, and others.⁷ The main criticism leveled against Waltz is that he only has a theory of the consequences of structure and has no means to explain the origins or the causes of structure. Neorealism thus lacks a generative dimension: It can explain the reproduction of structures but not their initial production. Waltz and neorealists take the state and the state system as givens and from there analyze the system’s operation, but they do not attempt to explain its origins and thus the possible circumstances of its demise or fundamental transformation.

Robert Gilpin, another neorealist whose major work is focused on change, does not attempt to provide much insight into the origins of the state and state system. Gilpin’s analysis of change focuses upon systemic change (changes of relative power and position within a given system) rather than system changes (changes in the fundamental units and nature of the system).⁸ The failure of neorealism with regard to fundamental change is one of omission rather than of commission; it is not that neorealists have sought to understand fundamental change and failed but rather that they have not tried. Insofar as theorists find fundamental or system change to be of central interest, they cannot be satisfied with neorealist international relations theory. Much of the animosity toward neorealism on the part of its critics derives from this refusal of neorealism to deal with system change while at the same time it magisterially purports to be a largely complete or routinized science. Not surprisingly, the silence of neorealism on the issue of system change has been a central theme in the recent debate over the causes of the end of the Cold War.⁹

Geopolitics contains the realist tradition’s main theories of fundamental change. Neorealism has refined one set of important realist arguments, without exhausting realism’s conceptual resources. It is not by accident that as geopolitics has decayed, realism has come to be focused on statics and secondary systemic change. Recovering geopolitical approaches offers a realist theory of fundamental or system change. In this chapter I seek to contribute to that goal by exploring geopolitical concepts of change. I begin by mapping the main theoretical claims of the five main clusters of geopolitical theory, in
order to acquaint the reader with its distinct varieties. I then sketch the main features of a geopolitics reformulated as a theoretically disciplined social science model, which I refer to as structural-functional security materialism, or neoclassical geopolitics, for short. After these preliminaries, I explore both how this theory understands the nature and sources of change in security systems, and its treatment of transitions and contradiction.

The Varieties of Geopolitical Theory

Few words in the study of world politics are as widely used and vaguely defined as the term "geopolitics." As Robert Harkavy has observed, "the term 'geopolitics' has come to be used in such a variety of contexts that it is no longer clear just what it means . . . it has come to mean almost everything, and therefore perhaps almost nothing." In short, the word "geopolitics" is overdetermined: It stands for several quite distinct theories or understandings of world politics. There are five overlapping but distinct clusters of ideas that have been advanced as geopolitical: (1) a primitive political naturalism; (2) an extreme realism couched in organic and Darwinian metaphors; (3) a realist theory of interstate conflict that emphasizes geographical features; (4) political geography; and most important, (5) analyses written in the late nineteenth and early twentieth centuries of the global power system created by the technologies of the industrial revolution interacting with the largest geographical features of the earth.

Naturalist Social Science: Physiopolitics

By far the oldest and most heterogeneous cluster of geopolitical arguments concerns the impacts of nonhuman physical nature upon human affairs. Naturalist political science begins with the ancient Greeks, extends through Jean Bodin and Montesquieu in the early modern era, and then takes new directions in the nineteenth century. The basic claim of naturalist social and political theory is that fundamental differences among human societies are the product of the different natural environments (particularly climate, topography, arable land, and access to the sea) in which these societies live and to which they must adapt. The appeal of this naturalism is the simple notion that the physical constraints and opportunities provided by nature significantly affect the performance of very basic functional tasks that are universal to human groups (most notably economic production and protection from violence). Naturalist theory is not confined to international or world politics but includes broad aspects of culture, economics, and politics; it produces hypotheses that belong as much to anthropology, sociology, psychology, and economics as to political science. Natural facts are
seen shaping the character of individual humans, the customs and structures of societies, and societies' sizes and relations with others. In some cases political interactions between large groups were seen as indirectly shaped by environmental and geographical factors. But with some factors, such as topography, the causal relations were seen as quite close and direct.

Thus the term geopolitics is too narrow to capture the breadth of naturalist political and social science. The independent or causative variable in such arguments is nature rather than geography, and the dependent variables encompass more than international or even political phenomena. The term "physiocracy"—literally "the rule of nature"—would be most suitable, but it has been associated with the eighteenth-century school of French economists who believed that natural endowments were the decisive factors in production—a school that more accurately could be called "physioeconomics." The branch of physiocratic science concerning political outcomes might thus be "physiopolitics"—the study of the impacts of nature upon politics. Thus we can say that physiopolitics and physioeconomics are branches of physiocratic science.

In the human sciences, explanations from nature come in two broad streams. Theories of biological determinism emphasize human physical nature (race, intelligence, etc.). Theories of environmental determinism emphasize nonhuman physical nature as determining variables. Although racial and eugenic biological theories share in common with environmental theories a strong materialism, the two are otherwise near opposites, for they focus on entirely different aspects of material reality.

In looking for the natural causes of social and political outcomes, physiocratic science is different from the main body of twentieth-century social science theory. The main tendency of social science is to look for the causes of social and political outcomes in social and political factors, whereas physiocratic science looks for the causes of social and political outcomes in natural factors. Although arguments of the natural causation of social outcomes have not disappeared in social science, social science has marked its break with natural history by downplaying the impact of nature upon human affairs.

**German Geopolitik**

The second important cluster of geopolitical theoretical argument is the extreme statist realism cast in Darwinian metaphors of the German school of geopolitik. Since the term was coined by Rudolf Kjellen in the early years of this century, most self-described "geopolitics" has been written by Germans. Although there are differences in emphasis among different theorists, there are six main ideas characteristic of German geopolitik. First, the primary political entities are states, and states are organisms. Second,
the life of these state organisms is heavily dependent upon territory, thus making geography of paramount concern to statesmen and political scientists. Third, the interaction of state organisms is heavily competitive, making war a normal condition of world politics. Fourth, in the economic sphere state organisms strive toward autarky. Fifth, because states are natural beings, their actions are beyond right and wrong, subject only to the judgment of success and not the standards of abstract law or morality. Sixth, in the industrial era the optimum size of states is expanding, stimulating sharp competition and the creation of new empires. German geopolitik was thus extreme statism combined with an interstate social Darwinism emphasizing competition, material forces (particularly territory), and organic metaphors.

German geopolitik was an intellectual movement with wide influence on German politics. The three most important figures in German geopolitik, Friedrich Ratzel (1846–1911), Rudolf Kjellen (1846–1922), and Karl Haushofer (1869–1946), were all prolific and widely read advocates of German expansion. Haushofer, introduced to Adolf Hitler by one of his students, Rudolf Hess, extensively tutored Hitler while he was in prison for the Beer Hall Putsch. Mein Kampf, written during this period, contains extensive passages about lebensraum and other themes of geopolitik. Under Haushofer’s leadership, a group of German scholars established the Journal of Geopolitics and the Institute for Geopolitics in Munich after World War I. During the 1920s and 1930s geopolitik was a flourishing intellectual enterprise with scholarly and popular organs, well-funded institute and academic supporters, and a critical mass of practitioners sharing a common set of assumptions. During this period there were far more self-described “geopolitical” analysts of world politics writing in Germany than there were “international relations” scholars in Britain, the United States, and France.

In sum, German geopolitik was a highly conflictual statist realism formulated in the metaphors of vitalistic metaphysics. As a school or approach to the study of world politics, German geopolitik is now dead, in the sense that it has no living practitioners, and few scholars in the field of international relations study its works or make reference to its concepts. In part this is because of Germany’s crushing defeat in World War II and the world’s revulsion at Nazi barbarism. But aside from these dubious associations, the vitalism and the organic metaphors of German geopolitik seem more quaint than compelling, more suggestive than scientific.

But stripped of its heavy baggage of organic vitalism and social Darwinian analogies, German geopolitik bears a striking resemblance to the more extreme and simplistic versions of realism that give almost complete paramountcy to the state and conceptualize the interaction of states in starkly conflictual terms. Seen in this light, German geopolitik is a dead
branch of a broader Germanic and continental tradition of statism and realpolitik that stretches back through Trietschke and Hegel to the seventeenth-century theorists of the absolute state. Although dead, German geopolitik played an important role in the formation of the realist school in the United States, and the term itself lives on as a dimension of this newer and still lively intellectual tradition.

Realism Plus Geography

The third distinctive way in which geopolitics is used is as a synonym for realism generally, and for realism with an emphasis upon geographical factors. This version of geopolitics is perhaps the most prevalent today, particularly in the United States. In contemporary American discussions, the term geopolitics has both a broad and a narrow meaning. In its broad usage, geopolitics is employed to mean “power politics between states.” In a narrower meaning, it indicates “power competition between major states in peripheral areas.” As a synonym for power politics, the term geopolitics is used by realists and non-realists alike. In its broader meaning geopolitics seems to embrace the most important issues separating the leading states in the interstate system. Perhaps the most authoritative employer of geopolitics in this broad sense is Henry Kissinger. In his earlier theoretical writings Kissinger never used the term in an important context, but in recent writings he has used it frequently, more or less synonymously with “power politics.”

Kissinger’s power politics is rooted in the largely unchanging world of territoriality. It embodies a suspicion of both the simplicities of social-scientific modeling and ideological extremism, attitudes he shares with other postwar American realists like Hans Morgenthau and George Kennan.

The term geopolitics is also frequently used more narrowly to refer to great-power competition in geographically remote regions of the world. An authoritative instance of this more circumscribed usage occurred in 1984, when Secretary of State George P. Shultz, introducing his testimony on the overall condition of U.S. foreign policy before the Senate Foreign Relations Committee, divided his remarks into two parts, “strategic affairs” and “geopolitics.”

The former encompassed relations with the Soviet Union, with a heavy emphasis on nuclear forces and arms control; the latter concerned regional conflicts in the Middle East, in Central America, and in the Persian Gulf. Here “geopolitics” is employed to describe spheres of influence, client states, and limited wars, which have little in common except that they do not touch upon the paramount survival issues of the leading states in the international system.

The most ambitious recent claim for geopolitics has been made by Colin Gray: “[G]eopolitics is not simply one set of ideas among many competing
sets that might help illuminate the structure of the policy problems. Rather it is a meta- or master framework. . . . "22 But Gray does not actually formulate anything approximating a social-scientific version of geopolitics as a theory. In Gray's analysis geopolitics amounts to the claim that states are inevitably in competition and that the geopolitical analysts of the late nineteenth and early twentieth centuries provide the best guide for understanding Soviet-American strategic antagonism. In short, most of the contemporary public discourse of "geopolitics" is more a thematic and rhetorical dimension of American state-centered realism and strategic studies than a distinctive or articulated theory.

Political Geography

The fourth cluster of ideas often referred to as geopolitics is political geography, the branch of the academic discipline of geography that concerns the spatial aspects of politics. Like physiocratic science, political geography encompasses more than claims about world politics. The attempt to establish a separate subfield of "political geography" either in the academic disciplines of political science or in geography has been unsuccessful.23 During the interwar years, when German geopolitik was at its peak, but before the Nazi aggressions had begun, the few self-described realists in American academic life sought to distinguish "geopolitics" from "political geography." Several American writers suggested that "political geography" was scientific and value-neutral, whereas "geopolitics" implied a political commitment.24 As late as the 1950s and 1960s Harold Sprout was arguing that political geography was a name for the scientific insights contained within the literature of "geopolitics."25 Also recoiling from the excessive ambitions and unsavory associations of German geopolitik, geographers have eschewed developing a "political geography" that grapples with the major issues of world security politics.26 Nor was "political geography" consolidated as a subfield of political science, as Sprout hoped. In attempting to escape the larger theoretical questions, political geography became a flat and theoretically unfocused enterprise.

Classical Global Geopolitics

Finally, the most important and most well-known body of geopolitics is the extensive literature produced in the late nineteenth and early twentieth centuries on the relationship between world politics and the material forces unleashed by the industrial revolution. Alfred Thayer Mahan, Halford Mackinder, John Seeley, Karl Haushofer, Friedrich Ratzel, H. G. Wells, Nicholas Spykman, Homer Lea, Frederick Teggart, Frederick Jackson Turner, James Burnham, E. H. Carr, Vidal de la Blanche, and many less
well-known figures employed a common set of general assumptions and approaches and grappled with a common set of contemporary problems.\textsuperscript{27} The theoretical orientation of these writers was often muddled and undisciplined, their works tended to mix analysis with policy advocacy, and they exhibited many of the most pernicious racial and class prejudices of the era.\textsuperscript{28} The global geopoliticians were deeply divided in their political and national loyalties. They spent more effort attempting to influence policy and sway public opinion than attempting to establish geopolitics as a disciplined and institutionalized intellectual or academic enterprise. But taken as whole, their analyses constitute the most sophisticated and insightful body of geopolitical analysis thus far produced.

The main goal of the global geopoliticians was to understand how the material capabilities of transportation, communication, and destruction produced by the industrial revolution (most notably railroads, steamships, telegraphy, chemical high explosives, and airplanes) interacting with the largest-scale geographic features of the earth would shape the character, number, and location of viable security units in the emergent global-scale security system. They brought into their analyses a bewildering range of variables, from political culture and strategic leadership to natural resource endowments and population growth rates, but their overarching organizing framework was essentially materialist in character.

Most global geopolitical theorists thought that the new global era would be characterized by a closed system, units of increased size, and intense competition. Most also believed that a great upheaval in world politics was imminent, that the balance of power system was obsolete as an ordering mechanism for Europe, that the British empire (the superpower of the nineteenth century) was ill suited to the new material environment and would probably be dismembered, and that the United States and Russia were the two states best situated in size and location to survive in the new era. They vigorously disagreed about the character, number, and location of the entities that would prove most viable in the new material context.

From this brief group portrait it is obvious that the problem of change was central to global geopolitics. In conceptualizing the sources of change, the global geopoliticians departed from earlier naturalist theorists by emphasizing technological change as the driving element in world political change. The term "geopolitics" suggests an exclusive focus on geography, but all the global geopolitical theorists incorporated, implicitly or explicitly, claims about technology in their arguments.\textsuperscript{29} Before the onset of the industrial revolution, technological assumptions were mainly implicit in geopolitical theory, but technology occupied a central role in the analyses of the global geopoliticians. The inclusion of an explicit role for technology in geopolitical theory helped to explain change but is problematic because it is not obvious how much technology and geography have in common. Global
geopolitical theorists also tended to conceptualize the process of change in terms of Darwinian analogies of adaptation and natural selection.

It is often assumed that global geopolitical theory was, like German geopolitik and more recent American geopolitics, entirely realist in character. There are important similarities between realism and global geopolitics, but important differences as well. Two main themes—the role of power (particularly material capabilities) in shaping world politics, and the primacy attached to security—are common to both. But global geopolitical theory differs from contemporary American realism, particularly neorealism, in several important ways. The global geopoliticians did not take the state as an inevitable feature of world politics, and many of them thought that the anarchic state system would be extinguished by the creation of a world state.

The most significant way in which global geopolitics differs from contemporary realism concerns the importance that some global geopoliticians attached to nonstatist political forms in world politics. It is often overlooked that Halford Mackinder's main geopolitical work, Democratic Ideals and Reality, which expounds the "heartland thesis" that is generally recognized as the single most important concept in global geopolitics, advocates a peculiar version of a League of Nations organization. The liberal and antistatist strain in global geopolitics is most visible in the analyses of the autodidact polymath H. G. Wells, who argued that the anarchic state system in the most materially developed North Atlantic region would be replaced by what he termed a "greater synthesis" analogous to the Swiss Confederation and the United States. Like their more competition-oriented contemporaries, liberal geopolitical theorists employed Darwinian analogies of natural cooperation and symbiosis. Liberal geopolitical theory was not entirely novel but rather extends insights about the relationship between material contexts and liberal political forms that were developed by Montesquieu in the eighteenth century. These neglected liberal strands in the global geopolitical debates challenge the common notion that liberalism is idealistic and realism is materialist. In short, global geopolitical theory contains a powerful set of arguments asserting that liberal political forms are better suited to the material conditions created by the interaction of industrial technologies and global geography.

Neoclassical Geopolitics: Structural-Functional Security Materialism

The atrophy of geopolitical theory since the 1960s has left international relations theory, particularly realism, without a robust theory of system change. In order to fill this theoretical lacuna, I have refurbished and refor-
mulated the inchoate notions of earlier geopolitical theory into a social-science model containing testable propositions about the functional fit between different material contexts and different security practices and structures. To avoid confusion with the other varieties of geopolitics, I label this model neoclassical geopolitics. In more technical language, the model is appropriately labeled structural-functional security materialism. A full exposition of the model is beyond the scope of this essay, but a brief sketch of its main features is necessary in order to frame and to situate its distinctive arguments about the nature of change. This section outlines the model and summarizes its main propositions.

**The Simple Model**

The simple model incorporates several main elements and posits several relationships between them (see Figure 5.1). The model posits that human security institutions are practical mediations between the unchanging natural human need for security and the changing constraints and opportunities of the material environment. The model assumes that security goals animate security practices and structures because the human need for physical security from violence is natural. Human nature is of course more complex than this, and other aspects of human nature impede and enable the achievement of the goal of security, but this goal is the measure against which security practices are judged functional or not. Security practices and structures are not part of nature but rather are created by humans engaged in practical problem solving. The characterization of human social agency as pragmatic means that social practices and structures are practical and instrumental solutions to fundamental and recurring problems. This characterization incorporates the notion that individuals are by and large self-interested and capable of instrumental rationality. But in assuming specific, naturally endowed sets of security ends, the model posits a set of interests that are recurring and fundamental. The need for security is natural, and in pursuit of this goal human practices and structures must adapt to powerful constraints and opportunities of the material context within which they must function. This material environment is composed of the interaction of geography and technology, which are for human practical purposes effectively revelations of natural possibility beyond human control. These material contexts change, sometimes in very fundamental ways, as new natural possibilities are revealed and discovered. Such changes pose new security problems while eliminating or ameliorating others. When this occurs the institutions that provide security must be reconstructed if they are to be able to continue to provide security.

Functional-structural materialist theories of security orders can be conveniently schematized using the conceptual apparatus of Marxian historical
FIGURE 5.1  Structural-functional security materialism: A simple model
production materialism, in which a "base" or "infrastructure" constituted by largely exogenous independent variables (in this case, the forces of destruction and protection rather than of production) determines the viability of a "superstructure" (in this case, protection practices and structures). In addition to attempting to explain the causes (rather than the consequences) of particular distributions of power, functional security materialist theory also seeks to understand how variations in the composition of power (i.e., the intrinsic strengths and limits of different power assets) shape political outcomes.

The essential nature of the causal relationship in the model is functional, and its propositions assert that different practices and structures fit or fail to fit fixed security ends in particular material contexts. Practices and structures are solution sets to particular problems, and so which practices and structures are functional depends upon which problems exist. As material forces change, problems change, and therefore which security practices are functional also changes. The model's central propositions on functional fit are subject to empirical validation and falsification. If practices and structures identified in the model as dysfunctional persist without a system breakdown, or a "crash," then the propositions of the model are falsified (see Figure 5.2). But whether the practices and structures specified as functional in a particular context actually emerge, or whether the outcome of dysfunction and crash occurs, cannot be ascertained simply by knowing which practices and structures are functional. Agency determines whether particular practices and structures arise, but not whether they are functional or dysfunctional. But the model does provide ancillary propositions on transitions, lags, and crashes that offer insight into the probability of functional adjustment or dysfunctional crash in particular situations.

Outline of Main Propositions

Although a full articulation of the model's taxonomic apparatus and substantive propositions would be inappropriate here, the essential thrust of its main arguments should be briefly summarized in order to prevent the discussion of change from becoming too abstract and disconnected from practical and historical problems. The overall proposition of the model is that as constraints on violent power have eroded as a result of the advance of science and technology, viable security orders are characterized by increasing social constraints on the employment of force. The material context is schematized in several dimensions, with violence interaction capability being the most important.33

In conceptualizing security structures, both at the unit level and at the system level, the neorealist dyadic conception of political structures as being either anarchic or hierarchic is augmented by a third ordering principle,
negarchy, which is present when both anarchy and hierarchy are constrained. This third ordering principle incorporates into the model the notion found in republican, democratic, federal, and constitutional theory about how practices of co-binding generate nonhierarchic and nonanarchic structures. Key historical examples of political systems ordered by this third principle include the early United States and the European Union. The nuclear arms control regime exemplifies it in a less fully developed form. With this conceptual apparatus the model incorporates both statist and nonstatist forms of political order and offers propositions on their viability of providers of security in different material contexts.

The unconstrained violent power historically associated with anarchy and hierarchy has been compatible with security in the past because of constraints provided by the material context. Over the past several centuries, as the advance of science and technology has produced a material environment of increasingly abundant violence capability, anarchy and hierarchy as well as the anarchy-hierarchy combination of the state system (islands of hierarchy in a sea of anarchy) have become increasingly dysfunctional.

In order to apply this model to historical cases, four broad historical periods (premodern, early modern, global-industrial, and planetary-nuclear) are delineated on the basis of the material capabilities dominant in each. In the global-industrial era (approximately from 1850 to 1950), the model hypothesizes that the anarchic state system was dysfunctional on a regional scale but viable on a global scale. The collapse of the European state system in the twentieth century vindicates the expectations of the model, as does the emergence of the global state system with continent-sized great powers. In the planetary-nuclear era, the model hypothesizes that the anarchic state system is dysfunctional and that only a system-level negarchy is functional. The gradual emergence of the nuclear arms control regimes provides a partial vindication of this hypothesis.
This proposition does not challenge the core claim of realism about anarchy but rather sets it in a historically dynamic material context. Full anarchy—the "state of nature"—has always been recognized by realists to be a security dysfunctional situation. What neoclassical geopolitics adds is that the size of the area in which anarchy is security dysfunctional has been successively increasing, and with the advent of nuclear explosives and ballistic missiles, it has come to encompass the entire planet.

The Nature and Sources of Change

With the essentials of the neoclassical geopolitical argument now sketched, it is possible to turn to the more specific question of how this understanding of world politics conceptualizes change in world security politics.

Change and the Crisis of Naturalist Theory

If the forgotten functional-structural materialist strand of geopolitical theory offers a theory of unit and system genesis, then its understanding of change is central to its appeal. Before turning to an explication of the specific ways in which functional security materialism deals with change, it is useful to review briefly the issue of change in the evolution of naturalist and materialist social theory. The greatest limitation of the early naturalistic theories of politics was their limited ability to explain historical change. Nature and society were conceptualized in either static or cyclical terms, and as a result such theories had great difficulty in explaining noncyclical change. Because nonhuman nature changed rarely and slowly—if at all—naturalist theories were at a loss to explain historical differences between institutions located in the same place. As Hegel, with uncharacteristic directness, noted, "Nature gives the Greeks, but history gives the Turks." Naturalist theories could make plausible explanations for variations across space but not time.

Beginning in the late eighteenth and unfolding in the nineteenth century, there began in the West a broad intellectual effort to explain noncyclical change in nature and human life. This tendency is visible in the geologists' efforts to explain the changes in the newly discovered "deep time," Hegel's dynamic idealistic historicism, Darwinian and other theories of biological change, the political economists' theories of economic growth, and the sociologists' efforts to understand change in social structures and revolutions. As is so often the case, the way was led by natural scientists who conceptualized noncyclical patterns of natural change. Geologists and biologists, who obviously could not explain aeons of change in the earth and its life forms as the result of human development, began to uncover a broad range of processes of natural change. Nature was found to have a history.
In the human sciences the dominant tendency was to look for the source of change outside of physical nature and in the development of human institutions and culture. The most pronounced such nonmaterialist was probably Hegel, who attempted to explain all human change in essentially idealistic terms as the dialectical unfolding of “spirit” (Geist) becoming progressively more conscious of itself. The main tendency within modern social science is to discern patterns and laws that are intrinsic to human institutions.

But not all social theorists abandoned naturalism. Many theorists, inspired by Darwin, sought to modify naturalist theory rather than to discard it. They took a different approach from the main tendency within Western social science in attempting to advance beyond the impasses of naturalist theory. Their response to the limits of static and cyclical naturalist theories was to incorporate technology—which changes—into their concept of the base or physical environment. They present an image of a *mutating* nature as the source of change in human arrangements. Or, to put the same point somewhat differently, the nature exogenous to human control changes via technological development. This idea of “nature changing through technology” is at the heart of the historical-materialist project of explaining historically variable political outcomes by reference to changing material forces.

*Technology as a Source of Change in Materialist Theory*

The realization that technology constitutes a change in nature as it presents itself for human purposes helped to deal with the problem of change, but in doing so it seems to have undermined the basic thrust of naturalism that a reality exterior to human intent and design intrudes into human affairs and decisively shapes them. How useful is it to speak of technology as “natural” or “like nature,” when humans seem to have such a major role in creating and directing technology? The prevalent view among contemporary international relations theorists is that technology is primarily derivative of human and political choice and that technology is socially determined rather than socially determining. Thus the key to restoring the plausibility of geopolitical theory rests upon a modified version of technological determination.58

One solution to this puzzle is simply to attribute a reciprocal or “dialectical” relation between technology and humans. Obviously without humans there would be no technology, and human institutions shape many aspects of technology. This is to say that the base or infrastructure is at least in part determined by the superstructure, that the relationship of causality runs both ways. However, it is the hallmark of all historical materialism that the base determines the superstructure more than the superstructure determines the base. If in fact the relationship between the base and the superstructure
is essentially reciprocal, then the basic assumption of the materialist approach is wrong.

The plausibility of the materialist characterization of technology in naturalist terms can be greatly strengthened by distinguishing several quite distinct phenomena that are often conflated as “technology.” It is useful to distinguish between scientific research, scientific knowledge, technology, and technics. Broadly speaking, scientific research is a process of seeking and validating claims about nature. Scientific knowledge is the set of truths about nature discovered by scientific research. Technology, strictly speaking, is engineering “know-how,” a practical knowledge of how natural principles can be put to work or harnessed to perform certain tasks. Technics are the actual tangible machines, apparatuses, and devices that are the product of labor and technology applied to natural resources. Scientific knowledge and technological know-how are intangible systems of symbols, whereas technics have materiality and can directly interact with nature. Another important difference is that scientific and technological knowledge diffuses, whereas technics have (or, in some cases, lack) mobility. Many of the effects commonly attributed to “technology” are really the effects of “technics.”

Given these distinctions, there are three main ways in which scientific-technological phenomena may accurately be thought of as standing, like nonhuman physical nature, as significantly outside of human control and as a material structure to which humans must adapt. First and most important, the features of nature that science apprehends are not of human creation or subject to human alteration. Thus the discovery of some new feature of nature is in reality a change in the human environment, much like the discovery of a new ocean or mountain range. Recent scholarship in the history of science has emphasized how social context determines scientific activity. Which questions are posed, which research projects get funded, and even which conceptual frameworks natural scientists employ in framing their investigations are heavily influenced by the social and cultural milieux. And with the expansion of corporate and governmental support—and direction—in scientific research, the haphazard influence of the social milieu has been replaced by conscious policy. There is, however, an inescapable limit to the social determination of science. Humans may control, with increasingly conscious awareness, the rate and direction of scientific research, but they do not choose and cannot change the features of nature discovered by science. For example, the decision to equip Columbus’s expedition into the Western ocean was, like all acts of statecraft, the product of human factors and choices. However, what he found—a “new world” rather than islands off the coast of Asia—was not shaped by his milieu, and it would have been the same regardless of the human milieu from which the explorers came. Scientific research finds natural realities that may or may not fulfill social priorities.
Second, the human environment, once changed by the advent of scientific knowledge and technical know-how, cannot easily be returned to its previous state. Because scientific knowledge and technological know-how are both information, it is very difficult to reverse or eradicate them. New realities of nature and know-how rarely disappear, unless they are supplanted by some newer version of scientific knowledge or technological know-how. History does provide examples of forgetting, such as the loss of knowledge about siege machines in Western Europe after the fall of the Roman Empire, or the loss of the formula for the Byzantines' 'Greek Fire.' Loss of knowledge was much more likely to occur in premodern times, when it often was a craft secret held by a few individuals and was unconnected to systematic science. In contrast, modern scientific knowledge and technology is widely disseminated and capable of being regenerated due to its systematic character. Barring a massive civilizational collapse or regression, there is little prospect that any substantial body of modern scientific or technical knowledge will cease to exist.

Third, technics, once built, are for human purposes like objects of nature. Their scope of potential consequence is set by their physical features and their interaction with their environment rather than by the intent or purpose of their makers or users. Technics do not have to be built, and once they are built they can be destroyed. But while in existence, technics are part of the physical world, and their consequences are bound by natural physical laws as well as human choices as to how to employ them. An example of this is provided by Arnold Toynbee, who noted that the Roman system of roads, which were built to expand military mobility, were as useful to the invading Germanic tribes as they were to their builders. Because of the material characteristics of technics, the theoretical apparatus of geographical materialism may be extended to encompass them.

The range of human institutional choice for technics is different from that for scientific and technical knowledge. Humans have more choice about whether there will be a particular technic than whether there will be a unit of scientific or technical information. Technics are produced by humans and can most assuredly be completely destroyed by humans if they so desire. In contrast, technology in the sense of knowledge about the ways in which the physical world can be manipulated is much harder to eradicate or control. Particularly when based upon science, technological know-how presents itself to humans more as a fact of the natural world than of the social world. Thus, for example, the discoveries of scientists and the inventions of technologists that make nuclear explosives possible are similar to a discovery of geography: Once revealed, knowledge of such features of nature permanently changes the opportunities and constraints of human groups.

Because functional security materialism posits that technological possibilities have a great impact upon human institutions, it is essentially an argu-
ment for "technological determinism." Recent works on international relations and technology by Barry Posen, Matthew Evangelista, and others have argued against "technological determinism," by which they mean that if a technical capability is possible or feasible, then it will be developed and/or used.42 This image of technological determinism is something of a straw man, however, for despite occasional rhetorical proclamations of this sentiment,43 it is hard to suppose seriously that any device that can be built will be built. In contrast, the functional-structural materialist model posits that the emergence of a significant new violence capability will either cause a system change or a crash—a system breakdown.44 If a violence technology significant for security emerges and does not generate either an institutional adjustment or a crash, then the security materialist model would be falsified.

To sum up on the question of nature and technology, the security materialist model posits that natural forces—particularly geography and technology—have an objective reality outside human intent or desire. These material forces present obstacles and opportunities for human institutions as they pursue the long-standing and basic goal of providing physical security. As these material circumstances change, the nature of functionally viable security practices and structures changes. Whether functional practices and structures emerge or whether the system suffers a dysfunctional security crash is not determined by the main propositions of the model.

Functionalism, Punctuation, and Path Dependency

Functionalist theories that hold that structures are adaptations to changing environments recently have been challenged by theorists of "path dependency" and "punctuated equilibrium."45 The essential notion of rapid change was noted by the geopolitical theorist Frederick Tegart46 early in the twentieth century but has reentered social theory from evolutionary biologists, who developed these concepts to supplement the gradualist models of change in Linnaeus, Lyell, and Darwin with one in which rapid changes are driven more by random and contingent factors than by actual variations in the adaptability of different organisms. These modifications in evolutionary theory were introduced to explain the results of catastrophic perturbation of ecosystems by exogenous geophysical intrusions (e.g., asteroidal collision or intense volcanism) that wiped out numerous forms of life, clearing the way for other, previously marginal species that were not intrinsically more adaptive than those they succeeded but were simply fortunate to be at the right place at the right time.47 If the exogenous material forces shaping world security orders make themselves felt in a similarly punctuated pattern, then the resulting institutional forms may have little or no real adaptive or functional advantage over those they replace, and the functionalist logic of security materialism is compromised.
The pattern by which changes in the forces of destruction affect security-providing institutions is significantly unlike the punctuation in evolutionary biology in two major ways. First, a new technological possibility or geographical discovery may arrive upon the political scene quite suddenly, but it remains a permanent part of the material environment to which security institutions must adapt. In contrast, geological or cosmological intrusions in ecosystems inflict their damage and then in relatively short order the geophysical environment returns approximately to its previous state (see Figure 5.3). Institutions are confronted with multiple occasions on which to respond to the imperatives of a new material environment, and this ensures that random and contingent factors play less of a role than the intrinsic adaptability of different institutional forms. Second, the adaptive potential of biological organisms is governed by their genetically based morphology, and organisms do not, contrary to Lamarckian theories, pass new behaviors to their offspring. In contrast, the adaptive potential of human societies is, except in very broad ways, not dictated by genetic endowment and can be transmitted to other humans without alterations in physical human morphology.

There is, however, another way in which temporal factors may deflect the impact of material forces. When technological succession is rapid, new security problems may crowd out previous ones before they have fully shaped practices and structures. Once introduced, new technologies persist, but they may be superseded by other technologies. Thus it may occur that institutions have not completed their adaptation to a new material environment before they are pulled and pushed in altogether different directions. Rapid succession and truncated adaptation occurred, for example, when the development of nuclear explosives and the other associated technologies that define the planetary era appeared on the world scene before the effects of the previous global industrial technologies had been fully registered.

**Progressive, Sequential, and Developmental Change**

As thus sketched, it is clear that neoclassical geopolitics has a conception of historical progress and repetition quite different from that of most realists. Like liberalism and Marxism, neoclassical geopolitics holds that history has a progressive or cumulative character. The far more typical view among realists such as Thucydides, Morgenthau, Wight, Gilpin, and others is one of history as cycles, a pattern thought to reflect human nature and institutional patterns derived from it.

The geopolitical approach sees progress, not cycles, but does not fully reject the pessimistic or tragic sense of realism. History does not repeat itself, but it is not necessarily getting better. History has direction simply because there is a cumulative increase in scientific knowledge and technological capability. Neoclassical geopolitics denies that history is coming closer to a
MODEL A:
SELECTION ON THE BASIS OF FUNCTIONAL ATTRIBUTES
PUNCTUATIONS PRODUCE NEW ENVIRONMENTS
THAT PERSIST UNTIL NEW PUNCTUATIONS

MODEL B:
SELECTION ON THE BASIS OF NONFUNCTIONAL ATTRIBUTES
PUNCTUATIONS PRODUCE NEW ENVIRONMENTS,
BUT THESE QUICKLY RETURN TO THEIR PREVIOUS STATE

FIGURE 5.3 Two models of punctuation and functional adaptation
realization of mankind's "ideal" or "true" nature, as it is for many liberals and Marxists. For neoclassical geopolitics, historical change occurs because science and technology alter nature, but nothing guarantees that these new constraints and opportunities will improve the human condition, or that humans will be competent enough to seize the opportunities and compensate for constraints. The agnostic stance of neoclassical geopolitics toward Enlightenment meliorism separates it from the mainstream of modern liberalism and Marxism. Marx's claim that mankind "inevitably sets itself only such tasks as it is able to solve" betrays an unfounded Enlightenment optimism not shared by neoclassical geopolitics. It is perfectly possible that further human exploration of nature will reveal potential capabilities of destruction so extreme as to defy plausible institutional control. Scientific and industrial advances have altered the human situation by increasing available power capabilities but have not guaranteed a corresponding increase in human self-control.

Although neoclassical geopolitics posits that history is driven by a cumulative alteration of the forces of destruction, the relationship between the different stages is sequential, not developmental: The security institutions of one epoch are not necessarily developed or unfolded out of prior ones in any tight or essential fashion. Rather, the institutions of one stage stand or fall in relationship to the material context of that age. In seeing the relations between subsequent stages as sequential rather than developmental, security materialism is closer to the theorists of the Scottish Enlightenment than to Hegel and Marx. Hegel's concept of succession is completely developmental, with internal contradictions and tensions in one phase giving character to subsequent ones, and Marx usually characterizes successive economic modes in a similar fashion, with resolutions of contradictions in earlier phases defining subsequent ones. More consistent with materialist approaches, Adam Smith, John Millar, and Adam Ferguson suggested that successive stages had little developmental relationship with one another.

Although the relationship between successive security modes is not developmental, history does not begin anew with a tabula rasa when material contexts change. Important continuities between stages may exist because anomalous and marginal practices and structures from one stage may prove to be viable in a subsequent context, and parts of the dominant mode of one era may be preserved and reused as part of a quite different mode. Also, the rate and ease of adaptation of security practices to a major change in material context may be significantly affected by the presence of such marginal and anomalous practices inherited from previous eras.

**Transitions and Contradiction**

The primary propositions of the neoclassical geopolitical model concern the functional fit between material environments and security orders. These
propositions are verified either by the emergence of security orders hypothesized as functional or by the occurrence of a crash. But the difference between an adaptive transition and a maladaptive crash is of great practical importance. To provide insight into this important aspect of change, a set of ancillary propositions is advanced. The ancillary propositions concern the probability of particular societies' successfully adjusting by producing practices and structures fitted to particular new material environments. The primary and ancillary propositions of the model are thus very different in kind. The primary propositions specify what must be done to be secure in a particular material environment, whereas the secondary propositions specify the factors shaping the likelihood of successful or unsuccessful adaptation. In presenting these propositions I will illustrate them with reference to developments during the planetary-nuclear era.

Transitions: Crashes, Lags, and Adjustment

When new material forces emerge, an existing set of security practices and structures may either persist, crash, lag in adjustment, or adjust. The determinants of crashes, lags, and adjustments are varied, calling into play aspects of a social system directly related to security, more general societal capacities to solve problems, as well as the features of the new material forces themselves. When a new set of material forces of destruction emerges, it is logically possible that the practices and structures congruent with its requirements will already exist (in effect prefitted), in which case adjustment requires no change and crash is highly unlikely. Of much greater concern are situations in which the practices and structures functionally viable in a new material context are significantly unlike those viable in the preceding period.

Eight factors determine whether a particular set of security practices and structures is prone to crashes, lags, or adjustment: (1) inheritance diversity (the character of the practices and structures produced in the preceding era that form the starting point from which adjustment must proceed); (2) embeddedness (how interconnected security practices and structures are with nonsecurity practices and structures); (3) militarization (when the military arm has subordinated the entire polity or achieved subsector autonomy, or when the populace at large has been militarized); (4) democratization (the extent to which security policy is accountable to the public); (5) learning and innovation capacity (ability to interpret and correctly understand new situations to develop new practices and structures); (6) social memory capacity (the ability to formulate, preserve, and widely inculcate authoritative social understandings); (7) distinctiveness (how different violence capabilities are from those prevalent in civilian society) and potential for reclusion (how easy it is to keep violence capabilities hidden from civil society); and (8) dysfunction acuity (acuteness with which dysfunction is experienced).
The first factor shaping proneness to crash or adjust is the diversity of inherited security practices and structures. An inheritance that is highly homogeneous will be much more prone to crash or lag than a diverse one. A diverse inheritance greatly increases the likelihood that some existing practice or structure will be at least partially fitted to the new material environment. Inheritance diversity can vary widely, but it is likely to be lower when the inherited security order has existed for long periods, and so a set of material forces that lasts a relatively short period of time before being superseded by another will yield an inheritance of practices and structures with components that had survived from a preceding period. The inheritance of the global-industrial era to the planetary-nuclear era was diverse because of the shortness of the global era. The partially hegemonic structure of the United States was dysfunctional and declining in the global-industrial era but has contributed to adjustment in the planetary era.

The second factor shaping the likelihood of a successful and rapid transition of security practices and structures to a new material context is the extent of the embeddedness of inherited security practices and structures. Highly embedded security practices and structures have greater staying power and lesser adaptability than those less heavily embedded. All else being equal, embeddedness is likely to be greater in a superstructure that has had a long time to take shape, but embeddedness can vary greatly regardless of duration, and its extent hinges more directly on whether the security practices and structures of a particular era lend themselves to integration with other factors. Throughout the Cold War, the embeddedness of military organizations in both the United States and the Soviet Union was high, and this impeded successful adjustment to the new material environment of the planetary-nuclear era.

The third factor is the extent of militarization. Militarized polities are prone to crash and lag. Autonomous militaries are likely to be slow to adjust because the power of dominant social actors hinges on particular orientations to violence capability. Both the United States and the Soviet Union had strong traditions of civil control of the military, but because of their sheer size and complexity, superpower militaries had some autonomy. The militarization of the civilian population was high in both countries during World War II but faded rapidly after the war, and neither country glorified violence, as did fascist states. Taken together, these features made successful adjustment more likely.

Fourth, the extent of political and social democratization also helps to define probable outcomes. In more democratic political orders adjustment is likely to be more rapid. Democracy is linked to adjustment through legitimacy. All else being equal, dysfunctional security practices are likely to be perceived as illegitimate by the general body politic because they undermine the fundamental security interests of the consumers of security services.
Democratization was highly asymmetrical in the nuclear era, but at key junctures, such as during the early 1980s, Western publics were an important constituency for arms control.

The fifth factor shaping capacities to adjust are social capacities to learn and innovate, which are correlated with modernity. The best simple index of these capacities is modernity, characterized by the prevalence of scientific, rationalistic, and instrumental approaches to problem solving. The scientific orientation encourages testing and experimentation; rationalism encourages actors to weigh evidence and better assess causes and consequences; instrumentalism helps adjustment because of its problem-solving focus. Highly modern polities have "learned to learn." Converting new knowledge into new practices and structures requires reforms and innovations, and modern societies are engaged in ceaseless efforts to adjust practices and governmental capacities to solve problems. Because both the United States and the Soviet Union were highly modern, they had high learning and innovation capacities, and this made successful adaptation to the security imperatives of the nuclear era more probable.

The sixth factor shaping the adaptability of societies to changes in material contexts is social memory capacity. Social memory, like learning and innovation, involves social cognition—information, knowledge, and symbols—but societies adept at one are typically poor at the other. Highly modern polities have very high capacities for cognitive memory, with immense capacities for preserving information (particularly scientific and technological knowledge that is logically integrated and situated in specialized organizations). But highly modern societies have very low social memory capacities because they lack authoritative mechanisms for encoding and transmitting social knowledge from one generation to another through rituals, ceremonies, narratives, initiations, and venerated elders. In highly modern societies undergoing rapid technological and institutional change, the experience of one generation seems irrelevant to the next, the old is suspect, and novelty is prized. The institutionalization and professionalization of history provide the basis for sounder lessons from the past to be drawn, but the sheer volume and range of accumulated historical information induces informational overload and historical relativism and impedes the simplifications and elisions necessary for authoritative social knowledge to emerge. In contrast, premodern or partially modern societies change more slowly and maintain abilities to encode and transmit authoritative knowledge between generations. They learn little, but they forget little that they do learn. The weak social memory capacities of highly modern societies means that nuclear learning is less likely to become part of social memory. What might be termed "nuclear forgetting" is thus an important factor impeding adjustment.

The seventh factor affecting probability of adjustment is the distinctiveness of the new forces of destruction and the possibilities for reclusion cre-
ated by high distinctiveness. Distinctiveness shapes not only the kind of security practices and structures that are functional but also the probability that functional forms will emerge. Highly distinctive forces of destruction impede rapid and successful adjustment because they are subject to reclusion—that is, they can readily be kept “out of sight” and thus “out of mind.” When capabilities are highly distinctive and reclusion is practiced, their dysfunctional character remains hidden until the actual dysfunction of a crash or near-crash occurs or until their reclusion has been explicitly countered. Nuclear and space capabilities are highly distinctive and lend themselves to reclusion, thus making successful adjustment less probable.57

Eighth and finally, dysfunction acuity shapes proneness to crash, lag, and adjustment. Dysfunctions may exhibit themselves in either a chronic or an incremental fashion. When dysfunctions are chronic they pose continuous costs and are highly visible to wide segments of a society, and so they are likely to stimulate incremental change. Conversely, dysfunction manifesting itself in infrequent and acute forms is likely to stimulate more episodic and sudden adjustments, or—if the dysfunction is acute enough—crashes. Dysfunction acuity is very high in the nuclear era, and this makes successful adjustment less probable.

This brief analysis of the salient factors shaping the probability that a society will successfully adjust to major changes in the material environment demonstrates the diversity and complexity of the forces at play. Applied to the case of the planetary-nuclear era, these factors point toward sharply conflicting outcomes, with some of them facilitating and some impeding the probability of a successful transition.

**Lagging Adjustment and Contradiction**

Established security practices and structures tend to persist, and adjustments to new material environments are never instantaneous. For the core propositions of the security materialist model, what matters is what eventually happens and whether the model postulates the outcome. However, in the nuclear era the long term is not yet here, raising the crucial epistemological and methodological question of how dysfunction short of a crash can be identified today. The neoclassical geopolitical model posits that practices and structures that are not in adjustment to their material context are in a state of misfit, or fundamental contradiction. The four main empirical indicators of such an important contradiction are disproportionalitY, superstructural incoherence, disengagement, and reversal.

Disproportionality occurs when a small cause produces a large consequence. In security orders, the most telling sign of disproportionality is when a small crisis triggers a major upheaval. In Gilpin’s analysis of lagging adjustment and contradiction in hegemonic systems, the ability of a small
crisis to trigger a hegemonic war signals the existence of a contradiction between the role of a hegemon as the source of systemic order and the material capacities of the hegemon to sustain its role. Similarly, in the security materialist model, the existence of a fundamental contradiction is indicated when crises over minor matters trigger major changes in practices and structures.

Superstructural incoherence occurs when the components of a security order, particularly practices and structures, cease fitting or working together. Some incoherence is an inevitable part of all human affairs, but when the major elements in a security order that previously operated as a functional system cease to do so, a contradiction is indicated. Such incoherence manifests itself in several ways: Actors find themselves increasingly compelled by circumstances to say one thing while doing another; established behavior patterns begin to yield counterproductive consequences; anomalous behavioral patterns and structural components begin to take on a more important practical role, but are discordant in juxtaposition with more established components; and traditional political coalitions are disrupted and disintegrated.

The experience of incoherence can be an important stimulus to change—both functional and dysfunctional—in institutions and patterns of behavior. Incoherence produces tensions as components come under stress. A small cause can produce large consequences as pent-up tension is released. The behavior of actors can become deroutinized and more volatile. Incoherence also imposes psychic burdens upon the actors, and in order to make sense out of contradictory situations actors may embrace schizoid beliefs and doctrines or irrational doctrines that rationalize discordance. Actors may also respond to incoherence by intensifying their obsolete behavior patterns. Such intensification occurs when actors conclude that failures and problems should be met with more forceful application of the old approaches rather than change in them. This may take the form of the hypertrophic expansion of the capabilities that are implicated in the maladjustment.

A third indicator of fundamental contradiction is disengagement, which occurs when actors suspend old practices and instead rely upon ad hoc solutions to problems. Although signaling contradiction, disengagement also entails an element of adaptive behavior, as the actors have learned enough about the new circumstances to cease relying upon the old practices, even if they have not yet fully replaced them with more suitable ones. Previously functioning structures take on a façade-like character as they become disengaged from the functional demands that gave rise to them. Disengagement may also occur within ideologies and their associated theories. Theoretical discourse reflects disengagement when idealistic theories become more prevalent and when theories emphasizing functional and generative
processes decline. Dissociation of structures from their functional roles is reflected in and legitimated by theories that take particular structures as inevitable or desirable in themselves. Such theoretical discourses accompanying disengagement have the tendency to retard adaptation by inducing actors to discount performance factors, to the degree that is possible.

The fourth indicator of fundamental contradiction, reversal, occurs when the components of a system that previously functioned in one way come to serve completely different, perhaps even opposite, roles. In its simplest form, reversal occurs when governments find themselves doing the opposite of what they formerly did for old reasons and goals, or doing new things for old reasons. The previously taboo is embraced, at least in practice, as necessary, while previous necessities become passé. Reversal also is present when substantive and symbolic roles are transposed, and when previously marginal or anomalous structural features are relied upon to serve central functional roles, while the previously central structures, roles, and procedures lose their relevance without disappearing. Reversal is also in evidence when political coalitions begin to take fundamentally new forms, particularly when vanguard coalitions crystallize across previously stark divides.

Reversals are strong evidence for the existence of a fundamental contradiction, but they also indicate substantial movement toward the resolution of the contradiction through the emergence of new practices and structures. New security orders are rarely built de novo but instead often take components of the old system, reconfigure them, and combine them in new ways. Like the stones of an old city, serving in one era as columns to a temple and in the next as pieces of a wall or road, social-structural components are reemployed and reshaped for new purposes in new contexts. Reversals indicate the recasting and rehabilitation of previous components into a new security order, and they make it possible to discern empirically, rather than only deductively, the contours of a newly viable security order. Every contradiction points toward a resolution (even if it is one beyond the ability of the actors to achieve). Reversals indicate more clearly than incoherence and disengagement evidence not simply of maladjustment but coalescing patterns of adjustment.

Conclusions

In order to contribute to an improved theoretical understanding of change in world politics, this essay has sketched the approach to change found in geopolitical theory. The refined and reformulated version of geopolitics outlined here offers to fill an important gap in realist theory left by the incompleteness of neorealist structural theory. Neoclassical geopolitics differs from neorealist theory in that it seeks to explain what neorealist assumes—
the existence of states in anarchy. This recast version of geopolitics gains greater purchase on the phenomenon of fundamental change by recovering the functionalist and materialist dimensions of earlier geopolitical theorizing that neorealist theory had dropped. The neoclassical geopolitical model also complements the neorealist variable of distribution of power, with an analysis of the consequences of variations in the composition of power. The neoclassical geopolitical model also advances beyond the division of international relations theory into competing realist and liberal schools. By recovering and rehabilitating the notion found in Montesquieu and other early naturalist and geopolitical theorists that liberal security practices and structures are—like statist ones—functional in some material contexts but not others, realist and liberal insights are combined into one model.

Early geopolitical theory offered many particular insights, but for a variety of sociological and conceptual reasons it never coalesced into a disciplined and social-scientific set of propositions. Early geopolitical theory also tended to have a highly reductionistic and deterministic view of politics. Reformulated geopolitics redresses these failings by placing human agency back at the center of security politics while still insisting that material contexts constrain in very significant ways the ability of human agents to fulfill their fundamental natural need for security from physical violence. Neoclassical geopolitics thus restores the practical value of international relations theory. In setting forth what must be done to be secure in given material context, geopolitics sets forth clear practical goals while leaving the question of whether what must be done is in fact done to the free play of political choice.

Notes

5. Kenneth Waltz, Man, the State, and War (New York: Columbia University Press, 1954). None of the leading global materialist thinkers appear in Waltz's index. The recent effort by Robert North and others to conceptualize a "fourth image" of global-level analysis is an attempt to respond to this theoretical lacuna. See Robert North, War, Peace, Survival (Boulder: Westview Press, 1990).

8. It is notable, however, that Gilpin's brief consideration of system change points extensively to geographic and technological factors. See his *War and Change in World Politics* (Cambridge: Cambridge University Press, 1981), pp. 56–66.


11. Many other commentators as well have noted the confused status of the term "geopolitics." Ladis Kristof has summed it up accurately in lamenting that "it is very difficult to give a definition of today's geopolitics." Kristof, "The Origin and Evolution of Geopolitics," *Journal of Conflict Resolution*, vol. 4 (March 1960):20. Somewhat more charitably, another writer has found diversity in this confusion: "Geopolitical analysis is a manifold phenomenon, ranging on scales from reductionist and determinist 'theory' to awareness of the geographical factor in strategy, and from highly politicized partisanship to a fairly noncommitted mode of analysis." Oyvind Osterud, "The Uses and Abuses of Geopolitics," *Journal of Peace Research*, vol. 25, no. 2 (1988):198.

12. I have omitted the new literature of "critical geopolitics" and "most-modern geopolitics" because the main thrust of this literature is critical of geopolitics and is radically antimatierialistic. A major theme of this literature is that the constructs of geopolitical writers are not to be taken seriously as claims about reality, but rather as power-serving ideologies. For example, see Gearoid O Tuathail, *Critical Geopolitics* (Minneapolis: University of Minnesota Press, 1996).

13. The single best reconstruction of this tradition is provided by Clarence Glacken, *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century* (Berkeley: University of California Press, 1967). However, Glacken focuses most on theories of climate as a shaping influence, and says little about early theories of nature emphasizing topography, land-sea interactions, and arable land.

14. Although such theories have been neglected by political scientists, anthropologists have continued to develop them. See Marvin Harris, *Cultural Materialism: The Struggle for a Science of Culture* (New York: Random House, 1979), and Martin F. Murphy and Maxine L. Margolis, eds., *Science, Materialism, and the Study of Culture* (Gainesville: University Press of Florida, 1995).


17. "In part, social science has asserted its independence as a discipline by demonstrating the limited explanatory power of physical concepts of human behav-


23. The geographer R. D. Dakshiti has observed: “The reasons for the neglect of research in political geography and the resultant retardation of the sub-field during the post-war period, are not difficult to understand. With its blanket ban on generalization, theory and model-building in general, political geography became a much too dull subject. It was rendered a field of study that seemed to be devoid of any real academic challenge.” R. D. Dakshiti, “The Retreat from Political Geography,” Geography, vol. 17 (1981): 238.

24. Johannes Mattern also makes this distinction between “geopolitics” and “political geography”: “[W]here and when geographers extend their sphere of investigation to include the configuration of land and sea, and the relationship of both as factors of nation-building and of practical politics, but confine their endeavor to a purely analytical and descriptive treatment of the subject, they may be classed as political geographers. . . . [W]here they [geographers] proceed, ex cathedra, and on the authority of Science, to develop and propose rules of conduct and means of procedure for application by the state and by those conducting the affairs of the state, internal and external, then they are to be classed as geopoliticians.” Johannes Mattern, Geopolitik: Doctrine of National Self-sufficiency and Empire (Baltimore: Johns Hopkins University Studies in Historical and Political Science, 1942), p. 45.


27. The seminal texts are: Alfred Thayer Mahan, The Influence of Sea Power upon History, 1660–1783 (Boston: Little, Brown and Company, 1890); Halford J.


31. For an analysis of the full range of ways that Darwinian analogies were used to make arguments about international politics, see Paul Crook, Darwinism, War, and History: The Debate over the Biology of War from The Origin of Species to the First World War (Cambridge: Cambridge University Press, 1994).


37. For an overview of nineteenth-century efforts to understand change, see Peter Bowler, Evolution: The History of an Idea (Berkeley: University of California Press, 1983).

38. The view most prevalent among contemporary international relations scholars is stated by Robert Gilpin: “[W]hereas environmental factors such as climate and geography lie outside of state control, the technological environment is man-made, and a society will develop technological capabilities in order to gain an ad-


41. Toynbee later elevated this pattern to a principle of history: “Our survey has brought to light so many cases in which a brilliantly planned and magnificently executed system of public communications has ultimately been turned to account by unexpected and unintended beneficiaries that we may tentatively regard this tendency as illustrating an historical law.” Arnold Toynbee, A Study of History, vol. 7A, Universal States (Oxford: Oxford University Press, 1947), pp. 91, 703.


43. A rare example is Ralph Lapp’s claim that “the unremitting buildup of the atomic arsenal represents another example of the technological imperative—when technology beckons, men are helpless.” Ralph E. Lapp, Arms Beyond Doubt: The Tyranny of Weapons Technology (New York: Cowles, 1970) p. 173.

44. The distinction between technics and technology (science-based technical know-how) is key to understanding the logic of deep nuclear control regimes: All nuclear explosive devices can be dismantled, but the possibility of fashioning nature into nuclear explosives is effectively a permanent feature of the natural world in which humans live. Thus massively constraining nuclear explosive devices does not mark the end of the nuclear era but rather the emergence of practices and structures adapted to its actual imperatives.


46. “This alternative model, then, envisages the course of evolution consisting in (1) antecedent long periods of relative inactivity, stagnation, and fixity (during which slight, continuous modifications may occur without, however, leading to new forms), followed by (2) short critical periods during which forms undergo abrupt change in which they make sudden fundamental advances or submit to extinction.” Frederick Tegart, Processes of History (New Haven: Yale University Press, 1918), p. 149.

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ist images of change in biology and geology were derived from social theory, particularly from the thought of Karl Marx and Frederick Teggart.


50. Security materialism’s image of the relation of successive stages thus may be likened to that of grass growing between the cracks of the old order, rather than of a new order maturing in the womb of the old, and the type and relative plenitude of the grasses in the cracks of previous orders bears heavily upon the speed with which new forms will take root.

51. Although the security materialist model offers categories to schematize different material contexts, it offers no insight into whether one material context will be superseded by another, how rapid this sequencing will be, or how alike the problems posed by the new and old material contexts will be.


53. Here I use “learning” in the ordinary-language sense to refer to acquired knowledge, in contrast to Ernst Haas’s use, in which learning refers to adaptation based on a new knowledge that reality is different. See Ernst Haas, When Knowledge Is Power: Three Models of Change in International Organizations (Berkeley: University of California Press, 1990), pp. 1–50.


55. For the importance of ritual and ceremony in the constitution and preservation of social memory, see Paul Connerton, How Societies Remember (Cambridge: Cambridge University Press, 1989).

56. The existence of highly developed social memory capacity means that harms inflicted in the distant past have a long afterlife, providing fuel for conflicts to burn long after their actual causes have disappeared. Social forgetfulness contributes to peace by erasing memories of past grievances and struggles.
