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ECOLOGY, CULTURE, AND RATIONALITY: TOYNBEE AND DIAMOND ON THE GROWTH AND COLLAPSE OF CIVILIZATIONS

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Why civilizations have flourished—and more especially, why they have fallen—has recurrently challenged the analytic imagination of historians with philosophical inclinations. The extended pedigree of their efforts to answer such questions is lengthy indeed. It reaches back from Oswald Spengler’s Decline of the West through Edward Gibbon’s Decline and Fall of the Roman Empire to the 14th C writings of Ibn Khaldun and his Chinese contemporaries. In most respects, it can be said to include Augustine of Hippo’s City of God nearly a millennium earlier. Some eight hundred years still further back lie Plato’s speculations concerning the general causes of “corruption” of whole societies and Thucydides’s resolutely empirical description of societal breakdown in The Peloponnesian War.

In our times, the names of Arnold Toynbee and Jared Diamond belong on any short list of outstanding contributors to that tradition. Beyond dispute, their works have been distinguished by matchless chronological and geographic scope, by a plethora of stimulating hypotheses, and by their striking use of case studies to illustrate and test the universal laws they have formulated. Both have entered serious claims to have located basic structural patterns creating order within masses of data concerning whole civilizations, and they have both invested these patterns with overarching significance. No other contemporary historical analysts have more boldly addressed the most demanding aspirations of their predecessors in the field.

Both Toynbee and Diamond interpreted the challenges of civilizational analysis in its most comprehensive terms. With the publication of the first six of its twelve volumes in the 1930s, Toynbee’s A Study of History immediately became a landmark in the study of civilizations for this reason. Despite much criticism of sometimes startlingly personal savagery from more specialized professional historians, time has not dimmed the magnitude of Toynbee’s achievement in these volumes. No one before him had grounded the search for general patterns in the rise and fall of civilizations in a panoptic survey—typically in telling
detail — of every human society that had developed sufficient territorial span and cultural complexity to warrant that designation since the emergence of Sumeria as the first recorded civilization in history.

Awesome as the chronological reach entailed by that project had understandably seemed to his contemporaries, however, by the turn of the century it had failed to satisfy Jared Diamond.

In Guns, Germs, and Steel [1997] he contended that Toynbee’s choice of starting point in the late 4th Millennium BC for his analysis was too limited to “come to grips with...history’s broadest pattern” [Guns, 24]. Perceiving that pattern and grasping the issues it raised, he asserted, required moving the analytical point of departure eight millennia back to the conditions of global equality prevailing among human societies at the end of the last Ice Age. Unless historical researchers adopted this altered baseline, they could not hope to identify the factors that by the era of the early Sumerians had already enabled numerous societies across the Eurasian continent to reach levels of mastery in the domestication of plants and animals, in metallurgy, and in incipient forms of writing that the simpler societies of South America, sub-Saharan Africa, and Australia would not attain for many additional millennia [Guns, 35].

Diamond’s quest for comprehensive analysis has not stopped there. More recently, he has advocated extending historical investigations along the orthogonal axis of civilizational space-time beyond Toynbee’s self-limiting span. In confining his focus to the internal dynamics of the great historic civilizations, he argued, Toynbee had failed to discern fundamental determinants of the rise or the collapse of whole societies more readily observable in simpler, less structurally differentiated, more geographically isolated social systems, where such forces could be charted and measured more exactly, their interactions more fully modeled, the causal factors determining outcomes more convincingly ascribed.

In Collapse [2005], the successor volume to Guns, Diamond showed how Greenland, Easter and Mangareva Islands, Papua New Guinea, New Mexico’s Chaco Canyon culture, Madagascar, and the African heartland could be viewed as natural laboratories providing controlled comparisons facilitating the identification of variables critically affecting the fate of such larger, more complex, more frequently studied societies as China, Egypt, and the Roman Empire. A large landmass and population base can confer determinate benefits to a society, but the significance of size can be stated in relation to positions along
relatively uniform scales [Guns, 407-408]. Partly for these reasons, Diamond himself rarely refers to “civilizations” as such, although his analyses have clear and continuous implications for the writings of those who do.

Toynbee and Diamond can therefore be said to have shared to an exceptional degree an expanding commitment to comprehensiveness in their analyses. Their conceptions of how best to reach that end have little further in common. They differed from the outset of their respective undertakings in whether to look for valid explanations in spiritual states or in the chemical properties of material substances.

Toynbee’s nomination of the determining forces in the trajectories of civilizations—the forces embedded in creativity and mimesis, in “etherialization,” in the “idolization of ephemeral institutions”—were of a scale manifestly proportionate to the crucial transformations he identified within social units constituting “the largest intelligible fields of study”.

Diamond, on the contrary, has traced the unexpected consequences for civilizations revealed by micro-analysis of changes in pollen counts, in chromosomal distributions, and in upward trends of temperature of as little as 0.01 degrees per year. Toynbee clearly believed that civilizations formed a distinctive class of societies best characterized through their emergent properties; Diamond has searched for laws universally applicable to small and large societies alike. In these, among many other ways, their broader contentions emblematically embody the polarities—or at least the parameters—of contemporary discussions of the driving forces in macro-societal change.

**Humanism, Natural Science, and the Study of Civilizations**

When two such eminent contributors to a common subject can differ so categorically not only in their conclusions but in their conceptions of what questions are most productive to ask, in what terms to pose them, and where and how to look for answers, it seems safe to assert that a lifetime of contrasting professional identities and experiences has shaped their investigations. Comparison of Toynbee and Diamond in these terms confirms this supposition.

A more archetypal student of ancient civilizations than Arnold Joseph Toynbee would be hard to name. Educated in Classical history at the very select Winchester school and then at Oxford’s Balliol College, Toynbee first formulated his “challenge and response” theorem in the early 1920s while on a culturally-mandated pilgrimage through
landscapes intimately associated with ancient Greece. Classical Greece provided concepts—Xalepâ tà kalâ, mimesis, hubris, nemesis, koros, palingenesia, pammixia (translation of which he appears to have regarded as unnecessary for the presumed readership of his Study)—giving structure and precision to his subsequent exposition of the turning points of civilizations; Classical mythology gave them cosmic significance.

Yet for him, as for so many Oxford graduates of his era, the needed complementary pole to this Hellenism was Christianity. The Levant of the Bible furnished a natural setting and point of reference for many of his most fine-grained analyses of religious sects, mercantile strata, and wars; and when, during the composition of his later volumes, his alternate role as Director of Studies at the Royal Institute of International Affairs in London exposed him ever more starkly to the darkening European political landscape of the late 1930s, the language of Christian eschatology came to seem to him a suitable vehicle for conveying the schisms of the soul accompanying civilizational decay.

Although he traveled across Eurasia to the Far East in the early 1930s and to Central and South America after his retirement in 1955, he acquired his knowledge of the civilizations of those lands primarily through his omnivorous reading. Given his conception of what constitutes a "civilization," it was perhaps predictable that he should have ignored the continent of Africa beyond its northern littoral; but that he should have given little more attention to Hindu India and Southeast Asia is surprising for a man who came of age during the peak years of the British Empire.

Toynbee's explanatory models reflect his broad historical training and literary cultivation. He assigned a central role in the growth of civilizations to the mimetic inducements of extraordinary individuals. He examined political institutions for unresolved tensions, religious doctrines for their fatal flaws. Toynbee's explanations derive their continued cogency from his sophisticated apprehension of factors he considered crucial to the case at hand—"marches" vs. interior location in one instance, technological innovation in a second, fissiparous leadership in a third, the in-built cruelty or hollowly secular pessimism of a culture where none of those factors seemed especially relevant. Like most historians, he borrowed freely from whatever disciplinary tradition best served his ends in the instant case, trusting to his literary skills to fuse his eclectically weighted explanatory variables into a richly coherent account.
Jared Diamond arrived at the study of civilizations in history by a far less probable route. It provides a contrast with Toynbee’s in almost every respect. A public-school product who currently teaches geography at the University of California, Los Angeles, he studied physiology and evolutionary biology before specialization in ornithology took him to Andean South American and then to Papua New Guinea. Living amid its tribes stimulated his interest in field anthropology; conversations with its villagers persistently raised for him the question of why the technologies and social institutions of small-scale societies composed of such manifestly curious, observant, intelligent individuals should have fallen so far behind those of the modern world outside. In *Guns, Germs, and Steel* he set out to answer this question.

Diamond’s project became one of notable audacity. His training as a biologist, together with his experiences in the field, led him to rule out innate differences in intellectual capabilities among racial and ethnic categories of human beings as explanations for differences in their social circumstances. He was equally convinced that citing such factors as religiously inspired resistance to change, the cultivation of martial ardor, or differing legal relations between states and the economic order to account for differing rates of modernization simply begged the question of why these cultural and institutional patterns manifested themselves more in some parts of the world than in others. They were at most merely proximate causes; and in any case the attempt to make use of cultural or institutional variables to explain differences in civilizational attainments was futile because in the long run the many factors cited in such explanations essentially canceled one another out.

“Prediction in history, as in other historical sciences,” he wrote, “is most feasible on large spatial scales and over long times, when the unique features of millions of small-scale brief events become averaged out” [*Guns*, 424]. In a stunning methodological declaration, Diamond therefore contended that “To the student of broad historical patterns ... it makes no difference what the specific reasons [for greater receptivity to and success in innovation in some societies] were in each case. The myriad factors affecting innovativeness make the historian’s task paradoxically easier, by converting social variation in innovativeness into essentially a random variable” [*Guns*, 254].

In two sentences Diamond dismisses by implication tens of thousands of pages on why societies differ among themselves in their cultures and institutions and how these differences affect the rise and fall of civilizations.
Yet societies do manifestly differ very greatly in the nature, degree, and range of their capabilities. How then are we to explain these differences? Diamond’s arguments appear to leave his readers with an insoluble puzzle. He is not content to leave them there. However, he is only willing to accept answers to the problem he has generated that remain consistent with his methodological canons and protocols. Drawing on his reflections as a student of evolutionary biology, but insisting on the biological unity of the human species, he contends that long-term emergent inequalities in levels of civilization both must and can be explained exogenously by strict reference on a uniform theoretical plane to objectively ascertainable differences in their material environments.

Thus the long east-west axis of Eurasia facilitated the diffusion of agricultural innovations across agricultural environments with similar growing seasons, while the north-south axis of the New World continents radically impeded such transmissions. Diamond’s meticulously exhaustive inventory of the availability and variety of domesticable plants and animals within contrasting geographical arenas similarly suggest why Mexican, African, and Australian aboriginal farmers lagged far behind their Eurasian counterparts, who likewise enjoyed greater cumulative immunity to contagious diseases through continued association with the disease-transmitting animals they had successfully domesticated.

This project sounds like a variant doctrine of geographic determinism, and to some extent it is. But Diamond is careful to dissociate himself from many elements of past theories of such determinism that had resulted in the discrediting of that entire enterprise. To begin with, he recognizes that unchanging features of the natural environment can have altered consequences as societies develop [Guns, 413-417]. He also makes no suppositions about the differentiating effect of topography or climate on the character of peoples. His works contain no equivalents to such cherished apothegms as montani sempre libri (i.e., “those who inhabit mountains are by their nature free”). Unlike Toynbee, he does not incorporate into his model such tautological and unmeasurable variables as the “stimulating” effects of certain climates, nor does he suggest that irrigation agriculture by itself generates centralized bureaucratic states (as Karl Wittfogel did in his Oriental Despotism).

Instead, as might be expected of a former physiologist concerned with the significance of the chemical properties of the physical world for human energy levels, he builds up his explanations through extremely precise, quantitative, testable propositions concerning the caloric
yield of alternative seafoods, the carrying capacity of llamas, and the factors restricting the possibilities for domesticating high-protein grasses in the southeastern forest lands of North America. As a geographer, moreover, he is primed to appreciate how radical fluctuations in Australia’s rainfall patterns from decade to decade prevented Australian aboriginals from developing the advanced agricultural practices that European settlers later imported to their cost.

It is from such building blocks, open to exact measurement, amenable to statistical treatment, subject to laws not derivable from human propensities and preferences, that he makes his case. The most fascinating passages in his two major volumes show that an astonishing number of conventional explanations for civilizational dynamics can be more convincingly and more economically restated in these terms.

Toynbee v. Diamond: Theoretical Crossroads and Their Implications

Comparative assessment requires as a prerequisite relevant similarities in what is to be compared. I propose to create the needed similarities for purposes of this analysis by grouping the causal factors in Toynbee’s and Diamond’s models into three categories: those emanating from humanity’s natural ecology, those consisting of cultural prescriptions, and those predictably resulting from the exercise of rational choice (i.e., of predictable choice, given the scale of preferences ascribed to the choosers, the state of knowledge and available means ascribable to them, and the exogenous constraints imposed on these choices).

Comparing Toynbee’s and Diamond’s works in these terms immediately reveals several striking conclusions. Both Toynbee and Diamond ascribe a leading role—in Diamond’s case, an exclusive role—to natural ecology in their explanations for the rise of civilizations [Toynbee, II, 1-73, 260-313; III, 3-22, 154-174; Diamond, Guns, entire; Collapse, passim].

In Diamond’s works, of course, there can be no doubt as to the preemptive centrality of differences in the natural environment as determinants of the marked lead acquired by the societies of the Eurasian continent over those located elsewhere on the globe: the very project of Guns in particular (the more paradigmatically ambitious of his two volumes) is to press for all it’s worth a naturalistic materialism as the sole source of explanations for such differentiation.

But Toynbee, too, devoted well over half his pages on the “genesis
of civilizations” to the significance of differing natural environments in human history. Indeed, the analytic concept through which Toynbee became best known to the lay world—i.e., “challenge and response”—was most closely associated with his (tautological) contention that the “response” evoked by the “challenge” of “hard” (but not “excessively hard”) natural environments constituted a primary motor force in the drive toward civilization.

As Toynbee turns to explaining the dissolution of civilizations, however, a most curious development occurs: the ecological factors that had served him so well in accounting for the rise of civilizations simply vanish from his analytic screen. The possibility that deteriorating natural environments could lead to societal collapse receives brief consideration at the very outset of his analysis [IV, 39-51], only to be dismissed as not an autonomous causal factor in itself but rather an outcome or symptom of social breakdown. Thereafter, natural environments have no role whatever to play in his remaining eight volumes. Consideration of resource distributions or material technology and its consequences fares no better. All such factors are displaced by long chapters devoted to analysis of the cultural lags and lurches induced by “the nemesis of creativity”, the idolization of ephemeral collective identities and institutions, the suicidality of militarism, the flight to “archaism” and futurism, and a corresponding growth of internal and external proletariats—a downwardly spiraling petrifaction of culture that ends with a path to salvation marked out by “the God incarnate in a Man” [VI, 259-277].

In near-complete contrast to Toynbee, Diamond keeps human interaction with natural environments having specified material properties and distributive patterns at the forefront of his explanations for societal collapse. Yet in a qualifying amendment of the rigorously materialist paradigm employed in *Guns*—an amendment signified by his inclusion of “How Societies Choose to Fail or Succeed” as a subtitle for his volume on *Collapse*—he shows a greater interest in examining the interplay of proximate causes with what he continues to consider the ultimate determinants of a community’s fate.

Thus he conducts at some length an examination of cultural inhibitions within the Greenland Norse community (e.g., the Norse refusal to eat fish like the despised Inuit instead of raising beef cattle for that purpose even as the latter undertaking became impractical with Greenland’s climatic shift in the 15°C into long-term cooling) and identifies vested interests (e.g., the refusal of the powerful Norse prelates to allow the reallocation of scarce shipping space from luxury items to the

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materials and tools needed for long-term survival despite the growing precariousness of ocean voyages in colder Arctic waters) to establish the proximate factors critically hastening the ultimate disappearance of the entire Norse community in the always-precarious natural environment of Arctic Greenland [Collapse, 266-276].

He also engages in close analysis of how informational thresholds (e.g., failure to perceive the prospects for rapid exhaustion of crucial nutrients in soils covered by lush tropical vegetation) can mislead cultivators beyond a point of no return, and how rational choice in bad social games help explain failures to correct courses of action having clearly destructive consequences (e.g., the continuance of over-fishing despite growing awareness of the depletion of fish stocks below replacement levels). And Diamond even acknowledges that arbitrary path determinacy (for example, the QWERTYUIOP typewriter keyboard layout still universally used despite its proven inefficiency) and purely idiosyncratic events (the successful braking of a huge truck just before it would have crushed Hitler’s car in the summer of 1930) can have crucial historical outcomes in the short run [Guns, 418-420].

Thus comparison in these terms reveals paradoxical theoretical progressions in precisely opposite directions in these two authors—toward a multi-tiered, multivalent explanatory model in Diamond’s writings, toward growing reduction to a single master variable in Toynbee’s.

These contrasting theoretical trajectories accompany similar trajectories concerning the relative importance assigned to rational choice and cultural conformity in their analyses. In Toynbee’s account of the rise of civilizations, his tale balances inescapable challenges with creatively chosen responses. As he turns to explaining the decline and disintegration of civilizations, however, the role given to creative choice contracts to insignificance, displaced by hardened, all-determining cultural convictions so mechanistic in nature that they can be plotted as three and a half beats on a graph. Once again, Diamond’s propositions propel his reader in the opposite direction. Lest the intersecting impacts of population growth, deforestation, and climate change come to seem like inexorable forces of nature, Diamond examines societies that reversed their destructive course; and while, in certain defined circumstances, individually rational choices predictably become socially destructive through the “logic of collective action”, he shows that this “logic” can often be offset through collectively-authorized intervention to change the rules of bad games [Collapse, 419-440].
Toynbee and Diamond: A Comparative Evaluation

In the concluding chapter of *Guns, Germs, and Steel*, Diamond enters a plea for brightening what he calls “the future of human history as a science” (*Guns*, 420-425). In doing so, he acknowledges that elements of complexity and unpredictability make human history importantly different from the universe the practitioners of such non-historical sciences as physics and molecular biology seek to capture in their theoretical nets. Even so, he notes the similarity of its challenges to those of astronomy, geology, paleontology, and the other historical sciences. The obstacles to the creation of a true “science” of human history are very real, he argues, but “the difficulties seem to me not fatal” (*Guns*, 421).

Toynbee likewise sought to discern general laws underlying the particularities of human history. How then do these two authors compare in advancing toward that objective? Let us consider their works in light of several widely endorsed criteria within the logic of scientific method:

1. *Simplicity*. Models that economize on required thought are intrinsically useful. All else being equal, paradigms that are confined to a single logical plane, that formulate problems in a manner systematically indicating starting and end points (i.e., Euclid’s celebrated *QED*), and that introduce their organizing propositions between these points in a transparently logical sequence are to be preferred to those that increase complexity by forcing readers to devise such choices for themselves in a context not defined by predictable rules. Especially in *Guns*, as we have seen, Diamond eases these tasks for his readers. He commits himself in various ways to principles that make clear why he will start his narrative when he does. He specifies the general rules that confine his search for explanations, where he will look for causal forces, on what terms his variables will combine, and at what point he will feel justified in bringing his inquiries to a close. Toynbee, too, has a clear (though more empirically defined) starting point. However, his eclectic selection of sources and forces soon complicates both his and his readers’ task, leaving the latter dependent on his conceptually unconfined historical insights to take them along paths of his choosing to destinations of his choice.

2. *Operationality*. Operational definitions reduce ambiguities in communication and provide necessary criteria for establishing the truth value of propositions containing them. Toynbee frustrates both ends in too many pages of his *Study*. 
Many of his most critically important explanatory variables lack independent indicators of their existence; instead, their presence and their causal force are established through the outcomes they serve to explain. Since the necessary degree of “challenge” to produce an effective “response” can only be known by whether civilizations do come into being as a consequence, Toynbee’s core explanatory mechanism for accounting for their emergence is an egregiously circular procedure. His subsequent analysis of “insufficiently” or “excessively hard environments” that thwart or “abort” the development of civilizations likewise depends heavily on the freedom he has given himself thereby. Since he provides illustrations but no operationalizing criteria for what can count as “routs” and “rallies” in his depiction of the downward trajectory of disintegrating civilizations, it is hardly surprising that he should prove successful in fitting his historical data to verbal curves depicting that process.

Diamond shows a natural scientist’s ingrained respect for the research canons that have been devised to avoid these problems.

3. Quantitative Precision. Diamond’s analyses are manifestly more quantitative in formulation than Toynbee’s. But more importantly, Diamond repeatedly demonstrates that such quantification is crucial to identifying the precise parameters governing continuation of a way of life. Quantification permits him to specify irreversible “tipping points” in changes induced by internal and extra-systemic pressure. It enables him to draw attention to the significance of cumulative totals of incremental changes that occur so far below perceptual thresholds as to require technologically-assisted observation. His quantitatively specified propositions tend also to induce greater rigor—i.e., tighter restrictions on what can be considered an acceptable range for answers resulting from applying the explanatory propositions of his models. Finally, and perhaps most crucially, quantification permits what political scientist Karl Deutsch has called “combinatorial richness” in his Nerves of Government [16]. Paradigms display combinatorial richness when they allow for models that generate new explanations within a common explanatory framework through moving up or down the scales of the model and through developing the implications of different combinations of the same variables.

Diamond relies heavily on such “combinatorial” possibilities in expanding his analysis in consistent terms, but with appropriate quantitative adjustments, from isolated fishing communities on oceanic specks of islands to the extended agrarian empires of China and the Maya.
4. **Scope of Analysis.** Other qualities being equal, models that demonstrate a capacity to bring a wider range of theoretically pertinent phenomena within their purview can be judged more powerful than those with a more limited reach.

Here Toynbee's work might be seen to hold an overall edge over Diamond's. His approach to the study of civilizations leads him to search for common patterns and interactions in the sources of creativity in the arts, in the impact of religious faith on political institutions, in technological innovation, and in the rigidification of manners and morality induced by incessant military ventures.

Diamond, as already noted above, declines to disentangle and assign individual weight to such explanations. But while bypassing these complex societal interrelationships provides him with a rationale for narrowing his focus to matters more comfortably contained within his materialist paradigm, it leaves him mute regarding a wide range of socio-cultural historical phenomena of intense interest to most students of civilizations. To be sure, he takes great care to show how biological and technological advantages enjoyed by Old World Eurasian societies over those of the New decisively foreordained the stunning success of Francisco Pizarro's *conquistadores* in their confrontation with the much larger indigenous forces of the Inca emperor Atahualpa in 1532 [*Guns*, 67-81]. Key elements of his model prove useful in accounting for why the Gutenberg “revolution” in 15th C. Germany proved so much more explosively consequential than the elegant printing system in use in Crete 22 centuries earlier [*Guns*, 239-241, 259-260].

Yet much of *Guns, Germs, and Steel* is devoted to the foundations of agricultural societies, and most of his second volume to expositing and accounting for the devastating consequences of ecological mischance and abuse. Bureaucratic petrifaction, currency inflation, otherworldly inspiration, and self-transcendence play little part in his narrative. As we shall see, this more restricted substantive focus encapsulates larger analytic issues we shall need to address separately.

5. **Organizing Power.** This property, in some respects the logical converse of the preceding, becomes manifest when theorists in a particular field of knowledge find that an approach developed in a seemingly “distant” field of knowledge has likewise improved their understanding of their own [Deutsch, *Nerves*, 17]. Growing recognition by economists of the convergence of Darwinian theories of natural selec-
tion with competitive free-market theories in economics provides an especially clear example of how confidence in a model can be strengthened by repeated demonstrations of its utility and validity in substantively unrelated fields of inquiry. As an extension of the criterion of "simplification," its merits are those of that principle. In both aspiration and achievement Diamond runs ahead of Toynbee on this count. By seeking explicitly—and with considerable success—to reconcile the core propositions in his model with the reasoning employed in rational choice theory (to take one of his examples), he adds to the grounds for thinking that his model can contribute to the goal of establishing "human history as a science".

6. Subsumption. Economizing on required thought is, as already noted, an intrinsically desirable property of any model. It follows that when, predictive accuracy being equal, one model can be shown to be a special case of a second, more general model, the second is to be preferred.5

Diamond's core claim—especially in Guns—is that explanations derived from his materialist paradigm suffice to account for many critical developments and turning points in civilizational history that previous historians (Toynbee among them) had explained through more particularized concatenations and conjunctions of causal forces. Thus Diamond can account for the Spanish annihilation of a vastly larger army of Andean warriors in terms that do not depend critically on psychoanalytically sensitive insights into the sources of Francisco Pizarro's resolute leadership of his small band of soldiers in a moment of crisis, nor on generalizations about a distinctively Iberian tradition of martial valor or even as an early manifestation of the payoffs from Europe's scientifically based technology, but rather as a statistically probable outcome of deploying advantages that had been accumulating to the inhabitants of the Eurasian continent over many millennia as a consequence of objectively ascertainable, measurable properties of that continent.

We can therefore say that, to the extent that laws at that level of generality can predict outcomes from confrontations of civilizations as validly as analyses limited to particular contexts, Diamond's model subsumes Toynbee's but not the reverse. Put somewhat differently in terms of transitivity, propositions derived from Diamond's model yield predictions paralleling Toynbee's generalizations, but from Toynbee's laws we cannot derive Diamond's.

Judged by the abstract criteria above, Diamond's work would on bal-
ance appear a marked advance over Toynbee's. Of the six scientific protocols I have cited, five clearly favor Diamond's approach. But four other considerations do something to restore the balance, if only by raising questions regarding central aspects of Diamond's model.

7. Necessity and Sufficiency. Diamond is at his most convincing in demonstrating why the absence of certain necessary conditions precluded or severely retarded certain developments (e.g., domestication of beast of burden; cultivation of large-seeded edible grains) in Australasia, sub-Saharan Africa, and the New World. He seems less committed to identifying the factors promoting the emergence and differentiation of complex civilizations on the Eurasian continent; indeed, as we have already seen, at one point he dismisses the search for factors accounting for transformative institutional and technological innovations as at once futile and unnecessary [Guns, 254]. Whatever the soundness of his rationale as applied to the study of technical innovation, he does not attempt the more challenging task of universalizing his case. Though often imaginatively ingenious in outlining plausible pathways to the discovery, development, and diffusion of various societal attributes and resources we now associate with modernity, in neither of his volumes does his approach account for the advanced level of attainments in Eurasian civilizations as fully and as conclusively as it rules out their early appearance elsewhere.

8. "Ultimate" and "Proximate" Determinants. As we have seen, this distinction serves Diamond well in complementing the chronologically and methodologically sweeping propositions of his first volume with a closer examination of specific historical outcomes (e.g., the extinction of the Norse Greenland community in the early 15th C. [Collapse, 266-276]) in the second. At times, it seems to serve rather too well.

What distinguishes these categories is never firmly operationalized. We know that "ultimate" determinants typically unfold over millennia and centuries rather than in decades and years. They seem more firmly grounded in the properties of climates and soils and the size and configurations of landforms (factors especially amenable to the rigorously materialist paradigm of Guns) than in the malleability and inconstancies of human nature. Yet the conceptual permeability of the distinction courts the temptation to save an explanation from disconfirmation by transferring its alleged causes from one category to the other.

To some extent, Diamond's decoding of the puzzle of the Maya col-
lapses shows this process at work ([Collapse, 160-177]). "Path determinacy" and "reasoning by false analogies (from the past)" ([Guns, 248, 418; Collapse, 423-424] have similar problems: we understand well enough how they operate in principle, and concrete illustrations are not hard to find; but without more specific indications of the circumstances in which they prevail, we can't be sure why American automobile manufacturers continue to learn so much more slowly from changing conditions than their Japanese competitors and why only some generals keep fighting the last war.

9. Small and Large-scale Societies. On no point does Diamond appear more at odds with Toynbee than in his contention that lessons can be drawn from tiny, isolated, sharply bounded societies (Easter, Pitcairn, and Tikopia Islands) that can illuminate the fate of societal entities as large and as complex as China and the medieval Islamic caliphate. We have already seen how this contention lies at the heart of Diamond's approach. The advantages to theory construction of denying—or at least minimizing—the emergent properties of macro-cultural systems are many. Not only does this stance greatly enlarge the pool of potential cases for study and propositional testing while simplifying the task of untangling causal strands; it also allows for the incorporation of instructively extreme cases, permits a cleaner distinction between exogenous and endogenous causes, and encourages the formulation of universalistic explanatory laws.

It also avoids the inherently arbitrary and often invidious issues arising from attempting to justify which entities to designate as "civilizations" and where to draw their boundaries. On the other hand, the relatively homogeneous populations of most small and geographically remote islands, together with their fixed boundaries and often fragile natural environments, tend systematically through the structural simplicity of these factors to highlight a residue of environmental variables in analyses of their fates—a weighting that becomes increasingly open to challenge as one moves to consideration of the societal and cultural heterogeneity, the hostile neighbors, the continuously operative economic linkages to outside markets, and the internal structural problems of collective coordination characteristic of larger continental communities.

Diamond shows explicit awareness of these problems in a paragraph noting the rationale for moving from the study of Mangareva to an examination of the Mayan Empire ([Collapse, 159]; more generally, as we have noted, he had already identified population and territorial size in his previous volume as one of four basic, objectively measur-
able sets of environmental features "affecting [the] trajectories of human societies" [Guns, 406-408]. But this recognition does not alter the primacy he continues to assign throughout the more than five hundred pages of his geographically wide-ranging second volume to degradation of natural environments as the critical source of systemic stresses affecting these trajectories. A more sustained sorting out of competing explanations for these dynamics would provide a more solid foundation for his thesis.

10. Generality vs. Precision. A final issue squarely raised by several of the preceding is the frequent need for a trade-off between the subsuming capabilities of a paradigm and the ability of a competing paradigm to generate more fully satisfying explanations for specific observable events of interest to the theorist. Unless a single paradigmatic model can achieve both—and that happens all too rarely—a choice may have to be made depending on the domain of concern to the analyst. No general principles can govern this choice. As philosopher Stephen Toulmin has pointed out [Philosophy of Science: An Introduction], Newton's laws are far simpler to use and more precise in their predictions than laws derived from Einstein's General Theory of Relativity in charting the trajectory of a naval ballistic missile, but the latter better accounts for the curvature of the sun's rays as witnessed during an eclipse of the sun. So also with Diamond's and Toynbee's models: Diamond's theoretical framework more economically identifies the factors accounting for the inequalities among different regions of the planet that have developed since the end of the last Ice Age, but Toynbee's serves as well or better in providing "proximate" explanations for the collapse of Assyria.

Toynbee and Diamond differ greatly in their academic backgrounds, their organizing perspectives, their choice of starting points for analysis, the kinds of data they seem most comfortable examining, and their explanatory aspirations. In the course of their studies they clearly reach differing conclusions regarding the role of human initiative and rational choice in history. The generational gap between the two, and the contrasting character of the international political environment during the most intense years of their adult life, almost certainly further widened these divergences. Yet all these differences should not obscure the deeper commonalities that link them together within contemporary civilizational studies. As the attentive intellectual public outside their scholarly arena has seemed to understand, perhaps more clearly than many scholarly combatants within it, Toynbee's and Diamond's ideas matter because both sought to address in systematic
terms a common topic posing some of the largest, most urgent questions of our age. Comparative alignment of their thoughts can therefore serve to invite further clarification of the nature, strengths, and shortcomings of the paradigmatic conceptual nets they have cast over our entire field.

ENDNOTES

1 Other reasons (which Diamond appears implicitly to endorse) for preferring such terms as “complex societies” or “macro-cultures” to “civilizations” are cogently given in Joseph Tainter The Collapse of Complex Societies (Cambridge: Cambridge University Press, 1988).


3 I shall note below the typical problems that arise with a need for trade-offs between generality and predictive precision.