The Really Big Picture: A Review of *Guns, Germs, and Steel: The Fates of Human Societies* by Jared Diamond

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Jared Diamond is a professor of physiology who works as an evolutionary biologist. In 1972 he met a New Guinean named Yali. Yali asked Diamond many questions, and one of them prompted this book. His question was, "Why is it that you white people developed so much cargo [material goods] and brought it to New Guinea, but we black people had little cargo of our own?" (p. 14). Diamond extends Yali's question: "Why did wealth and power become distributed as they now are, rather than in some other way? For instance why weren't Native Americans, Africans, and Aboriginal Australians the ones who decimated, subjugated, or exterminated Europeans and Asians?" (p. 15). It was after the end of the last Ice Age and Pleistocene Era, around 11,000 B.C., according to Diamond, that the divergences among the cultural practices of human populations began. Diamond rephrases the question about inequalities in the modern world as follows: "Why did human development proceed at such different rates on different continents?" (p. 16).

At the outset Diamond explicitly rejects any racial argument said to support the differences among societies. Solid evidence for differences in intelligence that parallel differences in technology is lacking. In fact Diamond contends that modern "Stone Age" people are probably more intelligent than industrialized peoples. In support of this contention, he concludes from

33 years of work with New Guineans that on average they are "more intelligent, more alert, more expressive, and more interested in things and people around them than the average European or American is" (p. 20). At some tasks, which presumably reflect brain function, such as forming a "mental map" of unfamiliar surroundings, they are considerably more able than Westerners. They also routinely master new technologies when given the opportunity. Diamond realizes, however, that his contention is a subjective impression that is open to challenge. Tests of cognitive abilities (e.g., IQ tests) tend to measure learning, "not pure innate intelligence, whatever that is" (p. 20). He reiterates in the epilogue that the dramatic differences among the peoples of the different continents have been due to their different environments, not to innate differences in the peoples.

Diamond says his book can be summarized in one sentence: "History followed different courses for different peoples because of differences among peoples' environments, not because of biological differences among peoples themselves" (p. 25). What could be more congenial to behavior analysts? It is important to note, however, that what Diamond means by *environment* is geography. Behavior analysts' conception of environment includes more than geography, of course, but Diamond cannot be faulted for failing to use the behavior analysts' view of environment; after all, he is not a behavior analyst. It is somewhat disappointing, however, although not unexpected, that he does not list behavior analysis among the scientific disciplines he

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draws upon. There is no reference made to operant behavior, contingencies, metacontingencies, or any other behavior-analytic constructs. Diamond's book, though, features a number of the attributes that Parrott and Hake (1983), in a behavior-analytic approach to the study of history, ascribe to a science of history. Diamond's epilogue is titled "The Future of Human History as a Science," and it addresses (as do Parrott & Hake, 1983) the challenge of developing human history as a science on a par with the historical sciences of astronomy, geology, and evolutionary biology. He addresses four features that he says set the historical sciences apart from such ahistorical sciences as physics and chemistry. These are methodology, causation, prediction, and complexity.

With respect to methodology, Diamond points out that in many of the historical sciences, laboratory experimentation can play little or no role. Rather, in such sciences, observation, comparison, and natural experiments are the primary sources of knowledge. Here, as on other points, there is clear agreement between Diamond and Parrott and Hake (1983).

Historical sciences are concerned with chains of proximate and ultimate causes, says Diamond, but in such disciplines as physics and chemistry, the concepts of *ultimate cause* and *function* are usually meaningless. The behavior-analytic distinctions among phylogenetic, ontogenetic, and cultural evolution are clearly compatible with the historical sciences' conception of causes.

Historical sciences can provide a posteriori explanations (e.g., why an asteroid impact may have caused the extinction of dinosaurs but not that of some other species), but a priori predictions are more difficult. Diamond says, however, that historians and historical scientists do make and test predictions about what future discoveries of data will tell us about past events.

A fourth feature that distinguishes the historical from the ahistorical sci-

ences is the extreme complexity of the phenomena studied by the historical sciences, such as human societies. With respect to human societies, "complexity means, for practical purposes, that . . . deterministic causation does not translate into predictability" (p. 423). The best that historical scientists such as biologists and historians can do is to formulate statistical trends.

Lack of prediction does not preclude understanding, however, and Diamond calls attention to the comparative method and to natural experiments. The comparative method involves "comparing systems differing in the presence or absence (or in the strong or weak effect) of some putative causative factor" (p. 424). An example of the comparative method is the way cultural anthropologists study the long-term effects of resource abundance on human societies by comparing recent Polynesian populations living on islands that naturally differ in resource abundance. Although he acknowledges the susceptibility of natural experiments to potential methodological criticism, Diamond lists epidemiology, ecology, and evolutionary biology as fields in which natural experiments are successfully exploited. Parrott and Hake (1983) also recommend the comparative method/natural experiment as a means of understanding in a historical science.

Those behavior analysts who are interested in the study of societies and cultural practices are aware of the necessity of having to rely on natural experiments in order to explain changes in the behavior of groups. Diamond also points out the inability of those who study human societies to implement designed experiments, and chapter 2, titled "A Natural Experiment of History," describes the settlement of Polynesia as a natural experiment. Over the course of about 1,700 years (a relatively short time span in that field of study) almost all of the thousands of islands of Polynesia were settled by people who descended from the

same founding population. This founding population shared essentially the same culture, language, technology, and domesticated plants and animals, but the islands on which these people settled differed greatly in size, degree of isolation, elevation, climate, productivity, and geological and biological resources. What would be the result of this natural experiment? From hunting and gathering, to slash-and-burn farming, to intensive food production including aquaculture, Polynesian cultural practices varied widely from island to island. Social organization ranged from fairly egalitarian village societies to some of the most stratified societies in the world. Material culture varied from the production of nothing more than personal utensils to the construction of monumental stone architecture. What accounts for these great differences? Diamond discusses the environmental variables that were responsible, and how the ranges of those variables influenced Polynesian societies.

The story of Polynesia sets the stage for Diamond's explanation of how varied environments produce societal diversification, and such diversification means that some cultures will subjugate others. The key is food production in the form of the domestication of wild animals and plants. Different populations moved from hunting and gathering to food production at different times. Geographic variation determined when the peoples of different continents became farmers and herders, and this, in turn, according to Diamond, explains societies' varying fates. Because food production was a prerequisite for the development of complex political organization, writing, and the guns, germs, and steel of the book's title, some societies prevailed over others.

Concerning the origin of food production, Diamond says that it was not a discovery, nor was it an invention. He points out that the first people who adopted food production could not have been making a conscious choice to do so, and they could not have been

consciously striving toward farming, because they had no experience with farming and thus had no way of knowing what it would be like. Rather, "food production *evolved* as a by-product of decisions made without awareness of their consequences" (p. 106). The people who initiated food production were not endowed with any particular biological advantages. It was the distinctive combination of the Fertile Crescent's climate, environment, wild plants, and animals that enabled the human inhabitants of the area to develop food production as early as they did.

The key question regarding technological development is whether the variables thought to be responsible for it "differed systematically from continent to continent and thereby led to continental differences in technological development" (p. 251). As in his description of the natural experiment of the settlement of Polynesia, Diamond demonstrates his scientific approach to answering the questions that concern him.

Diamond's geographical environments of interest are the world's continents. In his view, there are four sets of differences among the continents that determined the differences in human populations' development. One set consists of differences in the wild plant and animal species that were available for the initiation of domestication. Humans living on continents with more species amenable to domestication were able to develop the kinds of societies that included political and technological advantages over other societies. In behavioral terms, continental differences determined cultural practices and products that made possible the superiority of some societies over others.

A second set of differences were those that greatly affected rates of diffusion and migration. Diffusion of domesticated crops and livestock, as well as advantageous technological innovations, was most rapid in Eurasia because of its east-west major axis and

its relatively modest ecological and geographic barriers. Diffusion was much slower in Africa and the Americas because of those continents' north-south axes and more difficult geographic and ecological barriers.

A third set of factors influenced diffusion among rather than within continents. Diffusion among continents has varied because some continents are more isolated than others. Easy diffusion from Eurasia to sub-Saharan Africa supplied most of Africa's species of livestock, but the difficulty of inter-hemispheric diffusion meant that there was no contact between Native Americans' complex societies and Eurasia until relatively recent times. Similarly, Aboriginal Australia was also almost completely isolated from Eurasia; thus, the Native Americans and Australian Aborigines did not experience the cultural practices and products that conferred a kind of superiority on other societies.

Continental differences in area or population size are a fourth determinant of differences among societies. "A larger area or population means more potential inventors, more com-

peting societies, more innovations available to adopt—and more pressure to adopt and retain innovations, because societies failing to do so will tend to be eliminated by competing societies" (p. 407). There are more behavioral variants available for selection and retention.

In the beginning behavior analysis studied the contingencies, then meta-contingencies; now, derived from this book, is it possible to study megacontingencies? Jared Diamond presents us with a persuasive argument for the critically causal role of the macroenvironment in the fates of human societies. He presents the reader with a large number of interested facts to elucidate and support his positions. The book is a well-organized fascinating account, and the writing flows smoothly. Many behavior analysts should enjoy this book.

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