

Natural Experiments of History

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REVIEW

Natural Experiments of History

Edited by Jared Diamond and James A. Robinson

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Life is too short to be able to perform a reasonable geological experiment on a laboratory bench. To show the outcome of any process that operates over eons, the rocks are our only guide. Consequently, the idea of interpreting the natural world as a scientific experiment is fundamental to the earth sciences, and goes back to the late stages of the eighteenth century enlightenment in Europe, where it replaced the earlier notion of geology as revelation. Lyell makes the idea explicit in the first volume of *Principles of Geology*, which was published in 1830 and famously taken by Darwin on his *Beagle* circumnavigation.

In Chapter VI of volume I of the *Principles*, Lyell interprets an occurrence of fossil molluscs in Sicily. He points out that they are of the same species still to be found in the Mediterranean, but that there is a striking difference. The extant species are “dwarfish and degenerate, and stunted in their growth” by comparison with the fossils. To find living examples as

big, hale and hearty as the fossils, he said that you had to search in the warmer waters of the tropics – specifically the Indian Ocean. From this he concluded that the Mediterranean region had undergone an episode of climate-cooling over recent geological history, and he called the comparisons he was making between ancient and actual molluscs an “*experimentum crucis*” – a crucial experiment using nature as the laboratory. He was always looking for natural experiments of this kind, and a century before Karl Popper, Lyell claimed that his technique was to constantly try to disprove his working hypothesis, which was later called uniformitarianism by William Whewell. For example, in 1836 he wrote that “as a staunch advocate of absolute uniformity in the order of Nature, I have tried in all my travels to persuade myself that the evidence was inconclusive, but in vain.”

Charles Darwin admitted that he owed a great intellectual debt to Lyell, and of course his ‘one long argument’ in *Origin of Species* is an application of the idea of uniformitarian change to organisms. Lyell himself foresaw the possibility of such change, but hesitated to pronounce on the matter until after *Origin of Species* was published. Darwin recognized a similar hesitation in himself, although in the end he was bolder. For his uniformitarian purpose, he needed evidence of change amongst species in the here and now, which he obtained from animal breeders. Then the argument required evidence of what might happen if such changes proceeded over the very long term. Here again was a critical role for the natural experiment. In Darwin’s case, his interpretation of what happens to finches when they are isolated from each other on different

islands of the Galapagos, is one of the best known natural experiments in all of science.

From geology and evolutionary biology, the idea has migrated into the social sciences, which are the focus of Diamond and Robinson’s *Natural Experiments of History*. The editors state that their objective is “to showcase the comparative method [taken to be synonymous with ‘natural experiment’] in history and to examine some techniques for solving its obvious pitfalls by presenting a set of eight studies in seven chapters (p. 5).” Here is history on a human scale – in principle, a scale amenable to direct laboratory experiment. But in the social sciences, direct experimentation on human individuals or populations is not countenanced, at least in democracies. Hence the use of historical events as a laboratory where accidental or spontaneous change has taken place. In Diamond and Robinson’s book, there is a good definition (p. 225) that is applicable to this area of scholarship: “By a natural experiment we mean a situation in which some historical accident or event leads economic, political, and social factors to change in some areas while remaining the same in other comparable places. If indeed the various areas experiencing differential change are comparable, we can think of the group in which change has taken place as being the treatment group in an experiment and the other group as corresponding to the control group.”

The book is not a systematic examination of history’s natural experiments, as the title might lead one to expect, and, annoyingly, it lacks an index. However, the *potpourri* of individual studies maintains a high quality of scholarship and interest. In the Prologue, Diamond and Robinson intro-

duce the concept of the natural experiment, also called the comparative method, as the approach is to compare systems that are “similar in many respects but that differ with respect to the factors whose influence one wishes to study (p. 2).” The first four chapters are narrative and qualitative in style, whereas the rest are “explicitly based on statistical comparisons of quantitative data (p. 6).” In Chapter 1 (Controlled Comparison and Polynesian Cultural Evolution), Kirch’s natural laboratory is the southwest Pacific region, and his subject is the dispersal and cultural differentiation of the Polynesian peoples. His method is to begin with a family tree based on linguistics, and then to use multiple lines of evidence (‘triangulation’, p. 22) to reconstruct the evolution of society and culture amongst the Polynesians. In Chapter 2 (Exploding Wests: Boom and Bust in Nineteenth-Century Settler Societies), Belich compares seven societies profoundly changed by ‘white’ (European and Asian) settlement. Rather than a steady expansion in these societies, he detects a kind of explosive, three-step cycle of boom, bust and rescue. During this cycle, the Victorian ‘progress industry’ profoundly modified the landscape by gobbling up forests in the creation of transport routes, in construction, and in clearing land for agriculture. In Chapter 3 (Politics, Banking and Economic Development: Evidence from New World Economies), Haber compares the USA, Mexico and Brazil. All three societies started their post-colonial existence without chartered banks: they had not been permitted by their colonial masters. The narrative of how banking systems were created *ab initio* and how the systems changed and were to a degree controlled, is related to the development of effective suffrage. Chapter 4 (Intra-Island and Inter-Island Comparisons), by Jared Diamond, has the most resonance for an earth scientist, and is dealt with in more detail below. In Chapter 5 (Shackled to the Past: the Causes and Consequences of Africa’s Slave Trades), Nunn describes the trade in African slaves as a massive perturbation in many societies on both sides of the Atlantic and Indian oceans, the Red Sea and the Sahara. From the data he

assembles, Nunn concludes that “over four centuries of intense slaving are responsible for much of Africa’s current underdevelopment” and that if the slave trades had not occurred “the countries in Africa would, on average, have the same level of income as other developing countries in the world.” In Chapter 6 (Colonial Land Tenure, Electoral Competition, and Public Goods in India), Bannerjee and Iyer discuss a second massive perturbation – British colonial rule in India. They look at differing developmental histories under three different systems of land tenure: landlord-controlled (initially favoured by the British), cultivator-controlled in the Madras district, and village-controlled in the north. They find that the areas put under landlord control lagged behind the others in the provision of public goods and that four decades after India gained its independence of Britain, and three decades after landlord-based tenure was officially abolished, the differences are still discernible. In Chapter 7 (From Ancient Regime to Capitalism: the Spread of the French Revolution as a Natural Experiment), a third great massive intervention is presented by Acemoglu et al. French armies during Revolutionary and Napoleonic times introduced great institutional changes in conquered areas of Europe. By comparing areas of Germany where institutions were changed with areas where they were not, the authors conclude that the changes introduced by the French had positive economic effects. Interestingly, Friedrich Engels reached a similar conclusion, a fact that, as the authors dryly add, “hardly ensures consensus in the academic literature (p. 250).” In an Afterword, Diamond and Robinson summarize the eight studies in the book in a table (p. 258–259). They claim that the outcome of all eight can be interpreted as a function of initial conditions or of perturbations, or both. This conclusion depends on what the word ‘perturbation’ includes, but surely the outcomes are also a function of chance, of periods of quiet evolution, of stagnation and so on.

As you might expect, based on his previous books examining the rise and fall of civilizations – *Guns, Germs and Steel* and *Collapse* – Jared Diamond’s

Chapter 4 has the most resonance for an earth scientist. It contains two studies of natural experiments. The first takes the island of Hispaniola in the Caribbean as the laboratory, and compares the environments of Haiti and the Dominican Republic, the two nations that make up the island. The critical zone is the border between the two, and the criterion of environmental quality chosen for study is the state of forest-cover. A satellite photograph shows virtually complete deforestation with massive erosion on the Haitian side, while thick forest flourishes on the Dominican side. The difference is striking and follows precisely the line of the political boundary between the two states. This rules out any natural catastrophe as the cause and leaves the differing human histories on each side as the obvious answer. Diamond fills out the story with reasonable speculations about the relationship between the degree of political stability and conservation of forests, although without quantitative data and statistical analysis his ideas remain speculations no matter how commonsensical they seem.

Qualitative conclusions are a common shortcoming of the use of natural experiment, as Diamond clearly knows. It is discussed at various points throughout the volume. In Chapter 4, with the help of Barry Rolet and an unnamed statistician, Diamond introduces a quantitative element into a second study that examines deforestation on Pacific islands. He says that this study “illustrates the ubiquitous challenge that historians face in identifying the most significant causes of multiterminated or multicausal phenomena and illustrates how this problem can be approached by means of quantitative statistical comparisons of many individual case studies (p. 129).” However, in spite of an impressive sample size of 69 islands, the claim that the study is quantitative is a bit of a stretch. For example, the degree of deforestation could not be given a precise number, but was placed “more crudely on a five-point scale (p. 130).” Similarly, some of the nine environmental variables considered were “estimated crudely along two-point, three-point or four-point scales (p. 131).”

In this second study, Diamond

makes another attempt at interpreting the history of Easter Island (Rapa Nui). Does it provide evidence of the fecklessness of humanity in destroying their life-support system, as Diamond and others have suggested in the past, or are there mitigating circumstances in the story? The fact is that when the islanders first arrived at their new home, tiny and remote in the southeast Pacific, they probably could not believe their luck. By chance they had discovered a temperate, forested, well-watered place, covered by volcanic soils of high inherent fertility. Not only was the island agriculture-friendly, it was also surrounded by an ocean populated by big meals in the shape of large marine mammals. The good life beckoned and over a few hundred years the Easter Islanders built a stable, complex, civilized society. But when the first Europeans arrived in the eighteenth century they found an impoverished people, no longer with the resources to build boats sturdy enough to hunt at sea, living on an island covered mostly by grasses, sedges and ferns. The big trees were gone and unprotected soil was being washed or blown into the sea. The only big meals left were themselves, and they lapsed into cannibalism.

What were they thinking, asked Diamond in an article in *Discover Magazine* (08/01/95), as they cut down the last tree? Since he first asked that rhetorical question, with its implication that the Islanders were none too smart, he has nuanced his response with a possible nod to political correctness. The answer he gives in Chapter 4 is essentially a repeat of Chapter 2 of *Collapse*: the Easter Islanders had “the bad luck to find themselves living on one of the Pacific’s most environmentally fragile islands.”

In wondering what topics a similar book on the earth sciences might include, I immediately thought of Steven J. Gould’s speculation of what might happen if we could reel the tape of the geological VCR back to the Cambrian explosion and let it run forward a second time. He believed that chance would deliver a different outcome from our present world, and that there was no guarantee that intelligence would be part of the result. However, there is no natural experi-

ment by which we can test his idea unless we can find for comparison a number of accessible earth-like planets with biospheres. But a similar speculation, first made by the anthropologist Marvin Harris, is testable. Let us reel the tape back a mere 15 000 years to a time when *Homo sapiens* was still hunting, gathering, scavenging and burning its way through a pre-agricultural Old World. Would a re-run still produce the Neolithic Revolution – the invention of farming based on domesticated animals and crops? And would it lead to political, military and religious elites, cities with monumental architecture and roads, skilled trades and a division of labour? It did. As Ronald Wright

points out in *A Short History of Progress*, when the Conquistadores arrived in Mexico, they recognized that what they saw was an agriculture-based civilization.

I leave the last word to Acemoglu and co-workers in Chapter 7 of *Natural Experiments of History*. “History is full of [natural experiments]; it is just that historians have not yet thought of them in these terms. We believe that exploiting these experiments in a systematic way will greatly improve our understanding of the important forces that have driven long-run processes of historical, social, political, and economic change (p. 249–250).”

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