

# Review of *Cultural Evolution: Society, Technology, Language, and Religion* Edited by Peter J. Richerson and Morten H. Christiansen<sup>†</sup>

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*Peter J. Richerson and Morten H. Christiansen have assembled a compelling picture of the evolution of societies, technology, language, and religion—with culture at the epicenter. The book is a must-have for economists and any other social scientists interested in the evolution of behavior. Using the book as a starting point, this article sums up what cultural evolution can teach us about these four major aspects of human behavior. Each topic is also linked to the relevant empirical research in economics. Directions for future research integrating cultural evolution into an economic framework are also explored. (JEL D72, O33, O43, Z12, Z13)*

## 1. *The Ernst Strüngmann Forum in Cultural Evolution*

The Ernst Strüngmann Forum, whose mission is to promote interdisciplinary communication and research, brings together eminent scientists and scholars to discuss themes that transcend classic disciplinary boundaries. The forum, dedicated to cultural evolution offered a unique, powerful opportunity to explore how historical, biological, anthropological, and sociological insights into social structure can forge a framework for vigorous cross-disciplinary cultural research.

*Cultural Evolution: Society, Technology, Language and Religion*, developed under the auspices of the forum, is no doubt essential reading for economists and any social scientists interested in the evolution of societies. Spanning as many as twenty different contributions, this fascinating volume concludes that four major aspects of human behavior—social systems, technology, language, and religion—can be better understood by adopting a cross-disciplinary perspective on cultural evolution.

The book is a great tool for establishing the necessary connections across research areas, particularly useful for economists, since we often tend to do our research in relative isolation and with little interaction between established fields. In that respect, the book provides a unique opportunity to read the

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latest findings of cross-disciplinary research on cultural evolution, summarizes past and current research, and gives an overview of the various tools available, from both a theoretical and an empirical perspective.

Below, I attempt to summarize the cultural evolution conceptual framework that runs through most of the themes presented in this timely volume. Then, using the book as a starting point, I sum up what cultural evolution can teach us about society, language, technology, and religion. For each topic, I mention the relevant empirical research in economics. I conclude by proposing directions for future research, noting ways in which economists could benefit from integrating cultural evolution into their research.

## 2. *What Is Cultural Evolution?*<sup>2</sup>

Cultural evolution is the change of culture over time. The authors define culture as the set of ideas, skills, attitudes, and norms that people acquire through teaching, imitation, and other kinds of learning.

Many overarching questions depend upon a better understanding of cultural-evolution processes. Why and how did humans begin to imitate and teach? Why and how has human cooperation expanded to encompass very large societies?

The interdisciplinary field of cultural evolution, which emerged in the 1970s, has developed rapidly over the past twenty years, generating fascinating insights into the mechanisms that enable human behavior and the evolutionary history of these mechanisms.

Broadly speaking, cultural evolution derives from Charles Darwin's theory of natural selection. Darwin explained adaptation using the concept of what we call vertical transmission—handing down traits from parents to children. Cultural evolution posits that cultural processes, such as social learning, underpin this form of transmission. We

also learn from peers and authority figures—what we call oblique transmission.

The literature contains various formalized models of cultural evolution. The classic works are Cavalli-Sforza and Feldman (1981) and Boyd and Richerson (1985), whose formal models attempt to integrate the effects of cultural inheritance into standard biological models of evolution. Given the peculiarities of cultural evolution, cultural inheritance is modeled in ways that differ substantially from genetic inheritance.<sup>1</sup> Models, however, remain evolutionary in style, primarily because they seek to explain the changes in trait frequencies in a population over time.

The chapter on technology contains an interesting model from Boyd and Richerson (1985, 2005) that gives a flavor of the mechanisms at play in a cultural-evolution model; it introduces oblique transmission and attempts to explain how learning can produce outcomes that do not reduce fitness. They claim that overall adaptive benefits of learning from nonparents can in fact outweigh the overall adaptive costs for various reasons; if people can copy the behavior of others who are able to discover techniques or behaviors that increase fitness, then their fitness will probably be augmented, too.

The crucial question is how a learning mechanism can be developed so that beneficial behaviors are copied while detrimental behaviors are not. According to Boyd and Richerson (1985, 2005), various biases can overcome this problem, chief among them prestige bias and conformity bias. If people copy techniques from prestigious individuals, they increase the likelihood of copying beneficial techniques. This theory relies on the supposition that prestigious people have a better-than-average tendency to make use of

<sup>1</sup>Broad assumptions are made about how individuals acquire cultural traits: by learning from a variety of peers, modeling authority figures, and assessing how such rules will play out at the population level.

fitness-enhancing techniques (prestige bias). In human societies, imitating the common type is more likely than not imitating at all, and more likely than imitating a randomly chosen member of a population (conformity bias). These types of mechanisms help explain the evolution and diffusion of technology, along with many other cultural domains, including culturally transmitted skills, beliefs, preferences, and practices, as well as learning mechanisms, including how children learn. The book contains ample evidence that while young children are unselective with regard to what they learn, they are far more selective when choosing who they learn from.

### 3. *What Can Cultural Evolution Explain?*

A common theme running through the entire book is the rise of “ultra-sociality,” the extensive cooperation among large numbers of genetically unrelated people. Whereas it is easier to understand why cooperation exists in small-scale societies and among kin, explaining how human cooperation has expanded to include societies of millions with vast networks of global exchange is more challenging. Why is there so much cooperation among humans? The first few chapters outline the elements that lead to cooperation in complex societies and how gene-cultural evolution models can help to explain the evolution of sociopolitical systems. Two of the remaining sections are dedicated to explaining how two elements, language and religion, have contributed to maintaining large-scale human cooperation. The importance of cumulative cultural transmission is the theme emphasized in the section dedicated to the evolution of technology.

#### 3.1 *The Evolution of Sociopolitical Systems*

The first part of the book proposes a gene-cultural interpretation to explain the evolution of sociopolitical systems. The

reader learns the environmental elements necessary for a high return to cooperation: a meat-based diet, cultural innovations such as the domestication of fire (which obviate the need to climb and also permitted people to socialize at night), cooking (involving a central location to which the catch is transported and which gave rise to food distribution based on fairness norms), collective child rearing, and the availability of lethal weapons (which were essential for stabilizing the system).

In addition to these “niche parameters,” three other elements were crucial for the evolution of cooperation: increasing returns to scale with group size (individuals do better in groups than by themselves, like non-humans), a reverse-dominance hierarchy (which replaced social dominance based on physical power with a political system in which success depended on the ability of leaders to persuade and motivate), and control of defectors.

Overall, sustaining cooperation in human societies meant solving the collective-action problem stemming from the tension between the public nature of benefits yielded by cooperation and the private costs borne by cooperating agents. Social norms and institutions are among the most important tools for solving the problem. The authors cite several examples of ultrasocial institutions that enable cooperation in large-scale human groups: trust, government by professional bureaucracies, systems of formal education, and universalizing religions.

This series of chapters also help propose a definition of social complexity, listing several characteristics, including largest settlement size, population size, or population and density of the largest settlement. Other political-economy variables include the territorial extent of the polity, the hierarchy of jurisdictional levels in administration, and the economic extent of specialization (in large-scale societies, the number of

professions extends far beyond the division of labor seen in small-scale societies, which is based on sex, age, and expertise). Finally, large-scale societies tend to encourage a greater quantity and variety of information, especially cultural information, much of which is stored not only in literature and art, but also in monuments, architecture, and large public spaces for ritual, performance, economics, or politics. Religion and religious practices are also associated with social complexity, together with management technologies (systems of tribute and taxation; environmental modifications such as permanent roads, outposts, and observation stations; recording technologies such as writing and accounting; and weapons for large-scale violence), inequality, and urbanization.

What determines social complexity—often proxied by economic prosperity—is an old question in economics. The literature contains many studies of economic prosperity’s modern determinants, such as quality of institutions, economic policies, education, health, and political factors such as violence and instability. More recently, researchers have added a “long-run” dimension to explain the determinants of economic prosperity. A comprehensive summary of these contributions appears in Spolaore and Wacziarg (2013). In addition to surveying the literature, the authors emphasize how economic prosperity is affected by traits that have been transmitted across generations over the long-run, thus offering an obvious link to cultural-evolution models. Among the long-term determinants of prosperity, the authors describe the relevance of geography and institutions, as well as the past history of populations,<sup>2</sup> which they argue is a much stronger predictor of current economic outcomes than the past history of given geographical locations (Putterman and

Weil 2010; Comin, Easterly, and Gong 2010; and Spolaore and Wacziarg 2009, 2012, 2013). The intergenerational transmission of human traits, they say, has led to divergence among populations throughout history; in turn, this divergence has introduced barriers to the diffusion of technologies across societies. These barriers impede the flow of technologies in proportion to how genealogically distant populations are from each other. This type of barrier can also explain differences in income across populations over time. In addition, while some countries have experienced reversals of fortune, these reversals are much less prevalent when looking at the fortunes of populations, rather than those of geographic locations.

Michalopoulos and Papaioannou (2013) also emphasize the history of populations as the main driver of African development. The authors find that ethnicity-specific societal traits, rather than national institutions, play a central role in explaining comparative economic success.<sup>3</sup>

The empirical papers in economics on the evolution of societies parallel several determinants outlined in the book. Economists could benefit from the cultural-evolution perspective by borrowing the list of “niche parameters” considered essential for the complexity of societies. So far, it has not been possible to systematically account for these historical elements, due to the lack of good databases codifying information on historical cultural variation for a broad spectrum of societies. *The Ethnographic Atlas* (Murdock 1967) and the Standard Cross-Cultural Sample (Murdock and White 1969) can help economists implement cross-cultural comparative ethnography, and they provide information on

<sup>2</sup>See Spolaore and Wacziarg (2013) for all the relevant references.

<sup>3</sup>Their methodology combines anthropological data on the spatial distribution of ethnicities before colonization, historical information on ethnic cultural and institutional traits, and contemporary light-density-image data from satellites as a proxy for regional development.

the historical characteristics of preindustrial societies that economists can use to understand the evolution of different societal traits over time. The datasets contain four types of variables essential for this kind of analysis: environmental, political (such as the levels of jurisdictional hierarchy beyond the local community, and the traditional form of succession of the local headmen), economic (settlement patterns, main subsistence activity), and cultural (such as marriage customs, living arrangements, the presence of high moral gods, and norms about sexual behavior).

Both datasets, however, have a big limitation: they tell us about a culture at a particular point in time. One way to overcome this limitation would be to construct dynamic panel datasets that describe cultural trajectories through time. Another way would be to obtain more precise predictions from theory, to disentangle the channels of cultural transmission and understand what makes certain cultural and societal traits more adaptable and resilient than others.

Finally, when looking at the determinants of prosperity, most economics studies still tend to examine an event in isolation from other events, except possibly to account for other covariates. The evolution of many cultural traits can be much more complex and highly nonlinear. Therefore, structural analyses of the data, possibly guided by theory of cultural evolution, could be more appropriate than the linear-regression methods used so far.

### 3.2 *Technology and Science*

The book describes technological change as an evolutionary process: what distinguishes human transmission of technology are the learning process and the accumulation of modifications over time (chimpanzees transmit tool-use behavior, but they don't learn from or modify tools over time).

It is hard to trace the history of technology over time, as it is not clear what is transmitted.

An example in the book illustrates the issue: Polynesian canoes could have evolved through one of two scenarios—natural selection or result bias. The first scenario posits that makers and users of ineffective canoes drowned more frequently, thus leading to the disappearance of these designs, while groups with better-designed canoes, perhaps in different communities, survived their canoe trips and colonized new islands. The second scenario suggests that people observed the performance of different canoe designs and copied those they perceived as more effective.

Based on this example, one could say that in order to understand the trajectories of technologies over time, one would need to understand the two elements of transmission: the histories of technologies, and the histories of the human populations through which technologies are transmitted, which may coevolve with technologies to varying degrees.<sup>4</sup>

Economists have contributed to the understanding of the evolution of technology in two ways. First, Comin et al. (2010) documented a high degree of persistence in the transmission of technology from past to present. They find that the AD1500 measure of technology is a statistically significant predictor of technology observed today; they also show that the transmission of technology is much stronger when the old technology measure is constructed using a population-weighted

<sup>4</sup>Most of the cultural-evolution literature has tried to understand how culture can lead to cumulative adaptation of technology over time. The section on technology is largely devoted to different types of models of cultural evolution of technology. One view is that cumulative adaptation can gradually arise from payoff-biased transmission: if cultural learners can compare the success of individuals modeling different behavior, then a propensity to imitate the successful can lead to the spread of traits that are correlated with success, even though imitators have no causal understanding of the connection. Another view is that cumulative adaptations can gradually arise from rare innovations, which spread rapidly because their benefits are understood.

average of the technology of the places of origin of the current population using migration data.<sup>5</sup>

Their paper is relevant because it shows persistence in technologies over the long run for a large set of countries. The most important contribution of the paper is indeed the construction of a dataset summarizing the history of technology, the first step in understanding the evolution of technology. The dataset collects cross-country-level data about technology adoption for over one hundred countries at three points in time: 1000 BC, AD1, and AD 1500.<sup>6</sup> The fact that technology persists more within people than within places is also interesting from a cultural-evolution perspective—it evinces extensive learning (although little can be said about the sources of learning).

The second and most important contribution comes from Spolaore and Wacziarg (2012), who go one step further, linking the histories of populations to the evolution of technology. Their main point is that similarity in intergenerationally transmitted traits tends to reduce the barriers to technology adoption; that is, populations that share more similar intergenerationally transmitted traits face lower costs when imitating each other's innovations. To measure the degree of relatedness between populations, the authors use data on genetic distance. Population geneticists have gathered these data specifically for tracing genealogical linkages between world

populations (Cavalli-Sforza et al. 1994).<sup>7</sup> This study is therefore useful in showing that population connectedness is a key factor affecting rates of technological evolution. While Spolaore and Wacziarg provide evidence that the degree of connectedness between populations is relevant in explaining the diffusion of innovation, their estimates are reduced-form estimates, therefore they cannot explain why the lower degree of connectedness between populations prevents the adoption of technologies. Is it for lack of trust, or difficulties in communication? Economists might find it fruitful to study the evolution of those social institutions that could have encouraged or discouraged connectedness between individuals and groups and that could have affected the course of technological diffusion.

### 3.3 Language

Of all the topics studied in the book, language is probably the most controversial from a cultural-evolution perspective. Several scholars, including Pinker (1994), indeed argued that the domain of language has such special properties that laws of cultural evolution cannot be applied uniformly the way it can in religion, technology, and group organization.

The book outlines three models for understanding the evolution of language. First, biology–culture evolution, which looks at the interaction between language, the vocal tract, and possibly the hardware of the human brain. (Economists, unfortunately, probably cannot contribute much to this fascinating topic.) In addition, biological evolution was probably a more relevant problem at the origin of societies and less of a concern

<sup>5</sup>The data on the population matrix come from Puttermam and Weil (2010).

<sup>6</sup>The dataset could be biased: countries that were more advanced at the time of observation were more likely to keep records, and countries that are rich today may be more likely to find remains that prove the existence of past technologies. The authors try to solve these potential problems by controlling for other exogenous determinants of historical development—they use continent dummies, distance from the equator, a dummy for landlocked countries, and a dummy for tropical climate.

<sup>7</sup>By sampling large numbers of individuals from different populations, these researchers obtained vectors of allele frequencies over a large set of genes, or loci. Measures of average differences between these vectors across any two populations provide a measure of genetic distance.

today. Second, social–psychological coevolution, according to which languages had a double life as social institutions and individual representations. Understanding the role of language to mark social relationships could make for interesting research, but lack of data could make it arduous. Accents, for example, are group markers, but they are very hard to observe. Third, culture–language–cognition evolution, which proposes that language can affect cognition and behavior (for example, how grammatical gender affects female labor-force participation).

Economists have contributed to this intriguing area of research.<sup>8</sup> Chen (2013)—by using the fact that languages differ in how they require speakers to grammatically mark future events—tests the hypothesis that in languages that grammatically mark the future, individuals make different intertemporal choices. In particular, individuals speaking a language that grammatically marks future events tend to take fewer-oriented actions. Chen’s interpretation is that when grammar clearly separates the future and the present, speakers think that the future is more distant. He finds that these individuals save less, retire with less wealth, smoke more, practice less-safe sex, and are more obese. Meanwhile, Gay et al. (2013) investigate the relationship between gender marking in grammar and female participation in the labor market, the credit market, land ownership, and politics. They use both

cross-country and individual-level analysis to show that women speaking languages that more pervasively mark gender distinctions are less likely to participate in economic and political lives and more likely to encounter barriers in their access to land and credit. Earlier, Kashima and Kashima (1998) found a relationship between a language’s license to drop the pronoun in a sentence and a country’s level of individualism.

These papers all claim that the stability of the linguistic grammatical structure rules out concerns of reverse causality between language and economic outcomes. This is not necessarily the case. Take gender, for instance: if language reflected differences in women’s participation in productive activities in historical societies, and if there is persistence in such activities, the linguistic measure could still spuriously capture persistence in these activities. Economists should devote more time to understanding the origin of these linguistic differences to assess whether we are capturing persistence in linguistic differences or persistence of other societal characteristics that could have determined the evolution of languages.

Economists could fruitfully contribute to another aspect of the evolution of languages: a comparative perspective across societies using more sophisticated ways of constructing data. In particular, the book notes how relatively little attention has been devoted so far to the determinants of linguistic diversity. Michalopoulos (2012) contributed to this topic by exploring the determinants of ethnolinguistic diversity within and across countries, shedding light on its geographic origins. He finds that geographical variability, captured by variation in regional land quality and elevation, is a fundamental determinant of contemporary linguistic diversity. He notes that in the last 500 years, ethnic diversity has changed a lot compared to its historical distribution. As a result, one would expect geography to be less important

<sup>8</sup>The idea that language can influence the way people think and act is known as the Sapir–Whorf hypothesis (see Scholz et al. 2011, for a review). It’s quite controversial—several scholars have argued that it’s misguided to think that cognition is shaped by language. In particular, Chomsky (1957) argues that humans have an innate set of mechanisms for learning language that constrains all human languages to conform to a “universal grammar.” Later, in *The Language Instinct* (1994), Pinker argues that “humans do not think in the language we speak in, but rather in an innate ‘mentalese,’ which precedes natural language. There is no scientific evidence that languages dramatically shape their speakers’ ways of thinking.”

in places where the native population has been dramatically reduced and displaced. The author shows that this is the case across all levels of aggregation. Linguistic diversity no longer exhibits a systematic link with the underlying geography in places where the majority of contemporary inhabitants cannot trace their ancestry in AD 1500 to that same geographic area.

Though his paper aims to empirically identify the geographic origins of ethnolinguistic diversity, it also discusses the possible mechanisms through which geographic heterogeneity may operate on the formation of ethnolinguistic groups. It suggests that differences in land endowments across regions gave rise to location-specific human capital, diminishing population mobility and leading to the formation of localized ethnicities. Michalopoulos performs a detailed empirical analysis, together with an analysis of the population mechanisms that could have determined the evolution of languages.

### 3.4 Religion

Compared to other aspects of human culture that are clearly functional, religion serves no similarly obvious utility. Religion is typically costly for individuals, and it confers no straightforward ecological benefit. The angle followed in the book is that treating religion through the lense of cultural evolution involves understanding how religious beliefs and social norms have coevolved. The book offers several interesting observations. One of the most important is that religion can extend the scope of cooperative tendencies by invoking collective rituals to forge unrelated people into emotionally connected cooperative communities. Participation in rituals induces this type of emotional commitment to supernatural beliefs or agents. Religion helps foster a fictive kinship, which facilitates the diffusion of prosocial norms.

Although anthropologists and historians have long hypothesized that religion fosters

social cohesion and builds moral solidarity, whether and through which particular mechanisms religious beliefs and practices encourage prosocial behavior is still open to debate. The supernatural-monitoring hypothesis proposes that religious believers act prosocially to the extent that they experience being under supernatural surveillance by watchful, moralizing gods. The behavioral-priming hypothesis proposes that prosocial behavior is more likely if concepts related to benevolence or generosity are unconsciously activated. It is possible to distinguish between the two by looking at the type of god. The supernatural-monitoring hypothesis predicts that a belief that a god punishes should increase prosociality, whereas the behavioral-priming hypothesis predicts that if a god is good, prosociality should increase. In general, it has been found that punishment is superior to reward in promoting prosocial behavior: in places where people believe in heaven, there is more crime; in places where people believe in hell, there is less crime.

Religion may also foster prosocial behavior through its relationship with institutions; societies with weak institutions offer no viable alternative to religion, and thus religion is the main driver behind prosociality. In societies with strong institutions, high trust levels toward secular institutions encourage high levels of prosocial behavior.

The cultural-evolution aspect of religion has received scant emphasis in economics. The literature on religion in economics has taken a different angle: more than focusing on the determinants of the evolution of religion, it has looked at the relationship between religion and political-economy outcomes (see Barro and McCleary 2006, for a review) and the relationship between religion and various sets of values and beliefs (see Guiso, Sapienza, and Zingales 2003).

Economists might find it rewarding to undertake historical and comparative

research that examines the extent to which secular alternatives to religious prosociality (institutions such as courts, contracts, and police) hasten or encourage the decline of religion in societies. Some experimental evidence exists, but cross-cultural comparisons are still rare.

Economists might also do well to examine the ways in which religious institutions help transmit values of their members and how values are produced.

#### 4. *Conclusions*

Richerson and Christiansen have assembled a compelling picture of the evolution of societies, technology, language, and religion—with culture at the epicenter. The book is a must-have for economists and any other social scientists interested in the evolution of behavior.

There are perhaps three directions in which integration between the main findings of the book and research in economics could go. First, the range of topics that can be influenced by cultural evolution could be further expanded. In general, the logic of the models found in the book could be applied to any cultural domain influenced by prestige, conformity-biased transmission, and imperfect learning. The evolution of saving rates, the incentive to engage in innovative or entrepreneurial activities, risk aversion and insurance mechanisms, fertility decisions—all are among topics worth a look through the lens of cultural evolution.

Second, cultural-evolution models could be better connected to empirical research in economics and could make specific predictions. On the empirical side, so far, the evidence has mostly tested predictions of cultural-evolution models in laboratory settings (Efferson et al. 2008; McElreath et al. 2005). In economics, various empirical examples support the notion that transmitted culture is crucial for understanding

human behavior. Evidence on immigrants in the United States and various European countries shows that these migrants bring with them a “luggage” full of distinct cultural values, including preferences for redistribution (Luttmer et al. 2011), beliefs about the role of women in society (Alesina et al. 2013; Fernandez and Fogli 2009), living arrangements (Giuliano 2007), and beliefs about trust (Algan and Cahuc 2010). These cultural differences persist over many generations.

Behavior in economics experiments, such as the ultimatum game, also shows strong cross-cultural differences in fairness and willingness to punish (Henrich et al. 2004). For further generalization, the most promising area of study is the use of historical data to test different theories. Economists have already started using historical data to answer questions related to the evolution of societies, language, technology, and religion. So far, they have contributed uncovering a set of interesting correlations between past and present cultural traits spanning a long period. This pattern of partial correlations indicates the existence of culturally transmitted phenomena. Economists have used two tools to isolate the relevance of culture: within-country variation and instrumental variables. Neither, however, confers any structural meaning to the estimates, since most of the empirical studies look at correlations and have no underlying model specifying what is being estimated. Therefore, economists need to come up with a clear set of rival theories, delineate predictions, and specify what sort of historical data can be used to test these predictions empirically.

Also, empirical tests of the relevance of culture in economics typically do not distinguish between the various channels of transmission; they mostly assume the relevance of vertical transmission. Cultural-evolution models developed by Cavalli-Sforza (1994) and Boyd and Richerson (1985, 2005) have enriched the number of mechanisms of

transmission, including conformism, imitation of prestigious individuals, and simultaneous sources of transmissible information (including parents, peers and teachers). Whereas laboratory experiments and ethnographic studies of small populations have tested the assumptions included in this type of model and have explored the dynamics of cultural change, little is known at the aggregate level about the existence of these mechanisms.

Researchers could test the existence of cultural-evolution mechanisms at the aggregate level in several ways. For example, some changes occurring over long periods could be better understood using a cultural-evolution approach with precise predictions. Peter Turchin (2003) has suggested that the rise and fall of empires can be analyzed by adapting models of prey-predator interactions; the interaction of cultural processes and the niche parameter that Turchin identifies (success in war, amount of resources, social cohesiveness), led to fluctuations over time, which are similar to historical fluctuations.

Another powerful tool for aggregate-level historical and cultural reconstruction is the use of comparative methodologies based on phylogenetic analysis in biology. This approach has been used in historical linguistics to reconstruct the evolution of human languages and has helped to shed light on the origin of the Indo-European languages.<sup>9</sup> Phylogenetic analysis has also been used to infer the nature of relations between correlated social structures in communities. For example, a correlation between patriliney and cattle keeping in sub-Saharan

African populations can be due to either a common descent (both traits are inherited from a common ancestor who had both) or a functional relation between the traits (for example, cattle keeping tends to generate patriliney). Knowledge of phylogenetic relations is crucial for choosing between the above-mentioned alternatives and could help the interpretation of the empirical analysis in a causal way.<sup>10</sup>

Third, the book could have devoted some space to hypotheses that do not subscribe to cultural-evolution models. Richerson and Christiansen define culture as beliefs, values, norms, and techniques that people acquire by social learning. By contrast, authors such as Weber or Durkheim viewed culture as a “system”—cultural traits persist over generations due to a system of interactions involving not only social learning, but also positive and negative feedbacks between cultural processes and entities, such as institutions.

This alternative view of culture leads to a different way of thinking about the dynamics of persistence and change, stressing local interactions and other processes such as feedback effects with institutions. The type of questions that social scientists can ask with this approach is different. Think back to the evolution of canoes. Though one can trace canoe design throughout history, a cultural-evolution approach is indifferent on how new variants originate, what makes some types persist for a long time, and what leads to abrupt design changes. To answer these types of questions, we need to introduce additional assumptions about the functional relations of the canoes to other aspects of cultures, its position in the network of habits, skills, or institutions. Another example for which a nonevolutionary approach to culture could be more appropriate is the evolution of

<sup>9</sup>One view is that these languages originated with the spread of agriculture from Anatolia 9,000 years ago. Another hypothesizes that their origin lies in the spread of the Kurgan horsemen culture from southern Russia and Ukraine 6,000 years ago. Linguistic analysis based on phylogenetic methodologies has favored the Anatolian hypothesis.

<sup>10</sup>In this case, the analysis favored the functional interpretation. For a discussion of phylogenetic analysis in linguistics, see Mesoudi (2011).

cultural identity: how norms, standards, and routines (such as those related to religious behaviors) evolve; why normative behavior sometimes persisted; and why it sometimes changed abruptly. Perhaps the next step in the research agenda is a major engagement with the view emphasizing the systemic aspect of culture, at least for topics such as the evolution of religion, for which standard cultural-evolution models appear to be less enlightening.

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