**Henrich, Joseph. 2015. *The Secret of Our Success: How Culture Is Driving Human Evolution, Domesticating Our Species, and Making Us Smarter.***
Princeton, NJ: Princeton University Press. xv, 445 pages.
Hardcover $29.95.

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Cultural Evolution is a new interdisciplinary field whose intellectual roots go back only to the 1970s (unless, of course, you count Charles Darwin; but in a sense any new development in evolutionary science can be traced to Darwin). In this new field, "culture" is defined as "socially transmitted information that can affect human behavior." Such transmission can occur through books and manuals, by teaching, or simply by observation and imitation. Cultural variants are information packages that cause people to behave in alternative ways. Cultural Evolution, then, studies how and why frequencies of cultural variants change with time, just as biological evolution focuses on the changing frequencies of genetic variants.

It was during the 1970s when evolutionary scientists started to ask whether the quantitative tools developed for the Modern Evolutionary Synthesis, which had become broadly accepted by that point, could also be useful for studying the evolution of human societies. These pioneers were largely working independently of one another.

Following the publication of *Sociobiology: The New Synthesis* (Wilson 1975) and *On Human Nature* (Wilson 1979), E. O. Wilson teamed up with Charles Lumsden to publish *Genes, Mind and Culture: The Coevolutionary Process* (Lumsden and Wilson 1981). This last book became one of the three foundational texts of Cultural Evolution. The second foundational work was written by the geneticist Luca Cavalli-Sforza and the theoretical biologist Marcus Feldman, *Cultural Transmission and Evolution: A Quantitative Approach* (Cavalli-Sforza and Feldman 1981). The third and ultimately the most influential book, *Culture and the Evolutionary Process* (Boyd and Richerson 1985), was published by the anthropologist Robert Boyd and the ecologist Peter Richerson. This book summarized their papers, written in the 1970s, that developed a mathematical theory of what they called "dual inheritance," a coevolutionary process between genes and culture.

As Joe Henrich relates in the preface of *The Secret of Our Success*, his encounter with Cultural Evolution began after he started graduate school at the University of California at Los Angeles in 1993. While still a graduate student, Joe became a leader in using experimental approaches to investigating cultural variation in how people cooperate (Henrich et al. 2004).

*Secret of Our Success* is an account of the first twenty years of Joe's encounter with Cultural Evolution. It is engagingly written, is illustrated with fun examples, includes autobiographical reminiscences, and (important!) eschews mathematical equations. In this respect it's part of a new trend in publishing, reflecting the invasion by formerly staid academic presses into the turf traditionally occupied by for-profit publishers of popular nonfiction ("trade books").

However, *Secret of Our Success* is much more than a popular book. It addresses the most fundamental questions about our societies. Why are humans so smart and cooperative, compared

to other animals? How do we solve ubiquitous "cooperation dilemmas"?

Before getting to these big questions, however, let's talk about a smaller puzzle. Why do Thai love hot, spicy food and Norwegians don't? It turns out that certain chemical compounds in spices, such as capsaicin in chili peppers, are potent antimicrobials. In hot climates food, and meat especially, spoils rapidly. Spices kill pathogens, and people in the tropics who eat highly spiced foods enjoy better health. So far, this looks like a classic case of natural selection. However, of all animal species only humans use spices to control pathogens. Other animals evolve biological adaptations to safely consume dangerous, toxic foods.

Humans, on the contrary, "devolved" in this respect. Over the last 5 million years, since our lineage diverged from other hominid primates, our digestive apparatus (mouth, teeth, stomach, intestines) became much smaller. We also largely lost our ability to detoxify wild foods. If you try to eat like a chimpanzee (something that the anthropologist Richard Wrangham actually attempted) you will starve to death, unless you get poisoned first.

What happened? According to Henrich, "Culture stole our guts." Evolution sacrificed digestive apparatus so that our bodies could grow oversized brains. And oversized human brains, in turn, made cultural evolution possible. Sacrificing digestive and detoxification functions became possible because of a gene–culture coevolutionary process: in parallel with the evolution of large brains and devolution of guts, humans acquired a remarkable assortment of techniques for processing foods. The most important, of course, is treating food with heat—roasting, baking, boiling, stewing, frying in oil, sautéing, and so on. But cooking in a more general sense also includes chopping, slicing, pounding, grinding, leaching, marinating, smoking, salting, drying, and seasoning. Processing food in this fashion "externalizes" digestion. It makes food much more digestible and, very important, removes dangerous toxins or pathogens.

Unlike detoxification adaptations in other animals, cooking techniques are traits that are transmitted not genetically, but culturally. Thus, the evolution of food processing becomes a subject for Cultural Evolution (recall the definition I gave at the beginning of this article). When a cooking technique spreads through a population, this is cultural evolution. In fact, the initial adoption of chili peppers in Thailand is also an example of cultural evolution, because these cultivars were brought to Southeast Asia by Europeans from the Americas during the Age of Discovery.

We now understand why people in hotter climates use more spices, and why people in cold climates tend to eat bland food. Thus, one cultural variant (seasoning food with copious amounts of capsaicin) spread under a particular set of environmental conditions (hot climate), because there it conferred better health and survival for cultural groups practicing it. But it did not spread in another environment, where it does not result in better health.

But why do inhabitants of hot climates *enjoy* highly spiced food? After all, capsaicin literally causes pain (it activates a pain channel). Capsaicin is *the* active ingredient in Mace!

It turns out that as children grow up in cultures that value highly spiced foods, such as in Mexico, they learn to reinterpret pain signals as pleasure. Their brains are "rewired" (in a metaphorical rather than literal sense).

There is another example in the book, in which cultural transmission *literally* rewires the brain. Cabdrivers operating in London have to acquire "the Knowledge," a memorized map of London's central part, including about 25,000 streets and thousands of landmarks. Not everybody is capable of this feat, but in those taxi drivers who manage it, their hippocampus becomes enlarged by adding a substantial amount of gray matter—the biological wiring of our brains.

Let's step back for a moment. The expansion of human brain size during the last 2 million

years and the expansion of the hippocampus in London cabdrivers are, of course, very different processes. One is a slow evolutionary change of a particular group of organisms, the other is a fast developmental response in one particular organism (well, it takes four years to acquire the Knowledge). But there is also a shared feature. Both examples show that culture and biology (genetics, neurophysiology) are, really, not separate. This continuum between culture and biology is one of the most important threads in Henrich's book. Far from being separate, culture and biology are actually parts of one interacting system, with feedbacks going both ways. This is why gene–culture coevolution is such a central idea in Cultural Evolution. For convenience, a particular study might focus on culture or biology, but if we want to understand human behavior we need to synthesize the two.

What about big questions, such as cooperation and social norms? "Norms" are socially transmitted rules of behavior. Like cooking techniques, they are elements of culture: both are socially transmitted and both affect behavior. But the similarity between social norms and spicy foods goes even deeper than that.

Let's talk specifically about "prosocial" norms that induce people to behave in more cooperative ways. Social cooperation is the all-important glue that enables societies to produce public goods, such as clean air, public roads, and low crime. Public goods benefit all members of a community, or even the whole society, but are costly to produce. As is well known, cooperation is highly problematic from the theoretical point of view, because selfish agents gladly benefit from public goods, but refuse to contribute to them ("defect"). How humans evolved the capacity to overcome this "Cooperation Dilemma" is a big question, which doesn't yet have a universally accepted answer. But most researchers agree that prosocial norms play a very important role in solving this puzzle.

As an example of cooperation, consider meat-sharing, which is the norm in most foraging societies. Meat-sharing has numerous benefits for the group within which it is practiced. First, any particular hunter, no matter how skilled, is not always successful in bringing home game. Sharing ensures that everybody has a moderate amount of meat every day. Not sharing results in long spells of famine, interspersed with feasts (with a portion of the kill spoiling or being wasted in other ways).

Second, a hunter should care about the well-being of others in his tribe. An old man who can't hunt anymore may be an amazing repository of knowledge that can save the whole tribe when a drought strikes (as related in the story about Paralji in *Secret of Our Success*). A pregnant woman, whose husband was killed in a hunting accident, will give birth to a son who will eventually help the other hunters' children against the tribe's enemies. Thus, the whole tribe, including the successful hunter's descendants, benefits from meat sharing.

But when you bring that yummy warthog from a successful hunt, there is a terrible temptation not to share it with others. It's the Cooperative Dilemma all over again. The benefits of meat-sharing are spread thinly over all. Its positive consequences are often deferred into the distant future. Meanwhile, pigging out on the juicy warthog steak is here and now.

This is why you need social norms to help you stick to the straight and narrow. Such "cultural-institutional technologies" make sharing psychologically easier and prevent free riding. One kind of such a social technology is *meat taboos*. Among some Kalahari foragers, for example, "the hunter himself could only eat the ribs and a shoulder blade; the rest of the animal was taboo for him. The hunter's wife received the meat and fat around the animal's hindquarters, which she had to cook openly and share with other women (only). Taboos prohibited young males from eating anything except abdominal walls, kidneys, and genitals." These taboos essentially guaranteed that a large carcass would be widely distributed across the whole band.

I don't know how deeply internalized these food taboos are in the Kung. But food taboos

in general can be very powerful because they plug into one of the most basic emotions: disgust.

Food taboos are just a special case. More generally, what deeply internalized social norms do to most of us is rewire our brains to feel inappropriate pleasure as pain (just like chili peppers, although in that case pain is rewired as pleasure). It's interesting that norm-breaking often evokes disgust ("what he did made me sick to my stomach"). Cultural groups whose members internalize prosocial norms will sustain a higher degree of within-group cooperation—and will win and spread at the expense of other, less cooperative groups. And the prosocial norms will spread with the winning tribes.

In the preface, Henrich writes, "Intellectually, I was also keenly interested in the evolution of human societies, particularly in the basic question of how humans went from living in relatively small-scale societies to complex nation-states over the last ten millennia." *Secret of Our Success* doesn't really sink its teeth into this question, as the bulk of it is devoted to human evolution preceding the great transition of the last 10,000 years. This is where my own *Ultrasociety: How 10,000 Years of War Made Humans the Greatest Cooperators on Earth* (Turchin 2016) picks up the story of human history. Interestingly, Amazon.com, very appropriately, often pairs our two books as "frequently bought together."

I also "converted" to Cultural Evolution in the mid-1990s, but whereas Joe moved from the bottom up, running behavioral experiments that probed why people in small-scale societies cooperate, I approached the subject from the opposite direction. Soon after I became interested in applying the scientific method to the study of history, I realized that Cultural Evolution provides us with an invaluable set of conceptual and mathematical tools to build and test theories about the evolution and dynamics of large-scale complex societies. *Ultrasociety* is more work-in-progress than *Secret of Our Success*. But it's becoming increasingly clearer how Cultural Evolution will help us solve age-old questions about human societies. In particular, it helps us understand how prosocial norms spread and why they can be internalized.

Evolution of prosocial norms is a big subject in *Secret of Our Success*. It is, indeed, one of the major contributions from Cultural Evolution to the question of how complex societies are organized and function. Of course, the study of social norms and institutions has not been neglected in the social sciences (it's the subject of the New Institutional Economics, for example). But institutionalists in social sciences tend to focus on norms and institutions as "rules of the game," rather than why such rules are internalized. Yet, no matter how well an institution is designed, it will not ensure cooperation if people don't internalize prosocial norms. Rules can only work when following them becomes a preference that has intrinsic, rather than instrumental, value. In other words, people need to feel good about doing right. To put it crudely, their brains need to be rewired to experience pleasure while sacrificing time, effort, food, money, and so on for the common good. Biology (genetic influences on behavior, physiological and neurophysiological mechanisms, and so on) plays a very important role in this.

We live in exciting times, when science is making great strides in understanding how social and biological influences on human behavior interact and what makes our wonderful complex societies work (or not). Cultural Evolution provides us with an indispensable set of tools to untangle the interactions between the social and biological factors. My review has barely scratched the surface of the great variety of topics covered in *Secret of Our Success* (I didn't even talk about the Lost European Explorer Files). It goes without saying that my strong recommendation is to read the book. I'll say more: *Secret of Our Success* is going to be a field-defining book for Cultural Evolution in the next decade.

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