

EVOLUTION, CULTURE, AND THE HUMAN MIND

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1

Introduction

ARA NORENZAYAN, MARK SCHALLER,
and STEVEN J. HEINE

How and why does the human mind work the way it does? Consider two very different perspectives on this important question.

One influential perspective emerges from the study of human evolution: The basic psychological repertoire of the human species consists of adaptations, or their by-products, accumulated over the course of a very long evolutionary history. Key aspects of our emotions are adaptations, as are specific aspects of cognition. Many basic behavior patterns can also be conceptualized as adaptations, such that we respond to environmental cues with behaviors that, in ancestral environments, were associated with incremental advantages in reproductive fitness. In sum, the workings of the human mind—and the resulting psychological phenomena—must be considered the product of evolution.

There is a second influential perspective, provided by the study of culture: Our psychological experiences and responses to the world are fundamentally shaped by cultural learning. Other animal species may show evidence of some of the things that are commonly associated with the concept of culture (socially transmitted traditions, between-group differences that are independent of reproductive events), and there is lively debate over the extent to which chimpanzees, whales, and songbirds might be considered cultural species as well (e.g., Whiten, 2005), but there is no debate about whether humans are a cultural species nor is there any doubt that human life (and human reproductive fitness), compared to that of other species, is fundamentally connected to the complex sets of shared symbols, meanings, rituals, and behavioral norms that make up the cultures that we create, inhabit, and pass on to our descendants. The process of enculturation starts from birth, and the human brain develops in a cultural context. Abundant bodies of evidence document pervasive cross-cultural differences in psychological phenomena and thus attest to the many ways in which even our most basic thoughts, feelings, and behaviors are culturally shaped.

These two perspectives, and the enormous amounts of scientific research that they have generated, compel two fundamental conclusions: The human mind is the product of evolution, and the human mind is shaped by culture. These conclusions are, we think, unassailable.

Given these two conclusions, it might be expected that psychological scientists would have invested considerable energies to understand exactly how these two perspectives fit together in a rigorous and conceptually coherent manner. But, no, that hasn't been the case. For the most part, inquiry in evolutionary psychology has proceeded independent of inquiry in cultural psychology (Norenzayan, 2006). Evolutionary psychological research documents the many specific ways in which evolutionary adaptations appear to govern the operations of the human mind. But because an evolutionary approach compels researchers to focus on species-typical—and thus universal—elements of human cognition, these inquiries only occasionally grapple seriously with questions about human culture and cross-cultural differences. In contrast, research in cultural psychology has focused primarily on the many ways in which psychological phenomena are shaped by different cultural experiences. Because the focus is on cultural variability (rather than pan-human universality), these inquiries rarely consider evolutionary processes. The upshot is that, even after several decades of intensive research on human evolutionary universals and on cross-cultural differences, there has been little in the way of rigorous theory and research linking these two perspectives together.

But that is now changing, and that's what this book is about.

THE INTEGRATION OF EVOLUTIONARY AND CULTURAL PSYCHOLOGY AND WHY IT MATTERS

The seed of this book was planted several years ago at a historic gathering that took place at the University of British Columbia in Vancouver, Canada. Supported by generous funding provided primarily by the University of Hokkaido and the American Psychological Association, dozens of scientists (primarily evolutionary psychologists and cultural psychologists, along with a smattering of biologists and anthropologists and other scholars from related disciplines) came together with the explicit goal of forging meaningful integrations between evolutionary and cultural perspectives on the human mind.

Doing so isn't easy. The difficulty arises not because of any inherent incompatibility between these different perspectives but because these two different perspectives typically imply two distinct sets of questions, and these sets of questions don't necessarily overlap in obvious ways. Forging coherent integrations requires scientists to step outside of the comfort zone of the research questions that they are accustomed to addressing with empirical data and instead to ask a broader, more ambitious, and less wieldy set of questions altogether: Exactly which psychological phenomena are universal and which are culturally variable? How does culture itself fit into an evolutionary perspective on human nature? What specific evolutionary pressures gave rise to the human capacity for culture? Did this capacity alter the processes of natural selection itself, and if so, how? What is the

cognitive architecture of this capacity, and what are its consequences? How exactly can substantial cross-cultural differences in psychological functioning arise from evolutionary adaptations that are, at some level, universal across human populations? And so on. These questions pose substantial challenges, both conceptually and empirically. But there are also substantial benefits to be gained by rising to these challenges.

First, this integrative program of inquiry may help put an end to the common and troubling misconception that there is some inherent epistemic gulf between evolutionary and cultural perspectives on human psychology. This persistent misconception has its roots in the hoary myth of “nature versus nature”—a false dichotomy that continues to haunt the psychological sciences, to the intellectual detriment of the discipline. It will be valuable to any enthusiast of the psychological sciences to think in deeper, more sophisticated ways about evolutionary and cultural perspectives on the human mind and how they complement each other.

Rigorous psychological research of this sort also stands to make a substantial contribution to broader scientific conversations about evolution and culture. Although it has been largely overlooked within the psychological sciences, the complex relationship between evolution and culture has been an important topic of inquiry in other social and biological sciences (e.g., Richerson & Boyd, 2005). There is considerable scientific interest in adaptations for culture, and their specific cultural consequences, and the ways in which these consequences alter the process of natural selection itself. Psychological scientists are perfectly poised to contribute in novel and exciting ways to these multidisciplinary research programs. After all, evolutionary processes operate on the phenotypic traits expressed by individuals, including individuals’ cognitions, decisions, and actions. Moreover, cultural norms (which guide individual behavior) are themselves the collective consequence of individuals’ cognitions, decisions, and actions (Schaller & Crandall, 2004). Individuals’ cognitions, decisions, and actions are exactly the sorts of things that psychologists are especially adept at studying. In short, as it has become increasingly clear that a complete articulation of the complex relations between evolution and culture demands attention to the human mind, it has also become clear that psychological scientists must contribute more fully to this conversation.

And, of course, this is just flat-out exciting intellectual territory. There is a great deal we do not yet know about how the pieces of the puzzle—evolution, culture, and the human mind—fit together. The topic is fertile ground for novel theories and new empirical discoveries. These discoveries will contribute importantly to the psychological sciences and will be of considerable interest across a broad range of social and biological sciences as well.

OVERVIEW OF THE BOOK

We begin with a set of five chapters that, in various ways, show how cultural and evolutionary perspectives can fit together within the psychological sciences. Rozin explains why there is no incompatibility whatsoever between evolutionary and cultural perspectives on the human mind. Baumeister discusses a variety of ways in which evolutionary processes created the psychological building blocks necessary

for human culture to exist. Chiu, Kim, and Chaturvedi summarize the continuing relevance of Donald Campbell's seminal contributions to the simultaneous study of evolution, culture, and cultural evolution. Dutton and Heath address the topic of cultural evolution. They show how selection, transmission, and retention mechanisms can explain why some knowledge structures become and remain culturally popular while others don't. Kirkpatrick draws on recent advances in evolutionary psychology to describe how a focus on psychological adaptations is necessary to forge connections between the mechanisms of genetic evolution and cultural transmission.

Whereas the first set of chapters emphasizes basic processes that are relevant to understanding culture in all its many manifestations, the second section of this book highlights specific ways in which an evolutionary perspective can help us understand particular prototypic aspects of human culture. Gangestad describes how an adaptationist framework can help frame questions about the many specific things that are central to any definition of human culture. This is followed by two chapters that employ evolutionary frameworks to understand human religions and religious beliefs. Solomon, Greenberg, Pyszczynski, Cohen, and Ogilvie locate one particular theory of cultural origins (terror management theory) within an evolutionary perspective and, in so doing, suggest that supernatural beliefs may arise from specific adaptations. Shariff, Norenzayan, and Henrich show how moralizing religions and cooperative tendencies in large groups might have coevolved. Nesse also focuses on human cooperation as a defining feature of human culture and suggests that it may result in part from a specific form of natural selection: social selection. Kameda, Takezawa, Ohtsubo, and Hastie describe an adaptationist perspective on egalitarian beliefs and discuss its implications for social justice and for cultural variability in justice systems.

In the third and final section of this book, we turn our attention to the fact of cultural variability and speculations about the evolutionary roots of cross-cultural differences. Roberson describes a line of research that documents important cross-cultural differences in color vision. These findings underscore the point that even the most ostensibly "pure" psychological phenomena are influenced by culture. Yamagishi and Suzuki summarize an approach to thinking about culture as a self-sustaining system of beliefs and illustrate this approach with many examples that reveal how culture governs individual preferences, decisions, and actions. Kitayama and Bowman draw further attention to one fundamental dimension of cultural difference (the individualism–collectivism dimension) and its psychological consequences and offer one perspective on why these cross-cultural differences might exist. Daly and Wilson focus on another paradigmatic dimension of cultural variability (differences in a "culture of honor") that has important implications for aggression and violence. They reinterpret the cross-cultural evidence within an evolutionary framework. Schaller and Murray describe how different attitudes, values, and behaviors may have different consequences on reproductive fitness depending on the prevalence of pathogens in local ecologies. This evolutionary analysis successfully predicts a wide range of important cross-cultural differences in traits, values, and belief systems (including differences along the individualism–collectivism dimension). Finally, Kenrick, Nieuweboer, and Buunk show how cultural variability in mating systems can reflect deeper evolutionary universals. They

use this example to illustrate how an evolutionary analysis is essential to the simultaneous articulation of cultural similarities and cross-cultural differences.

ENVOI

The successes of cultural psychology and evolutionary psychology have fundamentally altered the landscape of the psychological sciences. But these successes create potential traps as well. By amassing large (and largely independent) literatures, and by creating conferences and journals that are specific to their subdisciplines, cultural psychologists and evolutionary psychologists have perhaps found it too easy to ignore each other's work. This book shows a way out of that trap.

Evolutionary and cultural perspectives on the human mind aren't incompatible or irrelevant to each other. Quite the contrary. The origins of human culture (and cross-cultural differences) cannot be fully understood in the absence of evolutionary considerations. Evolutionary psychologists cannot fully explain individual psychological responses without considering the fundamental "culture-ness" of human behavior. Genes and culture are mutually necessary for a complete scientific understanding of the human mind.

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2

Towards a Cultural/Evolutionary Psychology *Cooperation and Complementarity*

PAUL ROZIN

We start with the assumption that individual men possess authentic properties distinctive of *Homo sapiens* and that their actions in society alter them in authentically distinctive ways. (Asch, 1952, p. 119)

In about the past two decades, psychology has been blessed by the development of two new subfields, evolutionary and cultural psychology. Each has provided an important perspective and corrective to what has come before. Evolutionary psychology brings to bear on the phenomena of psychology one of the greatest scientific theories of all time. It introduces the important idea of domain specificity into a psychology previously dominated by general process theories, enriches psychological understanding with evolutionary and adaptive explanations, and places human behavior and mind in their natural context. Cultural psychology calls the attention of psychology to one of the most powerful forces, perhaps *the* most powerful force, that shapes human beings, challenges universal principles of psychology from a direction different from evolutionary psychology, and also emphasizes that humans must be studied in context. Both bring important new questions to the forefront of psychology. We should celebrate these accomplishments and recognize that the two together can do much more than either alone, not just because each can add to our understanding but because there is an interaction effect: They can each improve the other.

Consider the following scenarios. There are important problems to be solved. X has some of the tools to solve them, and Y has the materials to apply the tools to. Should X and Y cooperate? Of course.

In more detail, imagine two sets of researchers working within different paradigms. One group, E, has behind it a powerful, well-articulated, and detailed theory. Because, however, (a) the events the theory refers to are primarily in the distant past, (b) the fundamental process studied takes a long time (many generations) to show marked effects, and (c) the past residues (fossils) that are critical data are particularly lacking in the topic of interest (behavior and mind), the gathering of data and the testing and confirmation of hypotheses are extremely difficult. The second group, C, doesn't have a really good theory, but the events it studies are relevant to a variant of the great theory Group E works with. For the case of the phenomena studied by C, the relevant data are very accessible, occur in the present and recent past, provide a superb record of past events, and change very rapidly, in terms of months, years, decades, or at most centuries. Group E has a strength and weakness, and Group C has a complementary weakness and strength. Given that Group E's theory has substantial and easy application to the phenomena of Group C, Group E should be elated to have a much better testing arena. Group C should be delighted to be able to work from a strong theory.

Of course, Group E is evolutionary psychologists, and Group C is cultural psychologists. They should love each other. Instead of fighting over whether 10% or 90% of the variance in human functions is attributable to genes or culture or what percentage of cultural universals can be accounted for in terms of human evolution, they should be celebrating and sharing each other's strengths.

The matter is simple. Cultural evolution, broadly construed, is a principal account for cultural differences and cultural change. Biological evolution and cultural evolution share many important components: both depend essentially on variation, transmission, and natural selection. The differences between biological and cultural evolution are just what allows for a much speeded up evolution, one in which principles of natural selection, the core idea of evolution, can be seen to be at work rampantly, rapidly, and with clear measures. The evolutionary psychologist does not have a good fossil record of behavior or mental events, whereas the cultural psychologist has actual records of these events, in the form of writing for many thousands of years, of intentionally preserved artifacts, and, in most recent times, of photography, sound recording, and video. And with the speed of cultural evolution (look, for example, at fads in first name popularity, or the shift from landline phones to cell phones, or the entry of television into American life), prospective data can actually be collected and detailed archived data can be accessed. For at least decades, national random sample surveys have been carried out, with data available, on beliefs and practices of individuals in many parts of the world. This is the perfect raw material for evolutionary analysis. To add to this opportune cooperation, the forces of biological and cultural evolution interact with each other in recent human history.

The idea that the best arena for evolutionary theory in the domain of human activities is culture is hardly new with me. Donald Campbell (1965) among others pointed this out, and systematic efforts to apply evolutionary ideas to culture have been promoted and elegantly demonstrated by a number of investigators, most notably Durham (1991), Boyd (1985), Richerson and Boyd (2005), Wilson (2002), and Mesoudi, Whiten, and Laland (2004). Richerson and Boyd (2005), in *Not by*

Genes Alone, did a splendid job of arguing the case both for the importance of the principles of biological evolution in understanding cultural evolution and for the fact that cultural evolution is much more important than biological evolution in accounting for what has been happening in the world and mind of humans for the past thousands of years. (A paper by Newson, Richerson, and Boyd [2007] summarized many of the principal points in the Richerson and Boyd book.)

EVOLUTIONARY AND CULTURAL PSYCHOLOGY

All of psychology is about understanding animal and human behavior, mental events, and the worlds in which animals and humans live. For the case of humans, much of this world was actually made by prior humans. The goal of evolutionary psychology is more focused than that of cultural psychology. Evolutionary psychologists are interested in a particular type of understanding, which I have called *evolutionary-adaptive explanation* (Rozin & Schull, 1988). The focus of interest is dual. First is creating the history of any particular manifestation over a time period that extends before the lifetime of the current generation and often goes back thousands of years or more. Second is explaining contemporary behaviors, mental events, or environments in terms of the adaptive (survival) function that promoted their existence. These are extremely important aspects of understanding and are also difficult to accomplish, because they involve study of times long past, for which there is a minimal record. Cultural psychologists are interested in a wider variety of accounts, including describing cultural differences and similarities and explaining immediate and remote causes of these manifestations. The remote cause account in cultural psychology focuses on the period between birth and adulthood, what we can call *developmental explanation* (Rozin & Schull, 1988). There is also, however, a substantial interest in cultural psychology in explaining causes that are more remote than those within the lifetime; that is, evolutionary as well as development causes. And of course, function and adaptation are important aspects of explanation in cultural psychology.

Evolutionary psychologists can harness evolutionary theory, genetics, and extensive knowledge of nonhuman primate behavior and inferred information about early humans. It is incontrovertible that humans are primates and that they have a whole set of adaptations and features that they share with other primates, including, of course, almost all of their genes. But it is just as obvious, at least to me, that most of what humans do cannot be *directly* traced to our primate origins. Our movies, novels, work, eating, and sociality take on very special forms that have built on the primate base but are often very different from their primate precursors. Forks and knives and dinner parties don't have clear forbears. So if we are trying to explain the contemporary human condition, it seems clear to me that most of the variation in humans involves substantial cultural acquisition, within the lifetime. Put another way, culture and the environment (including the effects of cultural evolution) explain most of the variance. But culture is, to a large extent, what is acquired in development and the residues of past lives as expressed in the environment, including the institutions in the environment. The contents of culture have a history, and they have evolved, by the process of cultural evolution,

so that cultural evolution plays a central role in understanding culture and hence contemporary human beings.

Evolution and Culture: Nature and Nurture

The opposition between evolutionary psychology and cultural psychology has its parallel in the much older nature–nurture debate. Although many have commented that it is rarely nature *or* nurture, the arguments continue. The nature folks have one big advantage over the nurture folks: They have classical genetics and modern molecular genetics to provide models, units, exemplars, and processes. The nurture folks don't have a very comprehensive and well-documented theory of how experience works, of how the environment changes behavior. This parallels the difference between evolutionary psychology and cultural psychology. In my judgment, in both cases the evolution–nature folk have by far the best theory, but the cultural–nurture folks have a wider range of things that they can in principle explain; that is, they have most of the variance. And in many cases, what they are studying is more susceptible to experiment. The physical and social environments have enormous influence on individuals, but we don't have a great theory to encompass this. What we must remember is that one can separate the quality of theory from the range of domains on which it is applicable. Whatever one's position on the relative importance of nature and nurture (and our irresistible urge to make claims in terms of explaining variance, etc.), it is surely true that the range of phenomena explainable by nurture, “divided by” the quality of our theoretical models, is a much smaller number for nature than for nurture. If one wishes to work only where there is most light (explanatory power), we all have the option of physics, but we must keep an eye on the type of phenomena we are trying to explain. So nature (e.g., behavior genetics) and evolutionary psychology both share important theoretical material and mechanisms and probably can account for much less than half of what we try to understand in psychology. Nurture theorists and cultural psychologists don't have very elegant or comprehensive theories (what are powerful theories of the way the environment affects us: some principles of learning, ideas about social influence?), but they have most of the phenomena.

What is special about the evolutionary and cultural psychology distinction is that, unlike nature and nurture, the evolutionary principles are powerfully important in explaining much of what cultural psychologists are interested in. Cultural evolution is powerful.

Predispositions, Constraints, and Defaults

Both biological and cultural evolution, and human function as well, are molded to a large degree by predispositions and constraints. Reflexes account for little interesting human function. Evolution often acts by inclining an organism to perform in a certain way (predispositions) or excluding certain options (constraints). This is clearly the case for the laws of learning, as, for example, the predisposition to associate tastes with certain gastrointestinal events. Similarly, cultures operate primarily through predispositions and constraints. Most people are capable of

understanding how another culture looks at the world, but it is not their inclination to do so, because of socialization. I have identified this in terms of cultures operating by promoting default ways of looking at the world (Rozin, 2003).

One of the big default differences highlighted in cultural psychology is the difference between focusing on harmony and focusing on agency or valence. Thus, in a study originally done by Menon and Shweder (1997) and expanded by me (Rozin, 2003), Americans and Asian Indians were asked what does not belong of the three terms: *anger*, *shame*, *happiness*. Almost all Americans say *happiness*, because it alone is positive. Indians are inclined to say *anger*, because, as they explain, shame and happiness are socially constructive and anger is socially destructive. This is a first parsing on these terms. People in either culture can understand the other culture's default parsing of these terms, once it is explained to them. They just don't tend to think that way. The first parsing an individual makes of something is very important, because the usual process of thinking proceeds from that first default rather than from considering alternative framings.

APPLYING BIOLOGICAL EVOLUTION TO THE STUDY OF CULTURE AND CULTURAL EVOLUTION

In this section, I consider some of the basic ideas in biological evolution and how they apply to the study of cultural psychology and, to some degree, psychology in general. Richerson and Boyd (2005) made the most articulated and systematic attempt I know of to show how we can turn principles of evolutionary psychology into the understanding of culture on its own terms. Population thinking, central to thinking about evolution, can certainly be applied to cultures and cultural change. For example, the S-shaped curve describing the growth of an adaptive new variant, in biology or culture (Girifalco, 1991; see also Figure 2.1), has the same mathematical properties because of the way natural selection works and the way that transmission occurs. The Internet can speed up this process enormously, but the S shape remains, with slow adoption at the beginning and end of the penetration of a new variant and faster adoption in the middle period.

The three essentials of biological evolution—variation, transmission, and natural selection—will now each be examined with respect to their relevance to cultural evolution (see Mesoudi et al., 2004, for a similar set of arguments).

Variation

Darwinian evolution depends on variation. Without it, natural selection cannot operate. Heritable variation occurs randomly, principally through mutation and recombination in the biological world. But in the cultural world, variants are intentionally produced. One does not have to wait until a harder material can accidentally be flaked to produce an arrowhead; one can actively look for a harder material and a way to shape it. We do not have to wait for cars to get gradually bigger so that they can haul tree trunks; we can design a bigger car. We don't have to wait for the highly improbable merging of a calculator and a typewriter; we can just do it when

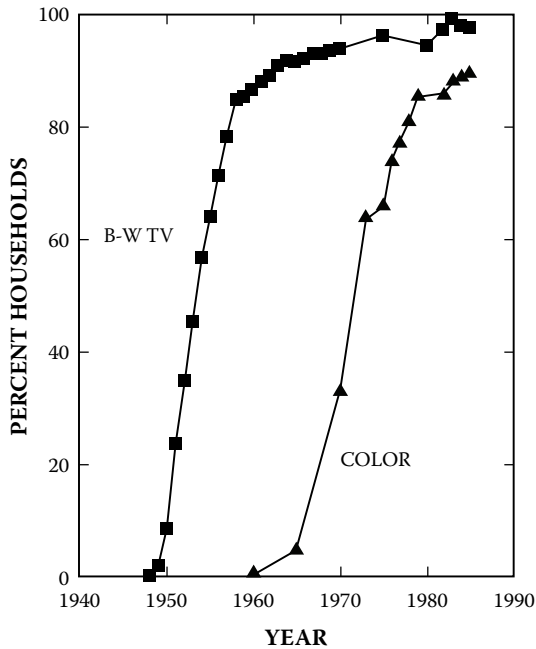


Figure 2.1 Percentage of households adopting black-and-white and color televisions in the United States between 1940 and 1990 (from Girifalco, 1991).

we get the idea and get a computer. If the path to an adaptive new variant involves going through a malfunctioning phase, it is fatal in biological evolution, but human persistence can keep this process going until success is achieved. There are five big advantages in the domain of variation for the cultural evolutionist: One, there are many more variants; two, we have a clear record of them; three, cultural variants can be intentionally produced; fourth, as a result of three, cultural forces allow for the evolution of an adaptation that has to pass through a maladaptive transitional stage; and fifth, groups of people over generations can be involved cumulatively in the production of variants.

Transmission

There are understandable arguments about both the units of transmission and the process of transmission in cultural evolution. The clarity of the genetic unit and genetic assortment is not carried over into cultural evolution. One can, however, understand a process without understanding what the unit is. The best example is Darwin's theory of evolution, expressed in a rich form without knowledge of the units of inheritance (or even that there was a genotype). Dawkins (1976) provocatively suggested the "meme," and arguments abound as to whether this is the only or even an appropriate unit. But what is critical is the process of transmission, as opposed to the unit. Here, those few interested in cultural evolution have ample models, some originating from research in social psychology. There are two types

of questions about transmission: The first is the source of transmission, and the second is the process through which transmission occurs.

As to source, Cavalli-Sforza, Feldman, Chen, and Dornbusch (1982) indicated three pathways: vertical (transgenerational, typically parent–child), horizontal (siblings and peers), and oblique (usually one to many, as by teachers or the media). Vertical transmission allows for both genetically determined and acquired features. Somewhat surprisingly, parent–(adult) child resemblance for preferences (e.g., for food or music), which incorporates both genetic and early experience influences, is low (averaging about $r = .15$; Rozin, 1991). Thus, it appears most variation in preferences comes via horizontal or oblique sources. Moral positions (e.g., religion, moral attitudes) show a higher parent–child correlation (Rozin, 1991).

The transmission process for cultural evolution is actually a set of processes. Richerson and Boyd (2005) presented a useful taxonomy (see also Newson et al., 2007). Transfer of information for nonhumans and ancestral humans can occur by observation and by imitation. Explicit teaching seems to be a uniquely human activity. Information transfer in humans was massively increased by a number of uniquely human adaptations or inventions: first language, then narrative, then writing, then photography and video, and now the Internet. A new variant can broadcast to half of the world in hours through personal chain messages or news services on the Internet. Written language and the newer visual and digital media provide a highly accurate means of transmission. People are influenced by norms, and hence the more frequent a variant is, the more likely it is to be adopted. This dynamic generates the ubiquitous S-shaped curve, a feature of transmission and natural selection, in biological evolution and cultural evolution, well illustrated by the acceptance of innovations and new technologies (Girifalco, 1991). Figure 2.1 dramatically displays the rapid S-shaped spread and adoption of both black-and-white and color televisions in the United States. In both cases, the innovation went from being uncommon to very common over about a decade.

The cultural transmission process centrally involves psychology and communication. In fact, an argument can be made that given human cognition and motivations, interpersonal interactions and communication, and differences in ecology and geography across the earth, culture (and culture differences) is virtually an inevitable by-product (Conway & Schaller, 2007). As Conway and Schaller phrase it, “Communication is necessary for culture,” and, “Communication is sufficient for culture.” Imitation and teaching are deeply psychological processes. The fitness of variants, that is, their success in being communicated and transmitted, depends on both their utility and their “communicability.” Recent work (e.g., Heath, Bell, & Sternberg, 2001; Schaller, Conway, & Tanchuk, 2002; summarized in Conway & Schaller, 2007) has emphasized the psychological variables, such as memorability, attention-getting potential, social “interest” (attracting commentary), and emotionality, that help to propel a variant into a cultural norm.

Natural Selection

Natural selection is the key concept in biological evolution, perhaps the most powerful process at work in the living world (Dennett, 1995). It follows incontrovertibly

from variation and transmission. It is deeply the same process in biological evolution, cultural evolution, capitalism, and instrumental learning. Lamarck's powerful but incorrect idea about biological transmission of learned acquisitions across generations may have proved untrue, but it is the core of the process of transmission in cultural evolution, and it accounts, along with media such as language, writing, visual media, and digital media, for the cumulative nature of the expansion of cultures. In addition to Lamarck's idea, a powerful form of group selection is at work in cultural evolution. The idea of group selection has been controversial in biological evolution, although it is now resurfacing in biological evolution (Wilson, 2002). There is no doubt, however, that "group selection" operates forcefully at the level of small or large human groups (Richerson & Boyd, 2005; Wilson, 2002).

Inclusive fitness, the coin of the realm for biological evolution, is often replaced by other selection criteria as a result of social consensus; money, influence, power, and prestige can come to dominate procreation in cultural evolution. The low birth rates in the wealthiest countries in the world are ample indicators of this.

What we have, then, in cultural evolution is a rapidly accelerated and expanded version of biological evolution. Intentional variations bridging local minima, rapid and worldwide transmission, and culturally induced strong selection pressures can collapse millennia of biological evolution into years, as shown in Figure 2.1. The power of the principles of evolution is apparent to all in modern developed cultures, as we see the rapid advances of technology. They are so rapid that there is now a major form of vertical transmission from child to parent, as the youngsters help their parents and grandparents navigate the Internet, master their new video recorders and cameras, and digitally manage their finances. A particular feature of biological evolution that blossoms in cultural evolution is preadaptation.

Preadaptation: Important in Biological Evolution, Much More Important in Cultural Evolution

Preadaptation, the use of an entity that evolved for one purpose in another context or system, is a major feature of biological evolution (Bock, 1959; Mayr, 1960; renamed *exaptation* by Gould & Vrba, 1982). Mayr (1960) identified preadaptation (as opposed to mutation) as the principal source of major changes in evolution. The most familiar example in vertebrate evolution is the conversion of a jaw articulation in fish into the middle ear bones of the mammalian ear. In some cases, such as the middle ear bones, the original adaptation is disassembled. In other cases, such as the use of the mouth (evolved for eating and breathing), including the teeth and tongue, for expression of language in humans, the original function is maintained. There are many specific adaptations that would be adaptive in new contexts. Examples include the first synapses or neurons (presumably tied to a specific narrow function), lateral inhibition, neural circuits that instantiate diurnal and other rhythms, initially localized neurotransmitters, principles of association (presumably initially evolved in a specific context such as avoiding aversive stimuli or approaching food), chunking in memory, and so on. The problem in biological evolution is creating either a duplication of a circuit or a connection into an existing

circuit so that a new module could access an adaptive specialization or module (Rozin, 1976). Even with this enormous problem challenging either the organization of the genome itself and/or the major constraints in development of the nervous system, preadaptation is a very important aspect in biological evolution.

In cultural evolution, the constraints that limit preadaptation in biological evolution are relaxed or even eliminated. An individual human being can see the value of an existing system (whether biologically programmed or socialized through culture) in a new domain and just apply it. Great inventions such as writing and the wheel spread rapidly and widely to many aspects of human life by the process of cultural preadaptation. Preadaptation is a major feature of cultural evolution.

Preadaptation and Virtues and Shortcomings of Carrying Mainline Psychology Over to Evolutionary and Cultural Psychology

There is a special case of preadaptation that applies to the development and evolution of the fields of psychology and its two new offspring, evolutionary and cultural psychology. The model of natural science, developed in the physical sciences, was preadapted for research in biology and psychology. The interplay of theory and data, the idea of testing theories, the idea of careful and objective measurement, and the idea of an experiment all adaptively direct research in the historically new areas of the behavioral sciences. These invaluable features of science were imported into psychology in the first half of the 19th century, and in the past 20 or so years, they have been transferred from mainline psychology to two of its newest offspring, evolutionary and cultural psychology. But, as I have pointed out elsewhere (Rozin, 2001), psychology has adopted only some of the basic features of natural science, and it is only these that have been transferred to cultural psychology and, to a lesser extent, evolutionary psychology.

Progress in physical and biological science, with the scientific method, was generally preceded by careful description of the phenomena of interest. This description often took the form of describing functional relations (as between the volume of a gas and its temperature), and, of course, for Darwin it involved careful description of different species in their natural environments. This piece of basic science has been endowed with negative prestige in modern psychology. Experiment should *follow* careful description in natural settings, and description of major functional relationships. This is particularly clear not only in the development of the psychology of learning in the behavioristic tradition but also in modern social psychology. As Solomon Asch, the seminal figure of the 20th century in social psychology, noted,

If there must be principles of scientific method, then surely the first to claim our attention is that one should describe phenomena faithfully and allow them to guide the choice of problems and procedures. If social psychology is to make a contribution to human knowledge, if it is to do more than add footnotes to ideas developed in other fields, it must look freely at its phenomena and examine its foundations. (Asch, 1952, p. xv)

Cultural anthropologists have done some of this work for cultural psychologists, in their ethnographies, but these get little attention. Also, the focus of cultural psychology, like the social and cognitive psychology it derives from, has been mental events and has drifted away from behavior (Baumeister, Vohs, & Funder, 2007). Ethnographies have been more behavioral in character. From my perspective, cultural psychology should pay much more attention to behavior, environments, and institutions and not make the same mistakes made by social psychology. Mental and more extended behavioral ethnographies deserve high priority and respect. It is nice to test an idea with sophistication, but it is at least as important that the idea being tested manifests itself in important contexts in real-world settings.

DIFFERENT DOMAINS AND DIFFERENT ROLES FOR CULTURE AND EVOLUTION: FOOD VERSUS SEX

I have focused on the way that evolutionary thinking can be applied to a major issue in cultural psychology, and that is cultural evolution. There are other areas of interaction. One, of course, has to do with cultural and biological cultural coevolution (e.g., Durham, 1991). A second is the idea of domain specificity, which entered late into psychology (e.g., Fodor, 1983; Rozin, 1976; Rozin & Kalat, 1971). It has been embraced by evolutionary psychology, because it seems to be generally characteristic of the way things have evolved (e.g., Tooby & Cosmides, 1992). That is, evolution is likely to begin with adaptation to a specific problem. Although this is sometimes taken to mean that everything is domain specific and modular, there is no reason to believe such a strong claim, but a weaker version surely holds. An adaptation (presumably via preadaptation but possibly by independent reinvention) can go from being very domain limited to available in some domains to generally available and even consciously stated (Rozin, 1976).

The domains of life such as sleeping, eating and food, work, sex, sociality, leisure activities (e.g., the arts, sports), and religion correspond to the focus of description of a species in zoology and of cultures in cultural anthropology. However, they receive almost no attention in social psychology (Rozin, 2006), and this feature of social psychology has been transferred to a large degree to cultural psychology. Cultural psychology is organized like social psychology, in terms of psychological processes. In this section, I propose to indicate how important domains are in both evolutionary and cultural psychology, by contrasting two major domains, sex and food.

Without sex, that is, sexual reproduction, there is no evolution in most species. Without food, there is no opportunity to grow to an age in which sexual reproduction is possible. Sex and food are essentials in evolution, in species survival. Most evolutionary biologists would agree that food, as opposed to sex, is the major force in directing evolutionary change. The reason is that finding, selecting, and capturing food make great demands on a species. It is probably true that the most useful single piece of information about an unknown species, other than its taxonomic status, is what it eats. Sensory systems, motor skills, and many other features of the organism are largely dictated by feeding. Basic changes in food selection and food availability (most notably the development of agriculture and domestication)

are foundational in understanding human cultural evolution (Diamond, 1996). The reason for this dominance of food over sex, especially for human evolution, is that food identification, for a generalist animal, is an extraordinarily difficult problem. Food selection in generalists such as humans is what Mayr (1974) called an open system, a system underdetermined by genetic adaptations. This underdetermination results in part because of the enormous variety of forms that nutrients can be packaged in and, simultaneously, the enormous variety of forms that toxins can be packaged in. Mate choice, in contrast, is a much more circumscribed activity, under more genetic control. It is what Mayr (1960) called a closed system.

Evolutionary psychology has paid more attention to sex and mate selection than any other domain of life. The degree of attention to sex is clear in *The Handbook of Evolutionary Psychology* (Buss, 2005), which has six chapters about mating and none about food. Why? The sex bias in evolutionary psychology is understandable, because the primate origins of human sexual behavior are much more direct than the primate origins of human eating. Chimpanzee and human mating are a lot more similar than chimpanzee and human eating.

The understandable focus of evolutionary psychology on sex should be paralleled by a major focus on food in cultural psychology, but it is not. There is one chapter on food, by me, in the new *Handbook of Cultural Psychology* (Kitayama & Cohen, 2007), and this is because of my intervention with the editors to allow me to write such a chapter (they obviously agreed). Briefly, I would like to explain why human relations to food are central to human biological and cultural evolution and coevolution (see Rozin, 2007).

With humans, especially in the approximately 10,000 years since the appearance of agriculture and domestication, food has been transformed from just nutrition and pleasure. Kass (1994) beautifully described this transformation, in European history. Food has become a major mark of civilization, of the distinction between humans and other animals. A simple indication of this is the separation of the verb *to eat* in German into eating by nonhuman animals (*fressen*) and eating by humans (*essen*). In much of the world, we eat at a table, facing each other, using implements, and we eat something that for the most part has been vastly transformed by culinary processes from its natural state. We are offended by the sight of food being masticated in the mouth, yet the civilized human looks right at his or her eating partner while that partner is putting food in his or her mouth and chewing it. And while doing this, we talk to each through the same hole, without displaying the food within (Kass, 1994)—an example of motor virtuosity and high civilization.

In the developed world, the amount spent on food (between 9% and 20% of total income; this contrasts with about 50% for the majority of humanity) is much more than would be necessary to obtain adequate sustenance. By a process of preadaptation, food and eating have adopted many functions besides the original functions of nutrition and oral pleasure. First, food is a source of aesthetic experience, an art form, as in enjoying cuisine and eating out in fancy restaurants. Second, food is a major social instrument, when used as a gift (e.g., on Valentine's Day), as a center of celebrations (e.g., the turkey on Thanksgiving), as a statement of ethnic identity and status, and, most critically, as the frame that much of our social interaction occurs within. The sociality of eating (conviviality) is one of the

few things that still brings the American family together on a daily basis. The social functions of food are universal and perhaps less obvious in American culture.

Third, food, because it is intimately involved with (incorporated into) the self and because, by its nature, involves killing life, is fraught with moral significance. In recent American culture, acts such as eating meat or smoking cigarettes have come to be viewed with moral suspicion. In Hindu India, food is an explicitly moral entity, a statement about and a vehicle for manipulating one's moral purity (Appadurai, 1981). The aesthetic, social, and moral functions of food can all be conceived as preadapted on the basic incorporative, nutritional function of food. Fourth, food is one of the major sources of metaphors, as when we describe someone as "bitter" or "sweet" or when we say we are going to get to the "meat" of the argument. Metaphor is quintessentially a preadaptation, the use of a word originally adapted to the food context for explaining or illustrating something else.

The changes in our food world have almost backgrounded the fundamental nutritional role of food. Indeed, an observer of American culture could almost reasonably conclude that eating is a nutritionally maladaptive activity! We have relatively few genetic adaptations to negotiate our complex ancestral food world, but two of them are innate preferences for sweet tastes (well documented; e.g., Steiner, 1979) and fatty textures (not well documented but probably true). Both are indicators of available calories. In the modern developed world, most particularly the United States, calories are treated primarily as a threat to health rather than as a necessity. Our urge for sweets and fats works against our longevity, however adaptive it was in our ancestral environment. So in the modern developed world, some of our ancestral adaptations work against us. Cultural and technological advances have allowed us to create abundant and cheap superfoods. These advances were motivated by our biological predispositions and now have taken on a life of their own. Food is an area that has offered the most striking examples of biological-cultural coevolution (e.g., lactose intolerance; Simoons, 1969, 1970), but the biological evolution just can't keep up with the rate of change of our food world. So although we continue to have sex primarily in the canonical way, our eating has been transformed in its latest instantiation to the consumption of foams and gels in *El Bulli*, the ultimate in establishing one's food status. Evolutionary adaptations, basically oriented to have us eat (rather than be restrained from eating) and to seek high-calorie foods, are now at the center of understanding humans and food in the developed world, but as maladaptive features.

EPILOGUE

It is time for evolutionary and cultural psychologists to work together and to focus together on how humans function, behaviorally and mentally, in the major domains of life. Evolutionary psychology can be a theoretical foundation for cultural psychology; culture can be the fruit fly for evolutionary psychology as it applies to cultural evolution.

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