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Explaining Socio-Cultural Evolution

The Limitations of Evolutionary Theory from Biology

by Jonathan H. Turner *and* Alexandra Maryanski

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Biology has hitherto been the guide and preparation for Sociology; but (...) Sociology will in the future be rather the type for the ultimate systematization for Biology.

Auguste Comte, 1830-1842

Introduction

When Auguste Comte proclaimed in the 1830s that sociology would arise from biology to take its place at the top of the “hierarchy of the sciences,” few took this claim seriously. Sociology was, in Comte’s view, to be based upon biology as a life science, but the complexity of human social organization would require a more complex science – sociology – that would in the future inform biology as much or more than biology would inform sociology. For much of the Nineteenth Century, functional sociologists like Comte, Herbert Spencer, and Emile Durkheim kept elements of biological reasoning in their general theories, but not to the extent predicted by Comte. By the early Twentieth Century, biological ideas began to recede in sociology. Sociologists abandoned talk of “human (biological) nature” and rejected evolutionary approaches that lined up societies on a scale of progress, often with thinly disguised moral views about higher and lower societies (and inferior “races”). The only remnant of evolutionary thinking in sociology in the first half of the Twentieth Century was human ecology, an approach that analyzed settlement patterns in urban areas in terms of competition among individual and collective units for urban space [e.g., Burgess 1925; Hawley 1950; Hawley 1971]. For fifty years, other forms of evolutionary thinking virtually disappeared in sociology, but in the 1960s stage-models of

evolution returned with the pioneering work of Gerhard Lenski [1966] and Talcott Parsons [1966]. Shortly thereafter, the ecological model was extended from urban areas to populations of organizations competing for resources in niches, with the life and death of organizations tied to the size of resource niches, the density of organizations in these niches, and the level of competition for resources in these niches [e.g., Hannan and Freeman 1977; Hannan and Freeman 1989]. Thus, by the late 1970s, evolutionary thinking was back in sociology.

At the same time, another form of evolutionary thinking from biology arose, posing a challenge, or at least a perceived challenge to sociology – *sociobiology*. Formally introduced by E.O. Wilson [1975; Wilson 1978] as the new science that would “reformulate the foundations of the social sciences,” sociobiology theorists appeared to argue – at least to sociologists – that patterns of social organization could be better understood by attention to the behaviors of individuals who, in the metaphor that became wildly popular, were merely “survivor machines” for genes which, through blind natural selection, “sought” to remain in the gene pool [Dawkins 1976]. Thus, just like physical characteristics of organisms, social behaviors of humans could be understood as the outcome of natural selection as it worked on phenotypes and, hence, the underlying genotype. Emphasis was placed on *fitness* or the ability of an individual to pass on its genes to succeeding generations.¹ Human patterns of cooperation and altruistic behaviors were viewed by sociobiology as driven by “selfish genes” programmed by natural selection to maximize their alleles in the gene pool *or* through a process of “kin selection” in which genetically related individuals sharing genes will cooperate and even self-sacrifice in order to assure that the alleles of close blood relatives, through “inclusive fitness”, remain in the gene pool [Hamilton 1963]. Even altruism between unrelated individuals was resolved by sophisticated modeling procedures showing that altruistic acts among selfish individuals occur because of potential reciprocity in future encounters that would promote fitness [Trivers 1971]. These models borrowed from neo-classical economists (who emphasized that humans were always attempting to maximize utilities) and used to explain, often through simulations, why purely self-centered actors would come to cooperate. Game theory was blended with genetic evolutionary theory, using simulations to “document” that

¹ Fitness in evolutionary biology refers strictly to the worth of an individual in reproductive terms. R.A. Fisher, one of the founding fathers of the Modern Synthesis, became intrigued with how an organism might increase its fitness. Fisher tackled this problem in his famous theorem, “the rate of increase in fitness of any organism at any time is equal to its genetic variance in fitness at that time” [1930, 35]; which, in a nutshell, means that gene pools with lots of variation (compared to those with little variation) have a greater potential for selection to work on. Fisher set the stage for sociobiology by planting the seed that human behavior and organization might also be effected by the same processes that occur in animal populations.

group-level adaptations or any collective phenomena were actually a “statistical summation of individual adaptation” [Williams 1966, 258]. Later, both biologists and philosophers latched onto the notion of altruism and began to model how altruists were more fit than non-altruists, presumably explaining the basis of human cooperation. To say the least, most sociologists were highly suspicious of these models, although a few embraced them (especially those adopting the neo-classical model from economics in various approaches to “rational choice”).

The emergence of evolutionary psychology [e.g., Buss 1995; Tooby and Cosmides 1992] did not allay this skepticism among sociologists because it retained elements of the sociobiological tradition, while adding assumptions that natural selection had worked to wire the human brain with “mental organs” or specialized “modules” directing the adaptive behaviors exhibited by humans. Thus, phenomena of interest to sociologists were to be explained by selection on a brain hard-wired (in the genotype of an individual) to exhibit those behaviors leading to cooperative behaviors – behaviors such as altruism and propensities for reciprocity – that promote fitness. As long as the emphasis remained on behaviors, these arguments had a certain plausibility, but once analysis shifted to patterns of social organization – often very complex – the relevance of evolutionary psychology to sociological analysis declined. For example, the evolution of markets might be seen as one way to institutionalize behavioral propensities for reciprocity, but evolutionary psychology cannot explain the actual dynamics of markets nor their evolution once they emerged. A different level of analysis is required; indeed, a new kind of evolutionary analysis beyond that drawing from biology becomes more essential as the complexity of human sociocultural formations increases.

Thus, just as evolutionary thinking was slowly working its way back into sociological theorizing, a perceived frontal attack came from sociobiologists and evolutionary psychologists. For many sociologists, these earlier approaches were too reductionist in trying to explain behavior by reference to selfish genes and brain modules. Sociologists were both threatened, and if they were not threatened, they were irritated that something as complex as human social organization could be reduced to models about genes and brain modules. It is not surprising, therefore, that sociology did not adopt these biologically-based approaches.

Yet, the taboo against any biological ideas in sociology had been broken, and some sociologists began to rethink how biology, particularly evolutionary biology, could be used in sociology. One approach – human ecology – never left sociology and could serve as one pathway for biological ideas to enter sociology; indeed, the ecological model was expanded considerably beyond its original roots in urban and organizational ecology to more general ecological-evolutionary models [e.g., Freese

1997; Hawley 1986; Lenski 2005]. For a time, the revival of general systems theorizing under the label “living systems” emphasized, as Spencer had, the isomorphism between all living systems [e.g., Miller 1978]; and while these models soon receded in prominence, they did make biological ideas respectable again in sociology. Stage models of societal evolution represented another route [Lenski 1966; Lenski 1970; Sanderson 2007]. And, so did some world-systems theorists who began to couch at least some of their arguments in bio-evolutionary terms [e.g., Chase-Dunn and Hall 1997]; and since these models came from conflict theory rather than contemporary functionalists, world-systems theorizing began to serve as “cover” for evolutionary-couched ideas within sociology. Still another potential route to re-introducing evolutionary thinking in sociology came with alternative forms of evolutionary psychology as well as with dual-inheritance and co-evolutionary models which provide a more nuanced analysis of the relationships among genes, individuals and their behaviors, social structure, and culture [e.g., Boyd and Richerson 1992; Durham 1991; Hopcroft and Bradley 2007]. Yet another route can come from new biosocial models that address older questions of human nature less speculatively than the first generation of sociologists along several fronts: the interplay between hormones and “gendered behaviors” [Udry 1994]; the wiring of the brain; and the use of primate field data [e.g., Baldwin and Baldwin 1991], and especially data on the great apes who, because of their genetic closeness to humans, can be seen as a “distant mirror” on humans basal nature before the evolution of the large brain and reliance on language and culture to build sociocultural formations [e.g., Maryanski and Turner 1992; Turner 2000; Turner and Maryanski 2005; Turner and Maryanski 2008]. Today, an evolutionary oriented sociology is more acceptable to sociologists, although it is still viewed with suspicion in many circles.

Thus, there are now real prospects for evolutionary thinking from biology to be re-incorporated into sociology, as Comte had predicted, but before this re-incorporation can go very far, some serious analytical work is necessary. It is valuable to use ideas from biology in sociological analysis, but at the same time, it is also important to recognize that there are limits to this application of evolutionary models. Social structure and culture cannot be reduced to basic behavioral propensities such as altruism and reciprocity, nor can agent-based models postulating a few simple human attributes and then simulating their distribution in a population over time come close to explaining the reality studied by sociologists. Nor can social structure and culture be fully explained by somewhat more robust models of human nature; societies and their parts are emergent phenomena, as most sociologists emphasize (often somewhat defensively). Emergence does not mean, of course, that we cannot gain great insight by studying more elemental units and their dynamics, but it does

mean that these will not offer a complete explanation of sociocultural formations and their evolution.

More fundamentally, the nature of the units in social organization and the very nature of how social structures and culture evolve are fundamentally different than in the biological evolution of species. It is this latter concern that will direct attention in this paper. Our emphasis will be on “selection” as a basic force in both the biotic and sociocultural universes, but as we will also emphasize, selection on sociocultural formations is very different than Darwinian selection. For the most part, the units of selection are not individual organisms but group-level corporate units revealing a division of labor; and the more complex societies become, the more likely is selection on large corporate-scale units. Furthermore, societal evolution is not Darwinian but Lamarckian-like, because the fundamental structure of society can be changed within a short period of time, and so fitness cannot be measured by the passing on of a “sociocultural genotype” across generations. Indeed, another way to conceptualize fitness will be necessary. We will not delve deeply into these issues but, instead, simply outline the problems adopting Darwinian theorizing, without substantial modification, in the analysis of human societies.

Reconceptualizing Evolution and Selection Dynamics in Sociocultural Systems

What Is Evolution?

Those traits that enable an organism to survive and reproduce in a resource niche and larger habitat (or, alternatively, those that decrease chances of survival) will be subject to natural selection; the result is that the distribution of traits (and underlying genes) will become modified, especially as environments change, over successive generations. A Darwinian view of evolution thus emphasizes a “descent with modification” *between* generations of a population. If the focus remains only on individuals, then a Darwinian view of evolution in conjunction with mutation, genetic drift and gene flow (the other forces now incorporated into the Modern Synthesis), which generate variations on which selection works, can be applied to sociological analysis of human behavioral propensities.² Still, there are problems that immediately arise

² In Darwinian evolution, selection is a directive force that acts on individuals (or their genes) but individuals never evolve – they pass on their genes and die. Evolution is a population concept because it is the population (or *deme*) that evolves (or changes) as the result of cumulative changes in a gene pool. The other agents of evolution – mutation, gene flow and genetic drift also fuel evolutionary change.

in applying a Darwinian approach to the evolution of sociocultural phenomena that emerge from interactions among individuals and the corporate units that they create.

The first problem with using a Darwinian definition of evolution is conceptualizing inheritance across generations. When an individual organism is born, inheritance can be established definitively, but what of a sociocultural formation? Do all sociocultural formations have offspring? Only in special circumstances can offspring be observed as when, for example, a retail outlet continues to expand by building more stores; in these cases, there is descent of structural and cultural features to new corporate units. Segmentation in general may have these properties, but often corporate units do not produce offspring but, instead, copy the structure and culture of other units. For example, in market systems, the template for social organization by one company is often copied, with perhaps superficial modifications by other companies. Indeed, humans in general will copy what they see as successful adaptations, and perhaps we can consider this copying as descent with modification but it is not inheritance in the biological sense, and it is inheritance more in tune with Lamarck than Darwin.

A second problem with a Darwinian approach to evolution is that sociologists often want to visualize a single organization or community as evolving in response to environmental conditions. There are no “offspring” but, rather, decision-makers within these corporate units who alter the structure and culture of a unit in order to adapt to new environmental circumstances. The descent with modification thus occurs *within one unit*, or perhaps a coordinated set of units, over a period of time. How, then, is fitness to be defined in such cases? It cannot be reproduction of traits in new generations of organizations; in reality, fitness is the capacity of a corporate unit or a larger unit such as a society to persist in its environment. The longer a sociocultural formation persists as an identifiable unit, the greater is its fitness in a sociological sense. Evolution is internal to the sociocultural formation as it alters its structure to adapt to an environment. Such evolution is not even Lamarckian because it does not literally mean passing on acquired characteristics but, rather, the use of agency by actors to change the structure and culture of an evolving social unit, thus enabling it to persist in its environment.

A third problem in applications of Darwinian ideas follows from the above. Humans and their survivor machines, sociocultural formations, have the capacity for agency. They can remake the fundamental structure of survivor machines, with the result that selection works in an entirely different way during sociocultural evo-

Mutation is what adds new variations for selection to work on; gene flow assures gene mixing between pools; and drift (in small populations) is responsible for the random drifting of gene frequencies.

lution. When corporate units like organizations or communities, as well as larger social entities such as societies, find themselves in competition with other units or when the environment changes, they can remake their social structures and cultures by borrowing, copying, and innovation. Selection may work against certain aspects of culture and structure as agents discover that these do not promote adaptation to an environment, but when new elements of culture or structure are developed in response to selection pressures and appear to facilitate adaptation to the environment, these elements are likely to be retained and, indeed, refined by agents. Thus, selection does some sorting, creating disincentives for continuing with older formations and providing incentives for creating new formations. But it is a selection that activates human and corporate unit capacities for agency, which, in turn, are employed by actors to sort through what works and does not work for a corporate unit.

A fourth problem with applying Darwinian notions of evolution is that even when sociocultural formations find themselves in competition with each other for resources, the less fit formation does not always die off. For example, war between two societies, with each trying to conquer the other, does not lead to the elimination of the society that loses the war (except perhaps as a sovereign geo-spatial entity), but more typically, some kind of consolidation of the cultures and structures of the two societies ensues. There is certainly modification of the sociocultural formations involved, but is this evolution? For sociologists transformations in structure and culture over time, especially those in response to challenges posed by environments, constitutes evolution, but it is a type of evolution not easily explained by biological conceptions of evolution.

A related problem with Darwinian theory was first emphasized by Émile Durkheim [1893] who recognized that competition under conditions of niche density and scarce resources does not always lead to the death of sociocultural formations that are less fit. Through the capacity for agency, the social formation can change elements of its structure and culture to be more fit in an existing niche, or it can migrate to a new niche. There are many studies of how organizations have done just this [McPherson 1983; McPherson 1988]. For example, American service clubs have all changed the culture and structure to appeal to new niches where new members can be recruited. This is evolution because the clubs still reveal much of their older structure and culture even as they modify their goals somewhat and move into new resource niches of potential members. This is descent with modification and it is even initiated by Darwinian-like selection pressures in a resource niche, but the dynamics are very different because organizations can change their culture and structure in ways that organisms cannot change their genotype.

In sum, then, sociocultural evolution is very different than biotic evolution. Some super-organisms like insect societies can be understood by Darwinian dynamics

because behaviors generating and sustaining the division of labor in such societies are programmed by the genome of insects, although some members of an insect colony can change their respective roles under certain conditions (but even in these cases, these changes are largely under genetic control). In human societies, structure and culture are invented and can be changed within one generation (in modern societies, even within generations); and this simple fact means that evolution is more about how structures sustain themselves through human capacities for agency. There are, of course, some analogous process of evolution between populations of organisms and sociocultural formations, especially when these formations are on a Darwinian playing field competing for resources in a resource niche – as organization ecology has demonstrated [Hannan and Freeman 1977]. But even here, biotic models break down because the units subject to selection can reinvent themselves.

What Is Evolving in Sociocultural Evolution?

Within much evolutionary theory, natural selection and the other forces of evolution – mutation, gene flow, genetic drift – work on the individual organism; and out of such evolutionary dynamics the distribution of phenotypes and underlying genotypes in a population of organisms is what evolves. And, if the distribution of phenotypes and genotypes is sufficiently great, speciation occurs. When these ideas are applied to human social structure and culture, however, they lose clarity. For example, early sociobiologists argued that social structure and culture could be explained by hard-wired behavioral propensities for kin selection and reciprocal altruism. Later, as we noted earlier, simulations were run to demonstrate that selfish actors driven by their genes could create cooperative social structures. Evolutionary psychology added that much of the selection for behavioral propensities occurred on the brain in the form of modules enhancing reproductive fitness; in turn, basal elements of human culture and social structure can be understood by reference to these modules and the behaviors that they generate. Yet, it soon becomes unclear about what is evolving as behavioral propensities are seen to “cause” the construction of sociocultural survivor machines. What, now, is actually evolving? The underlying genetic programming for these propensities? The brain modules activating these propensities? Or, the distribution of behavioral propensities among populations of humans? The resulting sociocultural formations? It is possible, of course, to claim that they are all evolving, but this claim does not add much clarity to what is evolving when a biotic vision of evolution is employed.

For most sociologists, it is *sociocultural formations that are evolving*. That is, descent with modification in sociology denotes changes over time to the systems of symbols and social structures as these constrain behaviors of, and interactions among, individuals. An immediate problem with this sociological assertion is that sociocultural forms vary widely in their culture and structure, with the seeming result that there is no definitive unit that evolves beyond vague pronouncements about cultural and structural change.

There do, however, appear to be just a few basic structures in human societies, even the most complex society. Beginning with the largest and moving down to the smallest, there are just six basic formations: inter-societal systems, societies, institutional domains, stratification systems, and corporate units (of which there are three basic types: communities, organizations, and groups), and categoric units (categorizations of subpopulations by attributes such as sex, age, ethnicity, class). Historically, the early sociological evolutionists focused on societies and implicitly argued that societies evolved – that is, changed over time as adaptive responses to their 1) biophysical environments, 2) sociocultural environments (other societies), and 3) internal environments created by the very nature of their culture and structure. Most early and more contemporary evolutionists in this vein posit(ed) stage models of evolution, viewing societies as evolving and, at times, de-evolving into basic societal formations, such as hunting-gathering, horticulture (and variants like fishing and pastoral societies), agrarian societies, industrial, and post-industrial. More recently, the emergence of world systems analysis emphasizes that inter-societal systems evolve; and in fact, much societal evolution can be best understood as being constrained by inter-societal formations.

Within American sociology in particular, more meso-level social units such as communities and populations of organizations have constituted, as we have noted, the major emphasis in human ecology. Early work borrowed from Darwin, Spencer, and Durkheim to argue that real estate markets institutionalize competition among both individual and collective actors (e.g., government, churches, businesses, etc.) in urban areas for space, with those possessing the most resources such as money, political power, and organizational skill able to secure particular niches (neighborhoods). Thus, settlement and resettlement patterns in urban space evolve as the number and type of individuals (varying by ethnicity, wealth, and income) and corporate actors (varying by money, political influence, organizational skills, and functions) compete for urban space. Here, the unit of evolution was the structure and cultures of communities as a distinctive type of corporate unit, with selection via the real-estate market working on individuals and organizations of individuals.

Later, as also noted earlier, this basic ecological model was extended to organizations. Emphasis here was on the growth, survival, and death of organizations within distinct sociocultural niches within a society. Much like Darwinian theory, selection worked on individual organizations – firms, service clubs, schools, and other organizations – but it was the population of organizations that evolved. Those organizations that built structures and cultures that could exploit a resource niche survived and, moreover, encouraged other organizations to enter this niche. As a particular sociocultural formation proved successful in that it could secure resources from the niche and hence survive over time, ever-more organizations copied this organization template, thereby increasing niche density and competition for resources. The result is that those variations of organizational structure and culture that could secure resources survived, whereas those variations that could not secure sufficient resources died out. Populations of organization thus revealed a common pattern of rapid growth in numbers of a population (which was defined as organizations seeking resources in a particular niche), only to set off a rapid decline in the population as niche density and competition increased, followed by a slight increase in the population of organizations when niche density declined with large-scale organizational failures. Organizational ecology is perhaps the closest to the Darwinian model in that it is the population of organizations that evolves, with selection working on the “sociocultural phenotype” of individual organizations. Moreover, because organizations become structured and regulated by culture, they reveal structural rigidities that give selection a more stable target to select on (much as phenotypes in organisms are constrained by the genotype that drove their formation).

Other structural formations in sociological analysis are less explicitly subject to Darwinian evolutionary analysis. For example, institutional domains – e.g., economy, polity, religion, education, law, science, medicine, sports, kinship, and other domains – all change over time and, hence, reveal descent with modification. Similarly, stratification systems revolving around social classes created by the resource shares of their members also change over time, again evidencing descent over time. To analyze these in evolutionary terms, what should be the primary focus: The corporate units – groups, organizations, and communities – from which institutional domains are built? The population of these corporate units as they become integrated to form an institutional domain? The overall domain? The relations among domains? Moreover, if a society is ultimately built from institutional domains and stratification systems, perhaps focus should be on the society, with selection working on domains and classes in the class system.

Since there is embedding of these structures – that is, institutional domains are built from corporate units, stratification systems from classes, societies from institu-

tional domains and systems of classes, and inter-societal systems from societies (or key institutional domains in a society such as economy and polity) – what is the unit that evolves and what (are) the units subject to selection? There is not an obvious answer to these questions, but the key point is that we are now a long way from individual organisms as subject to selection and populations (or distributions of traits in populations) as the unit that evolves. Elements of the Darwinian model can be adopted to ecological analysis of certain structures, such as communities and populations of organizations, but this analysis does not take account of the organization of populations within sociocultural formations. But which sociocultural formations: society, inter-societal system, organization, stratification system? The unit of evolution – that is, the unit that reveals descent with modification – becomes very slippery, but one thing is clear: For sociologists, it is rare that the individual person is the unit of selection, with the population of persons evolving. The population does not reveal distribution of traits as much current agent-based modeling pretends; rather the population is *organized* by sociocultural formations at several different levels of organization, *all* of which evolve. Thus, the evolving is a sociocultural formation, not an individual person or population of persons. Even when the individual might legitimately be seen as the unit of selection – as would be the case of a pandemic set off by a highly infectious and fatal disease – it is not just the human immune system (and the genes producing this system) that evolves; the institutional domains of medicine and science (and the polity and economy that provides these with resources) are being subject to selection and, hence are evolving. Populations living in either strong or weak survival machines structured by the integration of corporate units into institutional domains may evolve (through their rates of survivorship), but selection is not only on the individuals in this population. Those sociocultural survival machines are also evolving.

All sociocultural formations evolve in the minimal sense of persisting in an environment, and just which one is important to understanding a particular problem will vary with the nature of the problem under study. The notion of levels of selection in biology has consistently proved problematic [see Okasha 2006 for a review], and it becomes even more problematic in sociological analysis because all units evolve and smaller units are embedded in larger units, with the latter constituting a dimension of the environment to which embedded units must adapt if they are to survive. For example, a business firm exists within niche occupied by other related firms, with competition structured by the modes of integration of economic institutional domain. Much of the environment for any one firm is thus the market-driven economy and perhaps also the polity and legal system that regulate relations in the economy. What, then, is evolving? Firm, population of firms seeking similar

resources? Economy? Societal system? Inter-societal system? The answer depends on one's purposes, but we are now very far from a biological conception of what is evolving.

What Are the Units of Selection in Sociocultural Evolution?

The long-standing controversy over notions of “group selection” in evolutionary biology [Okasha 2006; Wynne-Edwards 1962] is not a controversy in sociology, except for a few who continue to maintain that selection works on the individual and it is societies that evolve. For most sociologists, it is so obvious that selection is working on the social structures and cultures of collective actors or corporate units revealing divisions of labor. For example, when two societies go to war, it is certainly true that individuals die but the rate of death is a function of the military survivor machines that organize the activities of individuals. Survival of individuals and collective actors is thus related to the levels of technology, population size, organizational structure, culture, and solidarity of armies and units in armies; these are the units of selection, not individuals. The same is true in other contexts. For example, when automobile makers compete in the auto market, it is not the line workers of each maker who are competing but the *organization systems* that each company possess to develop, make, and market cars. Toyota did not succeed where General Motors failed by competition among individual incumbents in the divisions of labor in these companies, but by Toyota being a better-organized and more efficient maker and marketer of cars.

Once collective actors become the unit of selection, it becomes more difficult to determine what is evolving. From an organizational ecology perspective, it would be the population of car makers seeing resources in a niche composed of potential buyers of cars. From this ecological perspective, a more Darwinian viewpoint can be maintained, with the distribution of companies in the niche being the unit that “evolves.” Yet, one could also make the case that it is the car companies themselves that are evolving, with fitness of any company defined by its capacity to maintain itself in the automobile market. At a macro level, one could also argue that the economy is evolving as, for example, American manufacturers decline as a proportion of all productive units, with the automobile and other industries (shoes, clothing, electronics, ceramics, etc.) declining relative to the production and distribution of services. As the distribution of productive corporate units evolves under competition in a variety of niches, the economy evolves. And, one can go to an even more macro-level unit – a geo-economic system – in which the American economy as a whole is seen as in

competition with other economies around the globe. Selection is now working on key corporate units in various sectors of the economy, but the economy as a whole is also under selection in an evolving world-level geo-economic system.

Looking at the matter in its broadest terms, human phenotypes and underlying genotypes are not evolving at a rapid rate for a simple reason: humans have built ever larger and more insulating survivor machines – groups, organizations, communities, institutions, societies, and inter-societal systems. Selection misses the individual for the most part because it works on the fitness of the survival machines. And the more complex and technologically sophisticated the survivor machines, the less selection in the socio-cultural universe gets to individuals through the protective structure of these survivor machines. Of course, there is often selection on individuals when these machines fail, as can be seen when pandemics cut across a continent or when one population is sufficiently organized to commit genocide on the other. In these cases, selection does work on individuals, but even here, these horrific situations can be better understood by examining the failings of the socio-cultural survivor machines than the attributes and behaviors of individuals. So, when the survivor machine is unfit and the competition intense, individuals will be affected, but only in very extreme cases does failure of a survivor machines mean death to individuals. More often, individuals migrate to new survivor machines or they create new ones, with selection then working on the newly constituted survivor machine. What is evolving, then, are sociocultural formations and their distribution within and between societies; and this evolution is driven by selection on corporate units more than individuals. Thus, most of the time, sociocultural evolution is a form of “group selection;” and if this is the case, then biological models, which focus on organismic phenotypes, are simply irrelevant to sociological analyses of social evolution. Moreover, the very nature of selection is different when it is sociocultural formations that are evolving, as we explore below.

What Is Selection in Sociocultural Evolution?

In human societies, Darwinian selection and evolution works primarily on individual persons (and their underlying genotype). At times, Darwinian processes operate on corporate units, selecting on sociocultural phenotypes, especially when these phenotypes are not easily changed by structural and cultural inertia. To take an obvious example, the American car companies represent a very good example of corporate units on which selection has worked; and at this writing, they may indeed die or be absorbed in parts by other companies. Another obvious example is the

American financial system in which competition has made many banks unfit, with some being selected out, others being absorbed by more fit organizations, and many surviving only through government intervention. But, as we have emphasized, most of the time, corporate units can change their phenotypes and become better adapted to their environments, or as is the case with American automobile companies, they have sufficient political influence to change their environments by securing resources from taxpayers. Durkheim [1893] probably did the best job of adopting Darwinian selection to sociocultural systems where the units can change their phenotypes and underlying sociocultural genotype to better compete or to move to a resource niche through borrowing and innovation of new traits. Once the units of selection can “acquire new characteristics,” only the notion of selection in the Modern Synthesis of evolutionary theory remains potentially useful to sociological analysis of evolution. The other forces of biological evolution – mutation, gene flow, and genetic drift – have only metaphorical analogues in sociocultural systems, but the mechanisms by which these operate are very different than those in sociocultural systems.

More fundamentally, much selection in human super-organisms is not Darwinian, or even Durkheimian because niche density, competition, and selection are not in play in the evolution of sociocultural systems. Yet, selection is still operating but it is a very different kind of selection. Functional social theory had the germ of an important idea in isolating this alternative type of selection, but did not develop it, and as a result, most functional explanations are rejected in sociology these days. In medical biology, researchers frequently refer to the “function” of a particular organ or biological system – e.g., the basic respiratory function of the lungs is to get air to cells and to remove carbon dioxide from the blood stream. Implicit in these kinds of statements is an evolutionary argument about how, as organisms became larger, those that could develop circulatory systems, including systems to get air to all cells, were more likely survive than those that could not, or did so inefficiently. What was left out of sociological functionalism was the implicit selections argument in biology. Yet, even if inserted into sociological functionalism, this selectionist argument cannot be the same as that implied in medical biological statements because the nature of selection in sociocultural systems is often very different – indeed, completely different – than selection in biological theory.

Darwinian and Durkheimian conceptions emphasize that selection works on existing phenotypes, with the power of selection to alter phenotypes over generations increasing when resources are scarce, when niche density is high, and when competition for resources is intense. This type of selection is, we believe, less frequent than what Jonathan Turner [1995; Turner 2003; Turner n.d.] has termed “Spencerian se-

lection.” What functionalists like Spencer recognized is that social units often find themselves in an environment where existing structures cannot secure adequate resources to sustain themselves and their human passengers in these survivor machines. Moreover, there is an absence of structures in the environment that can be copied, nor is density or competition among structures intense. Rather, corporate units find themselves under pressure to innovate new kinds of sociocultural formations or suffer the disintegrative consequences. Functionalists analyzed this kind of situation by postulating needs or requisites that all sociocultural formations had to meet in order to survive, but it is not necessary to go this far. What is required is only an understanding that one of the prime movers of sociocultural evolution is selection pressures to create new sociocultural formations.

Thus, corporate units and sets of units (including a whole society) often confront situations where they are under pressure to reorganize or disintegrate. For example, as Herbert Spencer [1876] argued, population growth puts actors under enormous pressure to develop new kinds of structures for production, reproduction, regulation (coordination and control through power), and distribution (movement of resources, information, people, and commodities about a territory), or face the disintegrative consequences. The pressures in functionalism became functional needs or requisites – in Spencer’s case, needs for production, reproduction, regulation, and distribution. Most functional theories after Spencer posited similar lists of needs or requisites. What all functional theories failed to emphasize is that these need states are generating selection pressures on actors to create new sociocultural formations or “die.” They are not operating under conditions of niche density and competition; rather, just the opposite. They are operating under conditions where no existing corporate units reveal structures and cultures to address these selection pressures. As noted above, Turner had termed this kind of selection Spencerian selection in deference to Spencer’s early insights. Turner has gone so far as to transform what functionalists saw as needs and requisites into “social forces.”

For Turner, these forces are very much like those in physics. For example, gravity is a force that is constantly pushing on matter, and along with other forces, generates patterns in the organization of the universe. Similarly, population, production, distribution, regulation, and reproduction are forces like gravity; they constantly push upon actors to find ways to organize themselves in response to these pressures. As the valences for any one force increase, selection pressures increase and push on actors to find solutions to these pressures. This is not a Darwinian selection process because selection is not working on variants of existing structures; instead, there are no relevant structures, with actors in a scramble to build new ones in response to the selection pressures generated by the macrodynamic forces of population, produc-

tion, distribution, regulation, and reproduction. Population growth, for examples, immediately generates selection pressures to build new structures, such as unilineal kinship systems, to organize the larger population; and if a society cannot find a way to do so, it will disintegrate or be conquered by a better-organized population. Population growth also increases the valences of the other forces. New modes of gathering resources and distributing these resources (under pressures from production and distribution as forces) must be discovered to support the larger population. New forms of control through the mobilization of power become necessary to coordinate and control the larger population as well as the new sociocultural formations that emerge in response to other forces like production and distribution. As the structure of a society becomes more complex, pressures from reproduction increase as individuals require more training and as structures themselves become more difficult to reproduce over time. Indeed, the whole of human evolution has been a response to these five basic forces – that is, population, production, distribution, regulation, and reproduction.

For most of human history, hunting and gathering represented a highly effective mode of adaptation to the selection pressures generated by these forces, but once populations settled down and began to grow, the “Big Bang” of human evolution was set into motion. The macrodynamic forces for production, distribution, regulation, and eventually reproduction began to increase in intensity, generating selection pressures that pushed on individual and corporate actors to new kinds of sociocultural survivor machines. Those societies that could respond to these pressures were more likely to survive, whereas those that could not, disintegrated. Humans were, in essence, building more complex survivor machines; and as these machines insulated humans from direct selection on their phenotypes, it is the sociocultural phenotype that became the key unit of selection, at times Darwinian and Durkheimian but most often Spencerian in nature. Thus, not only did the nature of the unit of selection change, so did the very nature of selection as a force in societal evolution.

Spencerian selection is less a competition under conditions of resource scarcity but a race for time to build new sociocultural formations that can reduce these pressures from the five basic forces in the macro realms of the social universe. But, as Spencer first emphasized and Turner [1995] has further theorized, as new corporate units, institutional domains, and stratification systems emerge in response to these Spencerian selection pressures, the complexity of society itself begins to generate *second-order selection pressures* that, once again, send actors scrambling to find new solutions to these new problems generated by sociocultural formations themselves. For example, law emerged as a response to selection pressures from regulation (to

coordinate and control the larger number of individual and corporate actors in societies); or markets evolved under selection pressures from production and distribution (among individual and corporate actors who produced an ever-increasing number and variety of goods and services).

This kind of Spencerian selection is typically the most common form of selection, especially in sociocultural systems that are changing or that find themselves in changing environments. Moreover, most Darwinian and Durkheimian selection soon generates Spencerian selection that puts pressures on actors to find solutions to competition and potential selection out of particular social units. For example, if ethnic subpopulations are competing for urban space or places in the divisions of labor in corporate units of the economy (and corporate units in other institutional domains), this competition typically escalates periodically into open conflict which generates selection pressures from regulation as a social force; and if polity and law cannot respond to these pressures, then the society as a whole may disintegrate under ethnic conflict – as has happened all too often in recent decades.

Sociological functionalists had the right idea: structures do represent responses to pressures, and rather than see these pressures as coming from need states, we argue that it is better to see the pressures as arising from fundamental macrodynamic forces that can vary in intensity. And unlike much functional analysis, there is no presumption that actors can adequately respond to these pressures. Indeed, the disintegration of a society (or corporate unit within a society) or the absorption/conquest by another society (or corporate unit) are frequent events in sociocultural evolution. Still, by fits and starts, societies like organisms have become more complex – as Herbert Spencer emphasized. But the selection forces that have driven evolution of the biotic and sociocultural universes have not been the same.

Once corporate units are the unit on which selection works, once units can restructure themselves, and once the form of selection is heavily Spencerian, the evolution of sociocultural systems loses much of its isomorphism with the evolution of populations of organisms. When the units and mechanism of variation and selection are so different than they are in the biological universe, we need a different kind of evolutionary theory. Moreover, just what is evolving becomes much more difficult to determine because the issue is no longer the distribution of traits in a population over time, but the transformation of social structures over time. Transmission and reproduction are not related to offspring carrying traits but structures persisting over time in their environments; in so doing, they promote fitness of their passengers – individual human beings – but their dynamics cannot be understood by reference to Darwinian selection on individuals because it is not the population that evolves but the sociocultural systems in which members of the population reside. These so-

ciocultural systems exist as many different levels – group, corporate unit, institution, stratification system, society, and inter-societal system – any or all can be evolving depending on the purposes of analysis. Ecological analysis in biology comes closest to this understanding of how selection works on layered reality when they examine ecosystems as evolving over time, just as societies or institutions do [Freese 1997]. But, there is an important difference: one system evolves by natural selection working on variations created by mutation, gene flow, and genetic drift; the other by Spencerian selection working on corporate units capable of restructuring themselves through the capacities for agency of their incumbents. They evolve in different ways, although at times Darwinian and Durkheimian selection can be seen as operative, but as we mentioned above, Darwinian and Durkheimian selection will soon turn to Spencerian selection pressures when they intensify.

The Search for a New Evolutionary Theory for the Social Sciences

There has been a number of highly sophisticated efforts to apply evolutionary theory from biology to the social sciences [see Sanderson 2007 for a review of these efforts as they relate to sociology]. These approaches vary, but they all suffer from an inability to deal with the problems that we have raised above. At some point, evolutionary theory in biology loses traction with the different nature of sociocultural phenomena. It is still possible to use evolutionary theory and modeling techniques derived from this approach (or neoclassical economics) to understand how the distribution of traits might change under varying conditions, but these models do not capture the complexity of human social organization and, thus, are of limited utility in sociology. We need, therefore, a new kind of evolutionary theory in the social sciences that draws what is useful from biology but then modifies or augments biological concepts with those more amenable to understanding super-organisms that organize themselves through agency and thereby create structure and culture. There is, of course, always descent with modification, but the units in which descent occurs are very different than those in biological evolution and the mechanisms by which descent occurs are equally different. Integration of the sciences is always a desirable activity, but as the failings of such promising approaches as general systems theory document, the isomorphisms among levels of reality soon break down and those that remain are typically so general and vague as to be vacuous. Reductionism is another promise in science; and as a general rule, it is wise to see what the properties and dynamics of lower level phenomena can explain emergent phenomena. But, at some point, they cannot explain the emergent phenomena, and so, we must look elsewhere.

As long as the focus on analysis remains on the individual, it is possible to sustain a Darwinian approach, at least for a time. But, as is obvious, the environment to which individuals adapt is sociocultural – that is, the survivor machines that have evolved over time. One can, as we have done so often, analyze the evolutionary history of humans, offering narratives of how natural selection reworked the hominid anatomy and neuroanatomy, as have evolutionary psychologists. In these analyses, it is possible to explain how Darwinian selection altered the human genome in ways promoting those behaviors that led to the first human societies: hunting and gathering.

Problems with this kind of analysis emerge, however, once we move beyond the first human society. The Big Bang of sociocultural evolution was initiated when larger numbers of people adopted a sedentary lifestyle near bodies of water, thus raising the valences for population as a social force and, in so doing, activating Spencerian selection pressures. It is these pressures that have driven sociocultural evolution; and it is here that we must devote our conceptual and empirical efforts. We need to understand how forces set into motion these pressures, and how the basic structures of human societies – corporate units, categoric units, institutional domains, stratification systems, societies, and inter-societal systems – have evolved as the valences of various macrodynamic forces have changed. Thus, a fundamental shift away from Darwinian and Durkheimian notions of selection to what all functionalists saw, and what Herbert Spencer saw best, to a different kind of selection is necessary if we are to have an evolutionary theory of society. Durkheimian selection still operates, of course, in human societies, but it is a limiting case rather than the fundamental force of sociocultural evolution.

We can even recast the search for human nature in a new light once we have a conception of Spencerian selection. The behavioral propensities posited by much evolutionary analysis of humans can be viewed as a kind of Spencerian selection pressure. Humans have created very complex systems that are not compatible with their “nature” as evolved primates; and this fact signals that there is always a tension between what is natural to humans and the complex survivor machines that they must now inhabit. Still, there may be a weak pressure on sociocultural formations to evolve towards structural and cultural formations that are more compatible to human nature. Thus, what we propose does not in any way eliminate the search for what is human and how human behavioral propensity evolved through Darwinian selection, but it does require that we not view these propensities as driving human sociocultural formations. Rather, they push and pull upon them to alter their structure and culture in ways more compatible with human nature, but as societal evolution documents, much stronger forces have generated dangerous, deadly, and unpleasant survivor machines that arouse anger, frustration, alienation, rage, and other negative emotions, even as

they persist for long periods of time. Thus, human nature is a rather weak but persistent force that generates its own Spencerian selection pressures. Population, production, distribution, regulation, and reproduction are the strong forces of human cultural evolution because they hold out the prospects of death and disintegration and, hence, are immediately responded to. These stronger forces will generally overpower the weaker force of human nature, but in the long run, the latter continues to work against sociocultural formations generated by responses to selection pressures from the strong forces if these formations violate humans' basic behavioral propensities.

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Explaining Socio-Cultural Evolution

The Limitations of Evolutionary Theory from Biology

Abstract: The revival of evolutionary thinking in sociology holds out real promise for understanding social change in human societies. This revival has often been highly threatening to sociologists because it is disproportionately based on evolutionary theorizing from biology, where selection works on individuals and their phenotypes (including their behavioral propensities), while populations are seen as evolving. Darwinian notions of selection have always been part of sociological theorizing, particularly in human ecology. In this paper, we argue that there are limits as to how far models from evolutionary theorizing in biology can be taken in the analysis of sociocultural evolution. A new and more distinctly sociological analysis of selection processes and the evolution of sociocultural formations is needed. Indeed, sociology should not be threatened by evolutionary biology, but instead should seek to create its own approach to the evolution of sociocultural systems. We develop our argument by answering four basic questions: What is evolution in the biotic and sociocultural universes? What is evolving? What are the units of selection in these universes? And, what is the nature of selection in these universes? The answer to these questions highlights the limitations of applying evolutionary theory from biology to sociological analysis.

Keywords: evolution, selection, ecology, sociocultural formations, Darwin, Spencer, Durkheim.

Jonathan H. Turner is Distinguished Professor of Sociology at the University of California at Riverside, USA. His main research revolves around developing abstract theories and models of basic social processes operating at the micro, meso, and macro levels of social reality. Among his thirty-one books, *The Social Cage: Human Nature and The Evolution of Society* (1992, coauthored with Alexandra Maryanski), *On the Origins of Human Emotions: A Sociological Inquiry into the Evolution of Human Affect* (2000), *Human Institutions: A Theory of Societal Evolution* (2003), *Incest: Origins of the Taboo* (2005, coauthored with Alexandra Maryanski), and *On The Origin of Societies by Natural Selection* (2008, coauthored with Alexandra Maryanski) demonstrate the utility of bringing ideas from evolutionary biology into sociological analysis. The present article summarizes his view that there are limits to the explanatory value of Darwinian-inspired concepts when applied to sociocultural phenomena.

Alexandra Maryanski is Professor of Sociology at the University of California at Riverside, USA. She is the author of four books (with Jonathan Turner) and lots of articles. As the founding Chair of *Evolution and Sociology*, a new section in the American Sociological Association, one of her goals is to bring evolutionary theory back into sociology. She is currently finishing up a new book: *Emile Durkheim and the Mystery of the Totem: New Data on the Elementary Forms of the Religious Life*.