# Evonomics

**Evolutionary Theory as a New Foundation for Economics and Public policy**

Proposal for an anthology with original essays

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## Background

Economics is a branch of the social sciences that studies the production, distribution, and consumption of goods and services in human society. Evolutionary theory examines the processes of variation and selection that account for all life forms. Although these two disciplines have a long history of partial interaction (Hodgson 1993, 2007), mainstream economics has yet to accommodate crucial insights from modern evolutionary theory. It has yet to adopt a conception of the individual or society that is consistent with our rich understanding of human biological, psychological, and cultural evolution.

When Darwin proposed the first adequate theory of evolution in 1859, everyone realized that it would have profound consequences for our understanding of humanity. Yet, for several reasons, evolutionary theory became marginalized for the study of human behavior and culture for most of the 20th century. Modern evolutionary theory has expanded beyond the biological sciences to include all branches of the human sciences, but most of the developments have taken place within the last three decades.

In his *Descent of Man* (1871), Darwin emphasized that the long evolution of humans and their ape-like ancestors had occurred in groups and tribes, and through natural selection humans had acquired dispositions to cooperate with and help others within their group. Recent theoretical and empirical research confirms this insight (Sober and Wilson 1998, Wilson 2002, Hammerstein 2003, Gintis, Bowles, Boyd and Fehr 2005).

While Adam Smith emphasized human sympathy for others in his *Moral Sentiments* (1759) – and this book influenced Darwin – mainstream economics after Smith has focused almost exclusively on self-interest and individual utility maximization. Instead of Darwin's potentially cooperative individual, furnished with moral dispositions, neoclassical economics depicted the human agent as a "pleasure machine" (Edgeworth 1881) focusing exclusively on his or her utility. This self-

regarding conception of "economic man" dominated economics during the twentieth century.

Consequently, attempts to reconcile economics with evolutionary theory either (i) had to counter the prevailing view of self-interested "economic man", or (ii) to adopt a narrow view of evolutionary theory that emphasized utilitarian self-interest and therefore provided a highly constrained view of topics such as cooperation, morality, culture, and groups as corporate units in their own right.

Thorstein Veblen (1898) followed the former strategy (i), but, despite his protracted influence over dissenting economists, most of his followers regarded his Darwinism as outmoded or taboo (Hodgson 2004). By the 1960s Veblen was almost a forgotten figure, rarely studied or discussed. His Darwinian research program was not revived until recently (Hodgson and Knudsen 2010).

Gary Becker (1976) and Jack Hirshleifer (1977) adopted the second strategy (ii). Their approach required an individual devoid of any social commitments that are not grounded on self-interest, and who is capable of immense feats of rational cognition. Their view of evolution accommodated cooperation only as a form of self-interest and focused on equilibrium outcomes. The Becker-Hirshleifer approach was not even gene-centered but individual-centered, yet it posited a rapidly calculating and maximizing individual whose super-efficient, all-purpose mental capacities are inconsistent with our knowledge and understanding of human evolution. Furthermore, the notion of competitive, self-regarding, utility-maximization was applied equally and liberally to other species (Tullock 1994) thus abandoning any characterization of what makes us specifically human.

New research has once again shown that the first strategy is viable. Economics has to be reconciled with our knowledge and understanding of the human species, rather than forcing biology and evolution into a narrow, neoclassical, economic mold that is out of line with recent empirical and theoretical research. Furthermore, both economic and biological systems are highly complex, and this complexity has to be acknowledged rather than assumed away. Economics has to learn from evolutionary theory and adopt new insights from the study of evolving complex systems (Arthur et al. 1997).

By contrast, much of contemporary economics is dominated by an antiquated conception of theory inspired by 19$^{th}$ century physics that doesn't apply to *any* complex system, including human social systems (Mirowski 1989). The conception was based on the laudatory goal of creating a physics of human social behavior, complete with a small number of laws similar to Newton's laws of motion and theorems that can be derived from the laws by analytical mathematics (Beinhocker 2006). Unfortunately, this proved to be an inappropriate framework for a theory of human psychology and social dynamics, whereas evolutionary theory provides a much more appropriate starting point. Modern neoclassical economics is still centered on core assumptions of utility-maximization and immense calculative capability, which prevents it from converging toward a conception of human nature

that makes sense from an evolutionary, psychological or even commonsensical perspective.

We wish to return to a much richer tradition of economic thought, based on a more nuanced conception of human nature outlined by Adam Smith and others. It has found champions in dissenting writers such as Thorstein Veblen, Herbert Simon, Richard Nelson, Sidney Winter and Elinor Ostrom, who have resisted neoclassical assumptions allegedly necessitated by mathematical tractability. Insofar as critics of neoclassical economics base their ideas on a commonsense view of human nature or more formally on other branches of the human sciences such as psychology, they are more likely than neoclassical economists to incrementally converge with evolutionary theory. Indeed, one evolution-oriented book titled *Moral Sentiments and Material Interests: The Foundations of Cooperation in Economic Life* (Gintis, Bowles, Boyd and Fehr 2005) draws its title from Adam Smith's *Theory of Moral Sentiments*. Ironically, the economic theory of the future will draw from its often forgotten past.

In contrast to neoclassical economics, the starting point of evolutionary theory is the process of variation and selective retention, which helps to explain how organisms adapt to their environments and the evolution of complex phenomena. Evolutionary theory is far messier and much less elegant than Newtonian physics, but so is life--including human life. To the extent that organisms are well adapted to their environments and both are relatively stable, the mathematical tools of optimization and game theory are useful for understanding the outcomes. This provides an important zone of overlap with parts of current economic theory. To the extent that species are not adapted to their current environment, then other tools are required from the evolutionary toolkit that are largely absent from the current economic and public policy toolkit.

Notably, adaptation at the individual level does not automatically result in adaptation at the group level (Wilson and Wilson 2007). Adam Smith's invisible hand operates only under highly circumscribed conditions. In most circumstances, lower-level adaptation *undermines* rather than contributing to the public good. Economic theory and policy needs to be centered on the tragedy of the commons and its solutions, rather than the assumption of a generally beneficent invisible hand (Ostrom 1990, 2005).

Evolutionary biologists appreciate that nonhuman species are only somewhat adapted to their current environments, especially if their environments have changed during the recent past. A given species consists of many traits that are often mechanistically connected, even as they are being pulled in different directions by natural selection. Many traits are not adaptations and exist as holdovers from the past, as byproducts of other traits, or as neutral with respect to survival and reproduction. Adaptations often cause some individuals or groups to succeed at the expense of others or to succeed over the short term despite long term negative consequences for all. The only way to understand the psychology and social dynamics of any species is by studying it closely in relation to past and present

environments, by learning as much as possible about its ancestry, and by learning as much as possible about the proximate mechanisms that result in the expression of phenotypic traits.

Humans are not exempted from these considerations. The idea that learning and culture place us outside the orbit of evolutionary theory is profoundly wrong. Both are fast-paced evolutionary processes, built by the slow-paced process of genetic evolution, and are far more productively studied within the orbit of evolutionary theory, as outlined in more detail below. The non-adaptive side of the evolutionary coin is even more salient for humans than for most other species because our human-created and human-altered current environments are so different from our ancestral environments. We suffer from tragedies of the commons at every turn. If economic theory and other theories that inform public policy do not make use of the full evolutionary toolkit, then they will simply fail as theories and result in policies that fail to solve problems in everyday life.

Formal analytical models play an essential role in evolutionary theory, but not in the way imagined by neoclassical economics. Every field of inquiry hits a complexity wall beyond which analytical mathematical models cannot go, as recounted by James Gleick (1987) in his book *Chaos: The Making of a New Science*. Even the relatively simple problem of computing the mutual gravitational interactions of 3 bodies in 3-dimensional space hits the complexity wall. Newton's laws of motion still apply, but the task of predicting the trajectories of the three bodies with analytical mathematical models becomes overwhelming, requiring more limited computer simulation models. The complexity revolution in physics required overcoming the prestige and arrogance of mathematicians who regarded themselves and their methods as superior, when in fact they were limited to a tiny fraction of the parameter space of the physical world. The dominance of neoclassical economic theory today is much like physics before the complexity revolution (Beinhocker 2006).

How can any field of inquiry progress beyond the complexity wall? Theory plays a role that is still essential but more humble, exploring small regions of the parameter space like a flashlight rather than trying to illuminate the entire world like the sun. Computer simulation models become an essential supplement to analytical models and need not be regarded as poor cousins. Theory becomes a refinement of intuition that needs to be constantly checked against empirical data to remain anchored to reality. This is how formal theory functions in evolutionary biology and needs to function in economics and public policy.

In addition to biological evolution, evolutionary theory can be formulated more generally as any process of variation and selective retention. According to the expanded definition, immunological, neuronal, psychological, social, cultural, and computer algorithmic processes can qualify as evolutionary, resulting in the same statistical tendency toward adaptation--with many messy and inelegant exceptions--as genetic evolution. Most non-genetic evolutionary processes evolved by the process of genetic evolution and were aptly termed "Darwin machines" by William

Calvin (1987; see also Plotkin 1994). Darwin machines require *two* evolutionary accounts; the slow-paced process of genetic evolution that created the architecture for the fast-paced process of non-genetic evolution. This twofold account has been worked out in most detail for the vertebrate immune system and comparable detail is needed to fully understand the human capacity for rapid psychological, social, and cultural change (Wilson 2010).

## Need for the Proposed Volume

*Evonomics: Evolutionary Theory as a New Foundation for Economics and Public Policy* will attempt to provide the kind of systemic push required for paradigmatic change. It will be an anthology of existing articles with an original essay introducing each section. Our reason for creating an anthology, rather than a volume of original essays, is because most of the "pieces" for a systemic evaluation of contemporary economics in relation to contemporary evolution are already available and primarily need to be assembled in a single volume and interpreted by the original essays introducing each section.

We believe that *Evonomics* can have a major impact on the future of economics and public policy for the following reasons:

1) The new evolutionary foundation is highly interdisciplinary. Articles in the anthology will be drawn from fields as diverse as economics, political science, sociology, anthropology, psychology, computer science, evolutionary biology, and numerous other branches of the biological sciences such as social insect biology and neurobiology. Evolutionary theory will provide the common language and theoretical framework that can unite so many disciplines. Most prospective readers of *Evonomics* will come from a single discipline and will be encountering the interdisciplinarity inherent in evolutionary theory for the first time.

2) Neoclassical economics is notoriously insular. As one telling example, Steven Levitt, author of the bestselling *Freakonomics*, devoted his *New York Times* column to Elinor Ostrom on the day after she received the 2009 Nobel Prize for Economics. He estimated that no more than one in five economists had ever heard of Ostrom, including himself, to his own chagrin. He saw this as an example of "how substantial the boundaries between social science disciplines remains". He acknowledged that economists want to see the prize restricted to their own discipline and would "hate the prize going to Ostrom even more than the Republicans hated the peace prize going to Obama". He ended his column by writing "This award demonstrates, in a way that no previous prize has, that the prize is moving toward a Nobel in Social Science, not a Nobel in economics." Ostrom's work exemplifies the evolutionary paradigm and *Evonomics* will provide the best single source for incorporating the evolutionary paradigm into the economic curriculum.

3) Behavioral economics is a relatively new movement within the field of economics that has become widely known to the general public through trade books such as *Nudge* (Thaler and Sunstein 2008), *Predictably Irrational* (Ariely 2008), and *Animal*

*Spirits* (Akerlof and Shiller 2009). Behavioral economists take several steps in the right direction by drawing upon the field of psychology and by emphasizing the importance of empirical research in addition to theory. Nevertheless, even though the central aim of behavioral economics is to ground economic theory in a more realistic conception of human nature, most behavioral economists are curiously uncurious about evolution. As examples, the word "evolution" is entirely absent from the pages of *Nudge* and *Predictably Irrational* and is used tangentially only twice in *Animal Spirits*. Behavioral economists who *do* seriously consider evolutionary theory, such as Ernst Fehr, Simon Gachter, Samuel Bowles, Herbert Gintis, and Gerd Gigerenzer, are a small minority of behavioral economists. Thus, *Evonomics* will be an important sourcebook for behavioral economists in addition to neoclassical economists.

4) The public policy community is much larger than the economic community. People who address specific policy issues such as childhood education or risky adolescent behavior frequently do not consult economic theory at all, but rather some other body of theory or expectations that have not been articulated as formal theory. *Evonomics* will be an important sourcebook for anyone attempting to formulate public policy on virtually any subject. It is important to stress that the evolutionary paradigm is in a position to inform public policy in the real world *right away*, as opposed to requiring a long period of academic development before it can be put to practical use.

5) *Evonomics* will represent a synthesis for those who are already employing an evolutionary perspective. Earlier we stated that economics and evolutionary theory have been entwined throughout their histories. It is *not* new to approach economics from an evolutionary perspective. What *is* new is our vastly more detailed understanding of human psychology and social dynamics that has emerged over the last few decades, which has yet to be related in detail to contemporary economic theory and public policy. The synthesis that our volume represents will be different from conceptions associated with terms such as "evolutionary economics" and "evolutionary psychology". These terms were coined by the first pioneers, whose original views unsurprisingly need to be modified as the fields they initiated have matured. In particular, the massive modularity thesis associated with evolutionary psychology (e.g., Barkow, Cosmides, and Tooby 1992) needs to accommodate the human capacity for open-ended psychological and cultural change as evolutionary processes in their own right (e.g., Buller 2005, Richerson and Boyd 2005, Wilson 2002, 2005). Approaches to evolutionary economics based on substrate-free variation-and-selection considerations (e.g., Nelson and Winter 1982) might need to incorporate the genetically evolved psychological architecture that makes the evolution of firms and institutions possible (e.g., Gintis et al. 2005) *Evonomics* will therefore represent a milestone for those already employing the evolutionary perspective in addition to those encountering it for the first time.

## Creation and Organization of the Volume

The volume will be loosely based on a conference titled "The Nature of Regulation: How Evolutionary Theory Can Inform The Regulation of Large-scale Human Social Interactions", that was organized jointly by the Evolution Institute (EI) and the National Evolutionary Synthesis Center (NESCent) and held at NESCent's headquarters in Durham, NC, during November 13-15, 2009. The EI is a new think tank, co-directed by D.S. Wilson, that is designed to connect the world of evolutionary science to the world of public policy formulation. NESCent is the National Science Foundation's largest evolution-related center and is designed to facilitate broadly synthetic research to address fundamental questions in evolutionary biology.

The conference was uniquely organized to include a "Community of Interest (COI)", whose members could become involved at a distance, in addition to the 30 participants who physically attended the conference. The total group included over 70 of the most distinguished scientists and scholars from across disciplines studying subjects relevant to economics and public policy from an evolutionary perspective. In this fashion, the conference was envisioned as a node in a process that was designed to begin earlier and continue after. The process began with the creation of an electronic library of relevant articles and the formulation of a mission statement via internet discussions on the EI website. Sufficient progress was made so that the conference participants could concentrate entirely on discussion without the need for formal presentations. Recommendations that emerged from the conference included the anthology proposed here and a number of other projects. The partnership with NESCent will continue with a two-year focus on the topic of "Integrating Evolutionary Theory with Behavioral Economics".

The proposed anthology will make use of the social network that was created for the conference, which can also be expanded to include new members.

• The sections of the anthology will correspond to the major subject areas identified by the mission statement and discussed during the conference.

• Committees drawn from the social network will nominate the articles for each section and will help to decide who writes the original essays introducing each section.

• The same committees will provide an internal reviewing system in addition to the external review process.

In this fashion the volume will represent--and can be advertised--as the consensus of an entire community rather than merely the opinion of the two editors. The involvement of the social network will also insure widespread awareness of the volume when it appears.

## The Sections

Following the organization of the mission statement and conference, the volume will consist of the following six sections:

**1) Fundamental theoretical considerations**: This section will compare contemporary economic and evolutionary theory "from the ground up" in order to achieve the paradigmatic change that we are seeking. There will also be a discussion of paradigms and the appropriate role of theory for the study of all complex systems, including systems of thought and economic systems.

**2) Learning from other biological systems**: The challenges of cooperation and coordination to achieve shared goals are not restricted to humans but are experienced by other biological systems such as multi-cellular organisms, social insect colonies, and developing brains. These biological units are much better regulated than most human societies, even though they are composed of members that are much simpler than individual humans. We should be consulting nature for ideas about regulation in the same way that we consult nature for ideas about pharmaceuticals.

**3) The innate architecture of human psychology and social dynamics**: The term "human nature" might seem so nebulous that scientists and intellectuals will never reach an agreement upon it. On the contrary, anyone who attempts to reason about human action, formally or informally, employs a set of assumptions about the rules that govern human action. The assumptions of neoclassical economic theory, often termed *Homo economicus*, are driven by mathematical tractability and are clearly inadequate from an evolutionary, psychological, or even commonsense perspective. This section will attempt to establish a more reasonable set of assumptions based on evolutionary theory and consilient with all branches of the human behavioral sciences. This section of the volume will be informed by our continuing focus on integrating behavioral economics with evolutionary theory, in addition to the "Nature of Regulation" conference.

**4) Taking Darwin machines seriously**: An adequate set of assumptions about human nature must include an open-ended capacity for change that adapts individuals and groups to their local environments. Taking this proposition seriously will have profound consequences for economic theory and public policy formulation because it means that there will be no globally optimal solution to many policy issues. Instead, the role of the policymaker is to facilitate the adaptation of local groups to their respective environments. This is at the heart of Elinor Ostrom's work and almost totally foreign to neoclassical economics. This section will also examine a key question in evolutionary economics; the degree to which our understanding of variation-and-selection processes should be enhanced by reference to underlying proximate mechanisms (e.g., human psychology).

**5) Mismatch**: In his highly influential article titled "The Methodology of Positive Economics", Milton Friedman (1953) relied upon an evolutionary argument to justify the central assumption of utility maximization in neoclassical economics. Friedman's argument can be authoritatively rejected on the basis of modern evolutionary theory. The fact is that optimization is a statistical tendency at best and an adequate understanding of any species must include the study of proximate mechanisms and the nonadaptive side of the evolutionary coin, as Stephen Jay Gould

and Richard Lewontin argued in their equally influential paper "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Program." These two papers have never been related to each other, even though each is classic within their respective field, providing another illustration of the lack of integration that our volume is intended to address. The non-adaptive side of the evolutionary coin is especially salient for our species, because our adaptations to previous environments are so frequently mismatched to our current environments. It is important to realize that the non-adaptive side of the evolutionary coin exists for *all* evolutionary processes; there can be psychological and cultural mismatches in addition to genetic mismatches. Some of our most spectacular public policy failures are due to mismatches, which can only be understood from an evolutionary perspective.

**6) Evonomics in action**: The final section will use case studies to show how evolutionary theory can guide public policy in the real world without requiring a long academic lag time. The real world is the most appropriate place to conduct academic research from an evolutionary perspective, since evolution is fundamentally about the relationship between organisms and their environments, resulting in a positive rather than a negative tradeoff between basic and applied research. The research program established by Elinor Ostrom and her associates illustrates the pragmatic value of evolutionary theory. Although her disciplinary origins are in the study of institutions within the field of political science, the subtitle of her 1990 classic *Governing the Commons: The Evolution of Institutions for Collective Action* shows that she was gravitating toward evolutionary theory. Her more recent *Understanding Institutional Diversity* (2005) is fully integrated with the current interdisciplinary literature on economic theory and policy from an evolutionary perspective. She provides numerous examples of how public policy based on evolutionary theory can enhance human welfare and correct the often disastrous effects of policies based on misguided theories. The case studies presented in the final section will show how *Evonomics* can serve as a practical handbook for formulating public policy in addition to a paradigmatic change at the level of formal theory.

## The Editors and Consortium Represented by the Evolution Institute

David Sloan Wilson is an evolutionist who has studied humans in addition to the biological world throughout his career. His books include *The Natural Selection of Populations and Communities* (1980), *Unto Others: The Evolution and Psychology of Unselfish Behavior* (with Elliott Sober, 1998), *Darwin's Cathedral: Evolution, Religion, and the Nature of Society* (2002), *The Literary Animal: Evolution and the Nature of Narrative* (co-edited with Jonathan Gottschall 2005), *Evolution for Everyone: How Darwin's Theory Can Change the Way We Think about Our Lives* (2007), and *Evolving the City: An Evolutionist Contemplates Changing the World—One City at a Time (2011)*. Wilson's programmatic efforts to expand evolutionary theory beyond the biological sciences include EvoS, a campus-wide evolutionary studies program that

is growing into a nationwide consortium, the Evolution Institute, which connects the world of evolutionary science to the world of public policy formulation, The Binghamton Neighborhood Project, which applies evolutionary theory to community-based research, and the Evolutionary Religious Studies website, which promotes evolution as the theoretical framework of choice for the study of religion.

Geoffrey M. Hodgson is an economist who specializes in the study of institutions and their evolution. His books include *Darwin's Conjecture: The Search for General Principles of Social and Economic Evolution* (with Thorbjoern Knudsen, forthcoming 2010), *The Evolution of Institutional Economics* (2004), *How Economics Forgot History* (2001), *Economics and Utopia* (1999), *Economics and Evolution* (1993), and *Economics and Institutions* (1988). He has published over 110 articles in academic journals and he is an Academician of the Academy of Social Sciences in the UK. Among his editorial responsibilities, he is Editor-in-Chief of the *Journal of Institutional Economics.*

A strength of this volume is that it will represent the consensus view of a large consortium of distinguished scientists and scholars across disciplines organized by the Evolution Institute, rather than merely the opinion of two editors. Please visit the EI website for the list of people who physically attended and were involved at a distance for "Nature of Regulation" conference. This list will be expanded for the creation of the volume so that it represents a comprehensive interdisciplinary referendum and can be advertised as such.

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