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An Archaeology of Evolutionary Concepts in Economics¹

Abstract

The intellectual histories of economics and evolutionary biology are closely intertwined because both subjects deal with living, complex, evolving systems. Because the subject matter is similar, contemporary evolutionary thought has much to offer to economics. In recent decades, for a number of reasons, theoretical biology has progressed faster than economics in understanding phenomena like hierarchical processes, cooperative behavior, and selection processes in evolutionary change. This paper discusses three very old “cosmologies” in Western thought, how these play out in economic theory, and how evolutionary biology can help evaluate their validity and policy relevance. These cosmologies, as manifested in economic theory are, (1) rational economic man, (2) the invisible hand of the market, and Walrasian general equilibrium. Philosophical speculation over past centuries has resulted in insights but “armchair theorizing” about human nature and how economies work, has done little to resolve disagreements over basic principles. It is argued below that current breakthroughs in evolutionary biology and neuroscience can break this impasse.

I. Introduction: Evolutionary Theory and Economic Theory

Evolution is important for economics for several reasons. First of all, for over 200 years ideas have flowed back and forth between evolutionary biology and economics. Secondly, the last thirty years have seen a revolution in thinking about evolution in biology, evolutionary psychology, and neuroscience and this is having a major impact on how economists see the world. Finally, the theoretical controversies in biology and economics are remarkably similar both because of the similarity of the subject matter of the two disciplines (evolving complex

¹ An inspiration for this paper is Marshall Sahlin’s Essay “The Sadness of Sweetness: The Native Anthropology of Western Cosmology” *Current Anthropology* 37, 395-428, who describes his essay as “an archaeology of mainstream social science discourse.”

systems), and because both fields have implicitly adopted the “cosmologies” discussed below. In recent years biology has been more successful than economics in breaking out of the straightjacket of outdated worldviews and can thus offer guidance to economic theory. The maturation of evolutionary theory in recent years has led to the successful application of evolutionary principles in fields far removed from biology, for example religion (Wilson 2002) and behavioral psychology (Dennis Embry). This article explores some recurring themes in economics from the perspective of some core beliefs embodied in “Western Cosmology”² that have preoccupied theologians, philosophers and social theorists for millennia. These beliefs are (1) “natural man” is a self-sufficient, egotistical individual free from the bonds of human society (rational economic man), (2) self-interest, not altruism, leads to a well-functioning society (the invisible hand), and (3) there exists an ideal, optimal state of nature (the Walrasian model of general equilibrium). This is certainly not meant to be a complete list of deeply ingrained concepts that may cloud our understanding of the economic process, nor is it meant to deny the existence of other traditions in the West and elsewhere.

The three cosmologies above are reflected in neoclassical theory. In the discussion below “neoclassical” economics is contrasted with “institutional”³ economics. Both terms are broadly defined to draw the distinction between economic approaches that embrace “economic man” (an isolated individual acting at a particular point in time) as the center of analysis versus those

² The term “cosmology” is used by Sahlins and other anthropologists to define a level of analysis that lets us at least partially escape the confines of a highly evolved “mother culture.” Applbaum (1998, 325) writes: “[T]he term ‘cosmology’ appears a more flexible and inclusive substitute for culture, indicating a totalizing framework in which culture is given historical and manipulable dimensions while retaining both its totalizing quality and its subjective interpretability through ‘key symbols’.”

³ Geoffrey Hodgson has written several excellent books about the history and intellectual context of institutional economics (Hodgson 1993, 1999, 2004).

approaches maintaining that economic behavior cannot be understood aside of its social and institutional context. It is argued that evolutionary theory and evidence can help evaluate the two approaches to economic theory and policy. Numerous “alternative” schools exist including ecological economics, evolutionary economics, post Keynesian economics, Marxian, and Austrian economics to name a few. Other more mainstream approaches such as behavioral economics and evolutionary game theory also take issue with the assumption that economic agents are self-regarding. We choose “institutionalism” as the label for alternatives to neoclassical economics because it has a long and rich history, it is the most consistent in stressing in importance of sociality in human behavior, and it calls among its own one of the most eloquent critics of neoclassical theory, Thorstein Veblen. Hodgson (2007, 12) points out that explanations cannot be institution free, but sometimes particular institutions lead us in the wrong direction: “What is required is a theory of process, development and learning, rather than a theory that proceeds from an original ‘state of nature’ that is both artificial and untenable.” Understanding the origins of widely accepted assumptions about human nature and human institutions in economic thought can help us understand the institutions that embody these modes of thought and point the way to fruitful research programs.

The histories of economics and biology have long been intertwined. It is well-known that both Charles Darwin and Alfred Russel Wallace, the co-formulators of the theory of evolution by natural selection both got their inspiration for the idea of adaptation through competition from reading the economist Thomas Malthus. Darwin (1958 [1876], 34-35) wrote in his

Autobiography:

I happened to read for amusement Malthus’ *On Population*, being well-prepared to appreciate the struggle for existence which everywhere goes on from long-continued observation of the habits of animals and plants, it at once struck me that under these circumstances favorable variations would tend to be preserved and unfavorable ones to be

destroyed. The result of this would be the formation of new species. Here, then, I had at last got a theory by which to work.

Likewise, Wallace wrote in 1908:

One day something brought to my recollection Malthus' *Principles of Population*, which I had read about twelve years before. I thought of his clear exposition of 'the positive checks to increase' – disease, accidents, war and famine – which keep down the population of savage races to so much lower an average than that of more civilized peoples... It then occurred to me that these causes or their equivalents are continually acting in the case of animals also... Why do some die and some live? And the answer was clearly, that on the whole the best fit live.

The model for natural selection was the dog-eat-dog⁴ world of industrial capitalism as it existed in England in the 1800s. Although the term "survival of the fittest" was coined by the sociologist Herbert Spencer, not by Darwin or Wallace, this view of nature was quickly adopted by Darwin's defenders like Thomas Huxley (1888): "From the point of view of the moralist the animal world is about on a level of a gladiator's show. The creatures are fairly well treated, and set to fight - whereby the strongest, the swiftest, and the cunningest live to fight another day. The spectator has no need to turn his thumbs down, as no quarter is given." The idea of natural selection through competition moved from commercial England to the biological world and quickly re-entered the social realm to be adopted by social conservatives as a justification for the "natural harmony" of unrestrained capitalism. Spencer was one of a number of writers in the 19th century to use the biological analogy to argue for a non-interventionist policy in economic and social affairs (Hodgson 1993). The survival-of-the-fittest metaphor is but one example of a number of ideas with hundreds-of-years-old pedigrees that keep reappearing century after century in many contexts and yet remain remarkably unchanged.

⁴ As Alexander Field points out, dogs don't eat other dogs, they generally get along quite well together.

It should be pointed out that other cosmologies have influenced views of evolution and natural selection. An interesting challenge to the Darwin-Wallace emphasis on within-group struggle for survival came from the “Russian school of Darwinian critics” (Todes 1987) most notably Petr Kropotkin. In his book *Mutual Aid*, Kropotkin (1901) argued that the struggle for existence usually leads to cooperation (mutual aid) rather than no-holds-barred gladiatorial competition. Kropotkin believed that the natural inclination of humans, and other animals, was to help one another, not to compete, and thus building on the natural tendency of human to cooperate would lead to a just and peaceful society. According to Gould (1988), Kropotkin saw a dichotomy within the term “struggle for existence.” On one hand, organisms of the same species competed for limited resources and, on the other hand, all organisms struggled against a hostile environment, leading to cooperation.⁵ Darwin himself accepted this view (Gould 1988) and it is consistent with contemporary notions of multi-level selection.⁶

In general, biologists have come to accept a much broader view of natural selection than Huxley’s gladiatorial metaphor. Theories of group selection (Sober and Wilson 1998) and evolution by endosymbiosis (Margulis 1998) may not be universally accepted but they have certainly entered the mainstream of discourse in biology. Economics has lagged behind. In spite

⁵ Gould (1988) and Todes (1987) point out that Darwin and Wallace did their field work in the tropics where a cacophony of species struggle with each other to gain a foothold, while Kropotkin worked in Siberian Russia where a few species struggled to survive in a harsh environment.

⁶ In the *Origin* Darwin wrote about the meaning of “the struggle for existence”: “I use this term in a large and metaphorical sense including dependence of one being on another, and including (which is more important) not only the life of the individual, but success in leaving progeny. Two canine animals, in a time of dearth, may be truly said to struggle with each other which shall get food and live. But a plant on the edge of a desert is said to struggle for life against the draught, though more properly it should be said to be dependent on the moisture.” Quoted in Todes 1988, page 537.

of recent advances in theoretical and experimental economics the core economic model is still Walras-Pareto general equilibrium theory. The intractabilities of welfare economics may be widely recognized by theoretical economists, but most applied work appearing in major economic journals still focuses on marginal analysis of near-to-equilibrium systems. Consumers (or their representative agent) are assumed to be rational and consistent in choices and firms strive to maximize profits in competitive environments.⁷ The core neoclassical model embodies several “cosmological” beliefs about evolution including natural selection as survival of the fittest, the existence of an optimal state of nature, and the belief that human nature is exclusively selfish. The emphasis is on equilibrium, isolated individuals, and static optimization. History and cultural context are, for the most part, considered to be outside the purview of economic analysis (as in Gul and Pendorfer 2005).⁸ As D.S. Wilson puts it: “With respect to culture, economics is by far the most isolated of the social sciences and most economists are eager to keep it that way.”

But methodological alternatives to Walras and Pareto have always existed. Institutional economics has a long and rich history and it arguably offers the most consistent contrast to the evolutionary ideas embodied in standard welfare economics. Institutional economics, beginning with Darwinian approach of Thorstein Veblen (Hodgson 2008) and more recently encompassing insights from behavioral economics and neuroscience offers another perspective on Western cosmology. Hodgson (2004) argues that Veblen’s views were more consistent with Darwinian

⁷Although John Davis (2006) and others argue that the field of economics is no longer dominated by a single methodology but is now characterized by plural, non-overlapping approaches.

⁸ Gul and Pendorfer (2005) write: “Populating economic models with ‘flesh-and-blood human beings’ was never the objective of economists.” In fact, until the dominance of neoclassical economics understanding actual human behavior in actual human societies was the prime goal of economics. See the response to Gul and Pendorfer by Camerer (2008).

principles of evolution: “Veblen thus upheld what has been termed above the (Darwinian) principle of evolutionary explanation. This principle demands that any behavioural assumption in the social sciences must be capable of causal explanation along (Darwinian) evolutionary lines, and be consistent with our understanding of human evolution.” The purpose of using the neoclassical-institutionalist dichotomy is not to dismiss either school of thought but rather to critically examine the evolutionary ideas embedded in each one and to show how these play out in economic theory and policy recommendations.

II. Evolutionary Cosmologies in Economic Thought

It is always disconcerting to discover that ideas we think are new and fresh have in fact been in the air for hundreds if not thousands of years. Sahlins (1996) refers to this as “intellectual vertigo.” The ideas discussed below have been central to the Judeo-Christian world for millennia and are encapsulated and reincarnated in economic theory.⁹ They continue to cloud our understanding of economy, society, and the relationship of humans to the natural world. We consider three dominant cosmologies posed as questions at the center of the debate between neoclassical and institutional economics.

1. Is Human Nature only Egotistical?

A recurring theme in Western cosmology is that people form society only because it is in their narrow self-interest to do so. Lorenzo Valla wrote in the year 1431:

⁹ Sahlins traces the definition of economics as the “allocation of scarce resources among alternative ends” back to the creation story of Adam and Eve. By disobeying God in the Garden of Eden, man became a slave of his insatiable desires. But, as Sahlins (1996, 397) writes: “Still, God was merciful. He gave us Economics. By Adam Smith’s time, human misery had been transformed into the positive science of how we make the best of our eternal insufficiencies, the most possible satisfaction from means that are always less than our wants. It was the same miserable condition envisioned in Christian cosmology, only bourgeoisified, an elevation of free will into rational choice, which afforded a more cheerful view of the material opportunities afforded by human suffering. The genesis of Economics was the economics of Genesis.”

And what is the aim of friendship? Has it been sought for and so greatly praised by all ages and nations for any other reasons than the satisfactions arising from the performance of mutual services such as giving and receiving whatever men commonly need? ...As for masters and servants, there is no doubt their only aim is common advantage. What should I say about teachers and students?...What finally forms the link between parents and children if it is not advantage and pleasure? (quoted in Sahlins 1996, 399)

In this view human society is merely a means to an end. People form friendships only because they can use others to their own advantage. As Margaret Thatcher (1987) put it “And, you know, there is no such thing as society. There are individual men and women, and there are families.” Other people are merely a means to the end of maximizing individual utility. If this is true, the selfish and self-regarding individual is the logical unit of analysis in economic theory as in Becker’s analysis of the family. In biology the analogous concept is the selfish gene that uses individual organisms merely to perpetuate its lineage (Dawkins 1976, Gowdy 2004a, Gowdy and Seidl 2004). The idea that humans are at bottom only selfish maximizers is a break from Darwin who (again influenced by Adam Smith) believed that sympathy toward others is essential for a harmonious society and a smoothly functioning economy. According to Ghiselin (2009, 7) Darwin explained the survival of altruism by invoking group selection.

A corollary to the selfish individual is the notion of the “noble savage” independent and free from the bonds of society. Thomas Hobbes wrote in *The Citizen* 1651 (quoted in Bowles 1998):

[Let us] return again to the state of nature, and consider men as if but even now sprung out of the earth, and suddenly (like mushrooms), come full to maturity, without any kind of agreement with each other.

As Lovejoy (1936) argues, this conception of man has divine origins. Aristotle wrote:

One who is self-sufficient, can have no need of the service of others, nor of their affection, nor of social life, since he is capable of living alone. This is especially evident in the case of God. Clearly, since he is in need of nothing, God cannot have need of friends, nor will he have any. (quoted in Lovejoy, 1936, 42)

This cosmology is enshrined in economic theory. A necessary feature of the Walrasian model is the self-regarding consumer whose utility function is not affected by the utility of others. If this is not assumed, the mathematical proof of the efficiency of competitive equilibrium breaks down (Gowdy 2004b, Henderson and Quandt 1980, 297). In evolutionary terms the unit of selection is the individual and by implication any form of pure altruism would make an individual less fit in the sense that maximizing utility would be impinged upon by concern for others.¹⁰

In the history of economic analysis, the exclusive focus on the individual as the unit of analysis, beginning in the 1870s, represented a sharp break with the past in the sense that it removed psychology from economics (Bruni and Sugden 2007). Pareto was explicit about this: “It is an empirical fact that the natural sciences have progressed only when they have taken secondary principles as their point of departure, instead of trying to discover the essence of things...Pure political economy has therefore a great interest in relying as little as possible on the domain of psychology” (quoted in Glimsher et al. 2009, from Busino 1964). By relying on an economic model composed of self-regarding rational individuals economics could be reduced to the study of “the mechanics of utility and self-interest” (Jevons 1871, 90).

The focus on the individual independent of society, and the way it plays out in economic theory has political and ideological implications. For example, the isolated actor model underlying the marginal productivity theory of distribution—asserting that an individual’s contribution to economic output can be isolated from the contributions of others—is presented as

¹⁰ To be clear about this, one could certainly construct a utility function where the well-being of consumer A depends on the well-being of consumer B, as in $U_A = F(X, Y, U_B)$. But this form does not lead to the result that the marginal rates of substitution for commodities are the same for the two consumers and thus one cannot go on to prove the Pareto efficiency of competitive exchange (Henderson and Quandt 1980, 297). This is *the* major result of neoclassical welfare economics—the First Fundamental Theorem of Welfare Economics. Utility functions can include “altruism” but they must still be self-regarding—altruism gives *me* utility.

a moral justification for the economic status quo. In the neoclassical model, in an ideal market economy people are paid what they deserve, that is, the amount each person contributes to economic output. As D’Souza (2001) puts it: “The guy who is worth little has probably produced little of value. By the same taken, the guy who’s earning twice as much as you is most likely—perish the thought—twice as good as you are.” In marginal productivity theory only the addition to economic output counts—the social nature of technology and production is ignored (Miller 2000, Pullen 2001).¹¹ The policy implication is clear—you earned it in a competitive market, you get to keep it. To consider the social nature of production is to suggest very different policies.

Elizabeth Warren (2011) makes this clear:

There is nobody in this country who got rich on his own. Nobody. You built a factory out there—good for you...But I want to be clear. You moved your goods to market on the roads the rest of us paid for. You hired workers that the rest of us paid to educate...Part of the underlying social contract is you take a hunk of that and pay forward for the next kid who comes along.

Economic output and current technology is the result of innumerable advances over the course of human history and the evolution of industrial society. Production is a social, not individual, undertaking.

Criticisms of the notion that humans are purely self-regarding go back to the beginnings of modern utility theory. Edgeworth (1881) included a term accounting for pure altruism in his theory of exchange which he called a “coefficient of effective sympathy.” Veblen’s (1898) criticism of the neoclassical concept of humans as a coldly calculating “homogeneous globules

¹¹ From its outset neoclassical theory has been explicitly political. Marginal productivity theory was conceived as an answer to Marx’s labor theory of value (Pullen 2001). Abella (2008) and Amadae (2003) trace the ascendancy of rational choice theory to the cold war activities of the RAND Corporation in the early 1950s. The view that the world is populated by rational individuals maximizing their well-being by choosing freely was a completing alternative to theories collective choice.

of desire” is still one of the most insightful in the literature. Another early criticism is that of Georgescu-Roegen (1954) who argued that individual utility depends not only on individual well-being but also the well-being of the community to which the individual belongs. More recently Frank (1988), Hirsch (1976), Kapp (1950), Mishan (1967), Scitovsky (1976), Sen (1977) and Ostrom (2005) have all emphasized the social nature of human decision-making. A large number of economic models have been constructed to explain altruism, charity, benevolence, and bequests. In doing so, many economists and other social scientists have been ingenious in finding explanations for the motives for such behavior in self-interest. Possible selfish motivations leading to apparently altruistic behavior include enlightened self-interest, pursuit of reputation, anticipation of reciprocity, and fear. Further explanations are that personal utility may be derived from someone else’s satisfaction, or that benefits may arise from the adherence to a social contract (Arrow 1987).

The microeconomic assumption of self-regarding, perfectly rational behavior is embedded in macroeconomic models. Akerlof (2007) in an influential address to the American Economic Association lamented the absence of attention given to social norms in macroeconomic models. He argued that ignoring social norms in microeconomic models has led to theories of macroeconomics inconsistent with economic reality. He points out that the “stylized facts” of neoclassical microeconomics, for example, that current consumption is independent of income, and current investment is independent of profits, arise from the neglect of social norms in economic theory. The microfoundations approach to macroeconomics focusing on the individual alone not only removes psychology from the subject area of economics (as in Gul and Pendorfer 2005) it also leads to the implicit assumption that causality in economic change moves only upward. But group level phenomena are relevant in economic

analysis because the presence of groups can change the behavior of individuals interacting with each other. These interactions can, in turn, affect the economic system as a whole. The combination of individuals and groups means that upward and downward causation operate simultaneously (van den Bergh and Gowdy 2009). Ostrom's (2005) research on groups and institutions focuses on a "third way" economies are organized, that is, social institutions and rules of conduct beyond the market-government dichotomy.

Evidence from neurobiology, psychology, and behavioral economics has clearly refuted the rational actor model. Results from now classic behavioral experiments like the ultimatum games, the public goods game and even the one-shot prisoner's dilemma indicate that economic behavior is other-regarding. The rational actor model makes poor predictions of actual human behavior (Henrich et al. 2004).¹² The behavioral evidence is verified by neuroscience confirming the existence in humans of the "social brain" (Frith and Frith 2010). The degree to which the brain is "hard-wired" according to cultural condition is almost unique among mammals. New findings about the structure of the human brain show that it is designed for sociality. This is the smoking gun that unequivocally refutes the claim that human behavior is self-regarding. It seems that evolutionary theory and evidence clearly calls for an alternative to the neoclassical model of human behavior.

2. Does Greed and Self Interest Lead to Social Harmony?

¹² For decades the classic defense of the rational actor model was that, although the underlying assumptions are unrealistic, it makes good predictions of actual behavior. Since that defense has been demolished, the fallback position is that the model gives "insights." "Faced with a choice between a theory which predicts well but gives us little insight into how the system works and one which gives us insight but predicts badly, I would choose the later." (Coase 1995, 17)

The “invisible hand” of the market is one of the best-known metaphors in Western cosmology. The idea is often traced to Mandeville’s (1709) *Fable of the Bees or Private Vices, Public Benefits* (Fraud, Luxury and Pride must live/While we the Benefits receive/Hunger’s a dreadful Plague, no doubt/Yet who digests or thrives without?) or Alexander Pope’s (1734) *Essay on Man* (“Thus God and Nature linked the general frame/And bade Self-love and Social be the same”) but the roots of the metaphor are much deeper. Benardino Telesio in 1565 described the organization of the universe as the result the self-interested actions not only of living things but even inanimate objects:

It is quite evident that nature is propelled by self-interest. In fact, nature can tolerate neither vacuum nor anything without a purpose. All things enjoy touching one another, and maintain and conserve themselves by this mutual contact (Telesio, quoted in Sahlins 1996, 400).¹³

Referring to Telesio and others Sahlins (1996, 400) makes the following observation about the precursors to general equilibrium theory global capitalism:

May we not conclude that the universe had achieved an ideal state of economic development while Europe was still struggling with premodern relations of production? In one way or another, the philosophers already imagined the cosmos as a capitalist world order?

¹³ The connections between economic theory and fundamentalist religion have been well documented (Cox 1999, Hilton 1986). And these connections are deep. Consider is quote by Nicholas of Cusa written in 1440 (quoted in Sahlins 1996, 399): “Without the power of judgment and of comparison, every valuation ceases to exist, and with it value would also cease. Wherewith we see how precious is the mind, for without it, everything would be without value. When God wanted to give value to his work, he had to create, besides other things, the intellectual nature.” Substitute the word “market” for “God” and this sentence could appear in any modern economic textbook. The theologian Harvey Cox (1999) writes: “The diviners and seers of The Market’s moods are the high priests of its mysteries. To act against their admonitions is to risk excommunication and possibly damnation. Today, for example, if any government’s policy vexes The Market, those responsible for the irreverence will be made to suffer. That The Market is not at all displeased by downsizing or a growing income gap, or can be gleeful about the expansion of cigarette sales to Asian young people, should not cause anyone to question its ultimate omniscience. Like Calvin’s inscrutable deity, The Market may work in mysterious ways, “hid from our eyes,” but ultimately it knows best.”

The mathematical model of general equilibrium and Pareto optimality arising from greed and self-interest did not arise spontaneously with the marginalist revolution of the 1870s. This should come as no surprise but it should give pause to those who claim that neoclassical economics represented a clean break with the past. The marginalist revolution kept the idea of natural order and applied it to the economic world but ditched the social relationships that made this order possible, for example, Smith's "propensity to truck and barter." It is ironic that, far from establishing a theoretical edifice for Adam Smith's invisible hand, Walrasian general equilibrium theory casts the dynamic and evolutionary energy of capitalism into a purely mechanical, non-human system (Mirowski 2002). Individual utility is deemed to be exogenous from particular human societies. Likewise, on the firm side, "perfect competition" is defined as the complete absence of competition—the actions of one firm are independent of the actions of other firms.

Evolution can offer insights as to how to evaluate the selfishness-leads-to-social harmony argument. From the point of view of evolutionary theory a problem with the general equilibrium optimization model is that relative fitness within groups says nothing about the fitness of the group. Wilson (2004, 208) summarizes the relative-fitness-as-optimization problem:

Thus, purely self-interested individuals are a product of a pure within-group selection and are driven exclusively to maximize their relative fitness within groups. Purely group-interested individuals are a product of pure among-group selection and are driven exclusively to maximize the fitness of the group, relative to other groups in the total population. It is obvious that by these definitions, the claim that adaptive groups can be forged out of self-interest is as wrong as it could be. The essential insight of multilevel selection theory is that natural selection within groups is insensitive to the welfare of the group...

Group selection favors traits that increase the fitness of one group relative to other groups (Wilson 1997). Group selection is the result of Darwinian natural selection but not selection

rooted solely in the characteristics of individuals (Richerson and Boyd 2005). It depends on other-regarding interaction among individuals, and is incompatible with the assumption of isolated, self-referential agents. Cooperation, interaction and mutualism are essential to evolutionary homeostasis. Group selection implies that natural selection is more likely to favor pro-social behavior than the selfish economic agent, selfish gene model would predict. Using a group selection perspective we can pose a scientific explanation for the cooperation and fairness observed in large groups and among unrelated strangers in non-repeated contexts. Given the genetic homogeneity of the human species, the wide variation in degrees of cooperation observed in human societies points to a cultural origin (Manner and Gowdy 2009). Henrich (2004, 30) suggests:

...rooting the development of large-scale cooperation in the details of human social learning, addresses this challenge. Other mammals do not cooperate to the degree humans do because they lack the social learning abilities that produce cultural evolution and behavioral equilibria not available to genetic transmission alone.

Robert Frank (2011) has pointed out that a major problem with competition among individuals is that it is a zero sum game and may even reduce the well-being of the group. Self-interest is not an isolated pursuit but rather involves competition with other living, breathing human beings. Economic arms races for the biggest houses and most expensive cars not only cause harm to the group but gives nothing but temporary gain to individuals who “win.” A similar point was made by a Richard Layard (2005) who distinguished between competitive and non-competitive goods. Experimental evidence indicates that if everyone receives a higher income, relative position does not change and soon the beneficial effects wear off. Leisure time, on the other hand, is not a competitive good and if everyone receives more vacation time all are better off. Ng (1987) argued that taxing “Veblen goods” is a win-win exercise. The people who

buy them are happier since the higher price allows them to gain even more prestige and the government gets more tax revenue.

But perhaps the most serious problem with the idea that selfishness alone leads to the common good is that it ignores the almost uniquely cooperative and social nature of human beings. A growing body of literature suggests that the success (so far) of our species may be largely the result of our ability to cooperate and to harness the advantages of collective decision-making (Henrich et al. 2004, Nowak and Highfield 2011, Richerson and Boyd 2005, Sober and Wilson 1998). This is in sharp contrast to the economic view of the sanctity of individualistic rational choice and it suggests that an evolutionary approach to understanding human behavior is essential.¹⁴

3. Do Economic Systems have an Optimal State of Being?

The idea that the universe has a harmonious ideal state has a long pedigree, going back at least to Plato's ideal state. This cosmology plays out in two important ways in economic theory. The first is the notion of competitive equilibrium as a natural state of the economy, and the second is the idea that the willful disturbance of this natural state will come to no good. Again, this idea has a long pedigree in Christian theology as summarized by D'Onofrio (2008, 78):

If evil exists, it is explicable only by the imperfection of the free creaturely will, which decides to orient its own choices and actions in a direction contrary to the cosmic order that God established, that is, predestined, in an eternal instant outside of time, and bodied for in the eternal ideas in his Word. In fact, God never punishes the nature he himself created; he does however, punish the wrong direction taken by the creaturely will. Indeed the punishment is simply the outcome of the free human will's turning away from its natural object, which is God. It is precisely, and only, by desiring something other than God and what he wills that the sinner punishes himself by losing the good for which every creature is eternally and universally predestined by God.

¹⁴ In a recent intriguing (and controversial) paper Nowak, Corina and Wilson (2011) argue that humans are eusocial animals. Like social insects, humans have been so uniquely successful because of their degree of cooperative behavior and division of labor. This is a promising line of research for economics.

Again, as Cox (1999) suggests, substitute the word “market” for God and you have the world view of free market economists. In the neoclassical theory of the firm there is “only one way to be”—economic agents passively use available resources. Firm size, production techniques and employment is shaped by exogenous resources, tastes and technologies. Given the goal of profit maximization and the assumptions of perfect competition, a firm is like a marble thrown into a round bowl, it can only end up at the bottom of the bowl. Like the Garden of Eden, the optimal state of nature can only be disturbed by presumptuous human behavior that thinks it knows better than the market (government regulations or labor unions for example).

Milton Friedman (1954) used a “survival of the fittest” argument to justify the idea of competitive equilibrium. Given the assumptions of perfect competition and profit maximization, inefficient firms will be driven out of business. Furthermore, any interference with the natural order of perfect competition will allow inefficient firms to survive rather than suffering the consequences of their inefficiency. Taking this idea further Friedman argued against any notion of corporate social responsibility. “The only responsibility that corporations have is to increase profits... The real social responsibility of the firm is to obtain the highest profits—obviously in an open, correct and competitive market, producing wealth and work for all in the most efficient way possible.” (Friedman 1970) Firms that attempt to be altruistic actually harm the common good by diverting resources from their highest and best use as prescribed by the market. It is unethical to be altruistic since this violates the will of the market. A telling criticism of Friedman is that for selection to work there must be some superior quality or characteristic of a surviving firm that is passed on from generation to generation (Winter 1964). Without that, Friedman’s argument is a tautology. Profit maximizers survive and if a firm survives that shows that it is a profit maximizer.

In Friedman's view any economic outcome shaped by the competitive market is by definition superior to any non-market imposed outcome. In biology the analogous controversy is the adaptationist paradigm so eloquently described by Gould and Lewontin (1979). They criticize as "Panglossian" the tendency to view an organism as composed of traits and then coming up with an adaptive story for each trait considered separately. They argue instead that organisms should be analyzed as integrated wholes. "We fault the adaptationist programme for its failure to distinguish current utility from reasons for origin (male tyrannosaurs may have used their diminutive front legs to titillate female partners, but this will not explain *why* they got so small)..." In the decades following Gould and Lewontin's seminal paper evolutionary biologists have moved toward pluralistic approaches to the analysis of evolutionary change including contingency, historical lock-in and path dependence.

The focus on optimality and static equilibrium in economics has led to a neglect of real unfolding time in economic models. This neglect is rooted in Walrasian theory.

Once the equilibrium has been established in principle, exchange can take place immediately. Production, however, requires a certain lapse of time. We shall resolve the second difficulty purely and simply by ignoring the time element at this point. (Leon Walras, *Elements of Pure Economics*, 1874, 242)

Again, Veblen's evolutionary perspective offers a clear alternative. Commenting on the work of J. B. Clark, Veblen (1909) wrote:

Within its limited range marginal utility theory is of a wholly static character. It offers no theory of a movement of any kind, being occupied with the adjustment of values to a given situation....Neither Mr. Clark nor his associates in this line of research have yet contributed anything at all appreciable to a theory of genesis, growth, sequence, change, process, or the like, in economic life.

If there is an optimal state for an economy—a natural equilibrium to which the economy will always return if perturbed—then the proper policy is to make sure the parameters are properly set (assign property rights and get the prices right) and then leave it alone. An example is

Friedman's monetary rule—the role of government should be limited to keeping the money supply growing at a rate equal to the growth rate of real output and everything else will take care of itself. By contrast, Veblen (1919, 436) argued against the idea of a final state in economic evolution: “[Evolution] is a scheme of blindly cumulative causation, in which there is not trend, no final term, no consummation” (quoted in Hodgson 1993, 44). If this is the case then economic policies should be more flexible—tinkering and adjusting based on particular circumstances.

Here again, theory and evidence from evolutionary biology can help settle the argument. It is clear that biological evolution is a process of adaptation to a continually changing environment. There is no ideal state of nature. Major transitions in evolution are responses to major changes in the environment. Furthermore any number of stable states may exist in an ecosystem depending on initial conditions, historical lock-in and accidents of history (Eldredge and Gould). Establishment of the conditions for a unique solution to the stability problem in economics has proved to be a formidable challenge.

Related to the idea of an ideal state is the belief that suffering is necessary and beneficial for the good of the group. The Roman Stoic (C.E. 35) wrote: “Those things which you call hardships, which you call adversities and accursed, are, in the first place, for the good of the persons themselves to whom they come, in the second place, they are for the good of the whole human family, for which the gods have a greater concern than for single persons.” Malthus believed that hunger and disease were divinely ordained “positive checks” on the human population. Likewise, competition was a divine stimulus to inspire people to work harder. This idea quickly took a nasty turn with the adoption of a crude form of social Darwinism by those who argued against sympathy for the less fortunate on the grounds that it weakened the social

order. The economist William Graham Sumner (1883) wrote in his influential essay “The Forgotten Man”: “Almost all legislative effort to prevent vice is really protective of vice, because all such legislation saves the vicious man from the penalty of his vice. Nature’s remedies against vice are terrible. She removes the victims without pity. A drunkard in the gutter is just where he ought to be, according to the fitness and tendency of things.”

But there is something to the failure-is-necessary debate. Moral hazard is a genuine problem in social interactions. If firms or individuals know they are to be saved from their mistakes, then there will be no incentive to avoid them in the future. This is obviously a powerful idea. Moral hazard played a key role in the recent financial crisis as investors put into play enormous sums of money with little or no fear of the consequences of failure. Firms under competitive pressure are more likely to use state of the art technologies in order to make profits and survive. On the other hand, how does optimizing utility make an individual more fit? What is fitness in utility theory? In general, modern biology rejects the survival of the fittest argument. An organism only has to be “tolerably fit” to survive. Kenneth Boulding suggests that “survival of the fitting” was a more accurate phrase to describe economic evolution. Occupying a niche infers a big advantage to the occupant – whoever gets there first gets the niche. On the firm side Radner and Dutta (1998) showed that firms that maximize profit are actually more likely to go out of business. Cooperation, co-evolution, symbiosis, synergy, and mutualism are the key elements of modern biology.

With their seminal book *An Evolutionary Theory of Economic Change* Nelson and Winter (1982) made evolutionary theory respectable in economics (more or less). They raise several objections to Friedman’s survival of the fittest argument. First, there must be some mechanism for radical innovations to enter the existing mix of routines (mutations). Schumpeter

provided the environment for innovation (creative destruction) but not the mechanism through which mutations are created (births are needed as well as deaths). Second, the economic environment is not exogenous to the firm. Firm behavior shapes the environment and its success or failure alters that environment. The economic and political power of existing firms can alter the selection rules. Third, accidents of history may favor “less efficient” firms or routines. Increasing returns to scale favor first entrants to a market but they may be less “efficient.” “Orthodox theory cannot adequately provide that analysis and understanding because, fundamentally, it is about an ahistorical world in which genuine novelties do not arise.” (Nelson and Winter 1982)

III. Bringing Evolution into Economics: Why does it Matter?

Many methodological controversies in economics are rooted in basic beliefs embodied in Western cosmologies that go back for millennia. Philosophical speculation over past centuries has resulted in some useful insights but “armchair theorizing” about human nature and how economies work, has done little to resolve disagreements over basic principles. It is argued above that current breakthroughs in evolutionary biology and neuroscience can break this impasse. Evolutionary principles and evidence can be used to compare the self-referential model central to neoclassical theory and the other-regarding (social) model of human behavior central to the institutional approach. Such comparisons show that other-regarding explanations fare better than those based on assuming atomistic agents. Likewise, evolutionary theory and evidence shows that competition at the individual level may not lead to improved fitness for the group. Finally, evolutionary theory and evidence indicates that there is no single optimal state for a particular system. A particular ecosystem or a particular economic configuration is just one of many possible outcomes from an original starting point. These ideas may seem self-evident but they

point the way to a new synthesis in economics. Evolutionary theory can help to make some sense of the diverse research programs now flourishing within economics. Examining the three basic cosmologies embedded in economic theory from an evolutionary perspective shows the power of evolutionary theory and results. Evolution can help evaluate controversies that have raged for millennia and actually move the debate along.

But where do we go from here? Economics now seems to be fragmenting into distinguishable but non-overlapping approaches. The Walrasian model is still widely used in finance, for example, but behavioral finance is rapidly gaining ground using very different methods. Wilson (2011) argues that evolution can provide a toolkit of approaches appropriate to a deeper understanding of economic phenomena. This toolkit can help make some sense of the current disarray in economics. Basic to this approach is Niko Tinbergen's (1963) four questions about evolution that constitute the toolkit of analysis for evolutionary biologists. Consider any trait that could exist in a species. Two basic questions are: Why does that trait exist compared to the many other traits that could exist (ultimate causation)? Given that the trait exists, why does it persist in a population (proximate causation)? Tinbergen added two additional historical questions: What is the phylogenetic history of the trait? How did the trait develop? (Wilson 2011)

Evolution can provide insights into economic phenomena:

1. Evolution is a way to make sense of all the "anomalies" uncovered by behavioral economics. For example, what role did loss aversion play in our evolutionary history and how is it related to other identified behavioral traits such as reference point dependency? How can all the anomalies uncovered by behavioral economists be lumped into meaningful groups?

2. The proximate-ultimate distinction can be useful in understanding and influencing public policy. For example, the U.S. uses too much fossil fuel because the private price is lower than the socially optimum price (proximate cause), but also because of the way the fossil fuel bonanza of the last 100 years or so influenced land use patterns, production techniques and the culture of consumption.
3. Evolution brings back into economics an appreciation of the potential conflict between self-interest and the public good. Within-group competition (keeping up with the Jones's) is a zero sum game. The well-being literature suggests that public policies are better directed toward promoting non-competitive public goods rather than increasing competitive material rewards.
4. Evidence from neuroscience suggests that cultural evolution is almost uniquely important in human societies. Cultural variation adds another dimension, along with genetic variation in human societies. Evolution can help answer Akerlof's question "Why do norms matter?"

This section needs a lot of work – I ran out of steam here. John

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