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Darwinian Foundations for Evolutionary Economics

J.W. Stoelhorst

Abstract: This paper engages with the methodological debate on the contribution of Darwinism to Veblen's (1898) evolutionary research program for economics. I argue that ontological continuity, generalized Darwinism, and multi-level selection are necessary building blocks for an explanatory framework that can fulfill the promise of Veblen's program. I clarify the causal logic of generalized Darwinism and suggest an ontology for the study of economic development on the basis of multi-level selection theory. Conceptualizing economic development along these lines has interesting implications for the evolutionary analysis of institutions: institutions only become units of selection in the competition between groups of individuals.

Keywords: Generalized Darwinism; Institutions; Veblen

JEL Classification Codes: B15, B41, B52

The Revival of Veblen's Promise

Thorstein Veblen's (1898) *Why is Economics Not an Evolutionary Science* has been described as a manifesto for evolutionary economics that holds a promise that is yet to be fulfilled (Rutherford 1998). In this paper, Veblen presented the methodological outline of a Darwinian research program that would turn economics into a modern science. The starting point of this program was the recognition that to become a proper science economic theory should steer clear of teleology and be firmly committed to causal explanation (Hodgson 2003; 2004; Rutherford 1998). Veblen envisioned an evolutionary economics that would study the process of economic development, or "the sequence of change in the methods of . . . dealing with the material means of life" (1898, 387). This process was to be studied in terms of the individual actions that are "the motor forces of the process of economic development," (1898, 388) and in terms of the "causal sequence" (1898, 396) that explains the "cumulative growth of habits of thought" (1898, 394).

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That the promise of Veblen's research program remains unfulfilled may be attributed to the confluence of a number of historical developments (cf. Hodgson 2004), but is also the result of Veblen's failure to consolidate his vision of a Darwinian economics in an analytical framework that his contemporaries and successors could build on and extend (Hodgson 2003; 2004; Rutherford 1998). As a result, post-Veblenian theory development in institutional and evolutionary economics has typically proceeded without much explicit consideration for the Darwinian foundations that Veblen advocated (Hodgson 2003; 2004). Rutherford (1998, 467) has pointed out that despite Veblen's insistence on causal explanation, his own discussions of "exactly how evolutionary processes work were frequently lacking." The central task in the project to revive Veblenian institutional economics is therefore to develop a framework that allows detailed causal explanations of economic development (cf. Hodgson 2004; 2005; 2007b). It is with this task that the current paper is concerned.

The proper role of Darwinism in efforts to rekindle Veblen's research program is the subject of a recent conceptual-methodological debate in this journal and elsewhere. This debate takes place at two levels. First, there is a general methodological debate about the ways in which Darwinism can inform theory development in institutional and evolutionary economics (Cordes 2006; 2007a; 2007b; Hodgson 2002; 2007a; Hodgson and Knudsen 2006; Nelson 2006; Poirot 2007; Stoelhorst and Hensgens 2006; Vromen 2004; Witt 2004). Second, there is a debate about how Veblen himself saw the role of Darwinism in realizing his vision of an evolutionary economics (Cordes 2005; Hodgson 1992; Ranson 2005; Rutherford 1998). This paper is concerned with the first debate, which is discussed in more detail below. The second debate, whether Veblen himself envisioned the use of Darwinism in quite the way advocated here, is an interesting question from the point of view of the history of ideas but not very relevant for attempts to ground Veblen's original research program in a more explicit and rigorous analytical framework. In fact, this paper's premise is that the development of the explanatory framework that Veblen left wanting depends on a broader set of Darwinian concepts than Veblen was willing or, given the state of theory in his time, able to adopt.

The Methodological Debate on Darwinism

There are three positions in the debate about the proper role of Darwinism in developing evolutionary economics. First, there are those who see the Darwinian variation, selection, and retention schema as a useful heuristic (e.g., Nelson 1995; 2006; Vromen 2004). Others advocate an explicit ontological commitment to Darwinism. This latter group divides into two opposing views. On one hand, there are those who advocate generalized Darwinism as the analytical framework for evolutionary economics on the grounds that it captures the ontological communality among all evolutionary processes (Aldrich et al. 2007; Hodgson 2002; Hodgson and Knudsen 2006; Stoelhorst [2005] 2007; forthcoming; Stoelhorst and Hensgens 2006).

On the other hand, there are those who reject the idea behind generalized Darwinism and limit their commitment to ontological continuity (Cordes 2006; 2007a; 2007b; Witt 1999; 2003).

Hodgson and Knudsen (2006) coined the term "generalized Darwinism" for the idea that the evolution of all open, complex systems needs to be understood in terms of the logic that Darwin used to explain biological evolution. The idea that Darwin's explanatory logic has currency outside biology has a long pedigree that goes back to Darwin himself and includes the writings of Veblen and a number of his contemporaries (Hodgson 2005). This idea has been taken up and developed into general statements of the Darwinian logic by a number of social scientists, biologists, and philosophers (Campbell 1960; 1965; Cziko 1995; Dawkins 1976; Dennett 1995; Hull 1988; Lewontin 1970; Plotkin 1994). The objective of the advocates of generalized Darwinism in evolutionary economics is twofold (Stoelhorst and Hensgens 2006). The first objective is to specify the general nature of an evolutionary explanation by building on and extending earlier work on generalizing Darwinism. The second objective is to subsequently apply this logic to develop theories of evolution in the socio-economic domain.

Witt (1999; 2003) coined the term "ontological continuity" for the idea that the human genetic endowment is the substrate on which cultural, and by extension, economic evolution proceeds. This term captures the idea that is central to evolutionary psychology (Barkow, Cosmides and Tooby 1992) and gene-culture co-evolution theory (Richerson and Boyd 2005): while cultural evolution is essentially driven by the cultural transmission of information, it is both enabled and constrained by behavioral dispositions that evolved over biological history. While this idea is perfectly compatible with generalized Darwinism, it has nevertheless been linked to a rejection of the argument that generalized Darwinism can explain cultural evolution. The advocates of ontological continuity believe that generalizing Darwinism is an exercise that can only lead to the construction of a misleading analogy that will obfuscate the real mechanisms of cultural evolution and economic development (Buenstorf 2006; Cordes 2006, 2007a; Witt 2004).[1]

There can be no doubt that Veblen would have subscribed to the notion of ontological continuity. Indeed, Veblen may be seen as an evolutionary psychologist and gene-culture co-evolution theorist *avant la lettre*. But presenting ontological continuity as an alternative for generalized Darwinism confuses the issue at stake. The advocates of generalized Darwinism have no quarrel with the notion of ontological continuity (cf. Hodgson 2007a). In fact, ontological continuity is part and parcel of the precepts of generalized Darwinism (cf. Dennett 1995; Stoelhorst and Hensgens 2006). We can thus accept ontological continuity and focus on the substantial issue in debating the role of Darwinism in economics: the causal logic that should be at the heart of the explanatory framework that is needed to revive Veblen's research program. Here, the alternatives that have been offered are generalized Darwinism, on one hand, and Witt's (2003) view of cultural and economic evolution as a process driven by the emergence and dissemination of novelty, on the other. While this latter

view may well lead to fruitful theory development, as yet it is a descriptive statement that lacks an explicit causal logic. In contrast, generalized Darwinism does explicitly state an explanatory logic to address cumulative causation.

The Causal Logic of Generalized Darwinism

Discussions of Generalized Darwinism typically revolve around different conceptualizations of its *explanantia*. It should be noted that different ways of generalizing Darwinian explanantia have been proposed in the literature, which shows that the project of generalizing Darwinism is not yet complete (Stoelhorst and Hensgens 2006). Here Campbell's (1960; 1965) conceptualization of Darwinism's explanantia in terms of variation, selection, and retention mechanisms is preferred over versions that refer to inheritance or replication because these latter terms may easily be misunderstood as inviting biological analogies. Surprisingly, the *explananda* of generalized Darwinism have not been given the same attention (Stoelhorst forthcoming). Yet the question "what can Darwinism explain?" is fundamental to assessing its value in developing theories of economic development.

A possible answer is that generalized Darwinism explains change over time. However, there are two reasons why this is not satisfactory. The first pertains to the project of generalizing Darwinism as such: the explananda of Darwinism are in fact much more specific than change over time. Darwinism can explain adaptive fit, variety from common origins, and accumulation of adaptive complexity (Maynard Smith 1993; Mayr 2001; Dennett 1995). The second reason pertains to the project of reviving Veblen's research program. Mere change was not what Veblen set out to explain. His explananda were the process of adaptation and the cumulative causation that drive economic development. The link between the Darwinian and Veblenian explananda is obvious. This provides a strong argument to place the explanatory logic of Darwinism at the center of an analytical framework for theory development in evolutionary institutional economics. Another powerful argument is that barring an omniscient and omnipotent designer there is currently no other known way of rigorously explaining the accumulation of adaptive complexity that was Veblen's goal (Cziko 1995; Dennett 1995).

But what is the causal logic that links variation, selection and retention to the Darwinian and Veblenian explananda? This becomes clear when we consider the interaction between these three mechanisms in an evolutionary explanation. This interaction establishes the recursive causal logic that is necessary for a functional explanation. Functional explanations have often been criticized because they seem to reverse cause and effect. Explaining the adaptations of a system (say, the wings of a bird, the internal organization of a firm, or the dress of a person) in terms of their function (flight, efficiency, or respectable appearance) is suspect because the function does not cause the characteristic. Wings make flight possible, but flight does not cause wings. In other words, specific adaptations are sufficient, but not necessary conditions to fulfill a particular function. There could well be functional equivalents, and it is

even conceivable that other adaptations could provide the required function in a better way.

Elster (1983) has specified three necessary conditions for a rigorous functional explanation, and the recursive causality of a feedback loop is central among them. A behavioral pattern X is explained by its function Y for system Z, if and only if:[2]

(1) Y is an effect of X;
(2) Y is beneficial for Z;
(3) Y maintains X by a causal feedback loop passing through Z.

In other words, functional explanations only work if a feedback loop can be specified that links the beneficial effect of having a feature to its prolonged existence. In Darwinism, selection provides the feedback loop that is necessary to complete a functional explanation. Selection restores the logic of cause and effect by specifying how variations in a population of entities is reduced so that those variations that work best in the system's local environment are retained.

In essence, the generalized version of Darwinism offers *a substrate neutral algorithm* to explain adaptive fit, variety from common origins, and the accumulation of adaptive complexity (Dennett 1995). Darwinism is algorithmic because the combination of variation, selection, and retention mechanisms *necessarily* leads to adaptive fit. When there is selection pressure on a population of entities in combination with mechanisms to replenish the variation in this population and to retain the selected variations, the entities in the population will become adapted to their local environment. Over time, previous adaptation becomes the basis for further evolution, and in the long run this process leads to the accumulation of adaptive complexity (Dennett 1995; Stoelhorst forthcoming). Note that this does not imply global, or even local, optimality. The resulting adaptations are constrained by the variations that become available. There is no process of adaptation as such: adaptations are by-products of the interaction of variation, selection and retention mechanisms. Evolution does not have the teleological goal of producing adaptations; they are posteriori phenomena.

Two criteria for Darwinian theory can be derived from the recursive causal logic of a Darwinian explanation. First, Darwinian theories need to specify the mechanisms of variation, selection and retention that drive evolution in the domain they study (cf. Hodgson and Knudsen 2006). If one of these mechanisms is missing, the explanation of adaptive fit breaks down (Stoelhorst forthcoming). However, a Darwinian theory also needs to specify its units of selection. The recursive causality of a functional explanation requires a unit of "selection of" (the phenotype of the organism) and a unit of "selection for" (the genotype of the species, Sober 1984). In nature, selection acts upon the way in which organisms interact with their environment and the success of this interaction, or lack thereof, feeds back into the gene pool. Nature does not "see" genes but establishes the feedback loop between the phenotype and the genotype by way of differential reproduction. A second criterion for Darwinian

theories is that they need to specify units of selection that play a role that is logically equivalent to the phenotype and genotype in order to establish the recursive causality that drives evolutionary processes. This points to the need for additional logic.

The Crucial Role of Multi-level Selection Theory

In addition to Veblen's insistence on studying economic development in terms of cumulative causation, another reason to look to his research program for inspiration is his emphasis on individual action as the driver of economic development. Veblen's approach works "from the bottom-up" and explains economic development in terms of the "process of selective adaptation" of individual "habits of thought with respect to particular relations and particular functions of the individual and of the community" (Veblen [1899] 1994, 188, 190). This feature sets his evolutionary economics apart from modern evolutionary economics in the tradition of Nelson and Winter (1982), where theory development typically "starts in the middle" and economic development is explained in terms of the selection of firms and their routines.[3]

However, Veblen's dual focus on individual behavior, on one hand, and outcomes at the level of the community, on the other hand, raises the crucial question of the relationship between these two levels of analysis. How, for instance, do we get from the individuals that are the focus of a Veblenian analysis to the firm that is the focus of an analysis in the style of Nelson and Winter? Generalized Darwinism holds that the Darwinian algorithm applies to both levels of analysis. However, by itself, generalized Darwinism cannot explain how we get from individual behavior to collective phenomena such as the firm. This leads to difficulties when specifying units of selection above the individual level.

Multi-level selection theory has a crucial role to play in developing an analytical framework that can fulfill Veblen's promise because it suggests a rigorous way of specifying units of selection in theories of cultural and economic evolution. To explain the emergence of a stable level of organization above that of the individual we need to specify a group and explain why competition among individuals within this group does not undermine its stability (cf. Maynard Smith and Szathmary 1997). Such an explanation in turn requires a multi-level selection argument in terms of advantages of within-group cooperation on the success in between-group competition (Maynard Smith and Szathmary 1997; Sober and Wilson 1998). Multi-level selection theory therefore conceptualizes human evolution in terms of the interaction between competition among individuals and competition among groups (Sober and Wilson 1998).

The corollary of the view of multi-level selection theory is that, at the supra-individual unit of analysis, only groups are relevant "units of selection *of*" that can play an explanatory role that is logically equivalent to that of the phenotype. Institutions are not. Institutions should rather be seen as emergent properties that find their origin in the interactions among individuals. They can be understood as

equilibria in coordination and bargaining games in the manner suggested by Binmore (2005). In terms of multi-level selection theory, institutions stabilize within-group competition. Institutions only become "units of selection *for*" in the competition between groups. In other words, they play a role that is logically equivalent to the genotype in competition between collectives. Selection does not "see" institutions and only acts upon individuals and groups of individuals. To be more precise: the success of groups in securing scarce resources in the competition with other groups feeds back into the institutions that code for the collective behavior of these groups. Institutions stabilize groups by channeling within-group competition, but they do so by virtue of their success in furthering the success of groups in the competition with other groups.[4]

Conclusion

Darwinism has a crucial role to play in the revival of Veblen's research program. Ontological continuity establishes an important link to evolutionary psychology and gene-culture co-evolution theory as sources of inspiration for updating, realizing, and extending Veblen's vision for institutional economics. Generalized Darwinism specifies the recursive causal logic at the heart of cumulative causation that Veblen didn't fully specify. Multi-level selection theory offers an analytical framework within which to understand the interplay between the selection processes at the individual level and collective level that jointly drive economic development. Adopting generalized Darwinism is consistent with Veblen's insistence on causal explanation as the mark of true science. Conceptualizing economic development in terms of within-group and between-group competition is in the tradition of Veblen's economic sociology and radical criticism.

Notes

1. The charge that the project of generalized Darwinism will lead to a misleading analogy construction seems to originate in a deeply held belief that grounding evolutionary economics in an explanatory logic that derives from the natural sciences would be repeating the mistake made by neoclassical economics when it turned to Newtonian mechanics. But this charge has not been substantiated with any meaningful arguments. The only argument offered is that the mechanisms of cultural evolution are very different from those of biological evolution (Buenstorf 2006; Cordes 2006; 2007a; Nelson 2006; Witt 2003). This is merely restating the motivation for generalizing Darwinism: to abstract from the specifics of biological evolution in Darwin's theory so that a general explanatory logic for the evolution of all open, complex systems can be specified. The objective of generalized Darwinism is to move evolutionary economics beyond the metaphorical and analogical use of Darwinism and to specify a rigorous causal logic and ontology for the social sciences.
2. Elster's original treatment specified five conditions: (1) Y is an effect of X; (2) Y is beneficial for Z; (3) Y is unintended by the actors producing X; (4) Y (or at least the causal relationship between X and Y) is unrecognized by the actors in Z; (5) Y maintains X by a causal feedback loop passing through Z. However, conditions 3 and 4 originate from Merton, who used them to distinguish functional explanations from explanations based on the actions of motivated and intentional agents. As Veblen was well aware, functional explanations also apply to evolution involving intentional action and conditions 3 and 4 are therefore superfluous.

3. This modern approach "starts in the middle" by assuming firms, and uses collective notions such as firm's routines to abstract from individual behavior. The result is a view of the firm that neglects its social dimension (Stoelhorst, in press).
4. This view extends to the more complicated social fabric of modern societies, where individuals are typically members of numerous groups, and where competition takes place at different levels of analysis (for instance, networks of firms that compete with each other). In such an analysis, institutions can be classified in terms of the level of competition they channel.

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