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Darwinism in Economics and the Evolutionary Theory of Policy-Making

by

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"Generalized Darwinism" and the Quest for an Evolutionary Theory of Policy-Making

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Abstract

According to the advocates of a "Generalized Darwinism" (GD), the three Darwinian principles of variation, selection and retention can and should be used as a meta-theoretical framework for the explanation of evolutionary processes in the sociocultural domain. Despite their biological origins, GD aims at redefining them in a way that is supposed to abstract from any domain-specific particulars. We argue that in order to qualify as an adequate meta-theoretical framework for evolutionary economics, GD should be able to support and inspire viable practical policy implications. After examining its potential to do so, however, we conclude that GD risks systematically misguiding evolutionary policy advice.

Keywords: Evolution, Selection, Darwinism, Ontology, Continuity Hypothesis, Evolutionary Theory of Policy-Making

JEL code: A1, B4, B52, D6, O1

"We study the laws of 'rest' in order to understand the laws of change."
(Lionel Robbins 1935: 103)

1. Introduction

The explanatory potential of metaphors and analogies from evolutionary biology (as opposed to classical mechanics) has fascinated economists since the days of Marshall and Veblen.[1] For if we wish to understand, with Lord Robbins, the "laws of change", why take the detour via the "laws of rest"? It may be more promising to tackle the laws of change directly! While the project of constructing a genuinely *evolutionary* approach to economic theorizing had been marginalized during most of the 20th century, interest in this endeavor has increased again over the last three decades or so. As a consequence, a century-old methodological debate has been rekindled about whether it makes sense to build such an approach upon concepts borrowed from Darwinian biology. In joint work with several co-authors, Geoffrey Hodgson has recently proposed a meta-theoretical framework for describing and analyzing economic change along the lines of a generalization of the basic Darwinian notions of variation, selection and retention (or replication/inheritance) to the socio-economic sphere (Hodgson 2002; Hodgson & Knudsen 2006a, 2010a; Aldrich et al. 2008).[2] This new framework is aptly called "Generalized Darwinism" (henceforth GD).[3]

This approach reaches well beyond earlier attempts to examine the metaphorical usefulness of "evolution" or "Darwinism" in general and of these three Darwinian principles in particular to understand specific processes of socio-cultural and particularly economic[4] evolution (see, e.g., Campbell 1965; Winter 1964; Nelson & Winter 1982).[5]

[1] I am grateful to Guido Bünstorf, Christian Cordes, Jan-Willem Stoelhorst and Ulrich Witt for helpful comments on earlier drafts of this paper. All remaining errors and omissions are mine.
[2] See also Hodgson (2010), Hodgson & Knudsen (2008b), Metcalfe (1998), Vanberg (2006), Stoelhorst (2008a, 2008b), and in particular Hodgson and Knudsen (2010a).
[3] As Hodgson and several coauthors explain (Aldrich et al., 2008, FN 3), the originally favored notion of "Universal Darwinism" (apparently first coined, in a strictly biological context, by Dawkins, 1983) has now been abandoned since it "may misleadingly suggest that Darwinism covers everything." Rather, Darwinian principles are now taken to "apply to complex population systems only" (ibid.).
[4] For the sake of simplicity, the predicates "socio-cultural", "cultural", and "economic" will be used interchangeably in the following.
[5] The underlying general motivation remains the same, however. Following Nelson & Winter (1982: 11), Hodgson & Knudsen (2007: 358) state to be "prepared to exploit any appropriate idea from biology that helps us

Given its far-ranging implications for the role of Darwinian thought in reshaping economics, for the way "evolution" is conceptualized in the socio-cultural arena, and for the specification of the essentials of evolutionary economics proper, it is not surprising that this new, much more ambitious program has provoked a lively debate, during which it has met with persistent skepticism (Witt 2003a; Nelson 2006; Cordes 2006, 2009; Vromen 2007, 2008, 2010; Pelikan 2010; Levit et al. 2011; Andersson 2011).[6] Mamy of the critics subscribe to a rivaling conceptual framework that they refer to as the "Continuity Hypothesis" (Witt 1999, 2003a). While the controversy continues, with both sides adducing ontological as well as pragmatic arguments and claiming the support of the founding fathers of evolutionary economics[7] for their respective positions, the time has come to probe the scientific potential of this new meta-theoretical framework to evolutionary economics. So far, this has been done in the realm of industrial and firm change (see, e.g., Bünstorf 2006; Murmann 2003) and organizational change (Stoelhorst 2009; Breslin 2011).

The present paper contributes to the literature by examining whether the GD framework can support an applied evolutionary theory of *policy-making*. To our knowledge, it is the first to do so. We argue that in order to maintain its ambition to provide a "unified evolutionary framework for the social and behavioural sciences" (Hodgson & Knudsen 2010a: 3), GD should also be able to direct research in that – more applied – area. At least, it should not hinder it by providing it with inadequate concepts of positive fact, which could misguide scientists' discussion of alternative policy goals and normative criteria. General interest in an evolutionary account of policy-making has increased in recent years (see, e.g., Rubin 2002; Witt 2003b; Wilson & Gowdy 2010; Schubert 2012).[8] First and foremost, it is expected to enable the field to enhance its

to explain socio-economic reality". A historical sketch of attempts (starting with Mandeville) to transfer concepts and methodological tools from biology to economics and vice versa is given by Hodgson (2007b).

[6] See also Rosenberg (2000). The debate is, however, plagued by many mutual misunderstandings, perhaps best illustrated by the exchange between Cordes (2007b) and Hodgson (2007a).

[7] It is in particular the orientation of Veblen and (the late, "evolutionary") Hayek that is hotly contested (Cordes, 2007a; Marciano, 2009; Hodgson, 2005), while Schumpeter's aversion against the use of Darwinian notions in economics is widely acknowledged (Hodgson, 1997; Andersen, 2009: 382). Hodgson (2005) presents some intellectual predecessors of contemporary Generalized Darwinism.

[8] As the application of Darwinian concepts to the economic domain has now started to permeate even popular narratives of the recent financial crisis and of the evolution of financial markets more general (e.g. Ferguson, 2008, stating that "[f]inancial history is essentially the result of institutional mutation and natural

practical relevance by developing sound policy recommendations. For instance, Wilson and Gowdy (2010) argue that the economic approach to policy-making should be informed by evolutionary theorizing, for the latter can improve policy advice by helping decision-makers "understand the large-scale and long-run consequences of economic policies" (ibid.: 5). Second, it could make sense of issues that are misconceived in neoclassical accounts of policy-making, such as the complex relationship between individual and collective welfare (ibid.), and the persistence of mal-adapted ("irrational") products of evolutionary processes, such as dysfunctional institutions (Whitman 1998).

In general, a proper evolutionary theory of policy-making should be based upon three pillars: It would need to (i) explain how the process of policy-making factually works, and how political institutions change over time, (ii) probe the effectiveness of alternative policy instruments (including general problem-solving mechanisms such as trial-and-error) under the conditions of an evolving economy, and (iii) discuss the legitimacy, applicability and operationalization of the diverse goals and criteria of policy-making (Keynes 1917; Witt 2003b). While it seems that pillars I and II can quite easily be construed within an evolutionary framework,[9] the third, genuinely normative pillar is much more challenging and controversial (and, unsurprisingly, largely neglected in the evolutionary economics literature). Its crucial role for the development of sound policy advice has, e.g., been stressed by Nelson (1977, 1981).[10] To illustrate, consider the issue of whether standard normative concepts such as Pareto efficiency or "market failure" can be consistently applied in an evolutionary setting. This leads us to the first of two hypotheses:

> **(1)** An evolutionary approach to policy-making requires a "normative structure" (Nelson 1977: 18) in order to clarify which policy goals and criteria can be consistently applied in an evolutionary setting of changing and incoherent preferences.

Given hypothesis 1, we ask whether such a "normative structure" can be construed within

selection" [ibid.: 342, 350]), we would argue that it is more important than ever to check whether and how Darwinian concepts bias the development of policy advice.

[9] On the first pillar see, e.g., Ebner (2006), Wohlgemuth (2002). On the second pillar, see, e.g. Kerstenetzky (2000, 2007), Dolfsma (2005), and Witt (2003).

[10] See also Nelson & Winter (1982: ch. 15), Dopfer (1976: 19-29), Witt (1996a), Hodgson (1999: ch. 11).

an evolutionary economics *that is conceptualized in terms of GD*. As we will see, our second hypothesis can be defended:

> **(2)** The GD framework risks misguiding the construction of a normative structure within an evolutionary theory of policy-making; it does so, not by systematically favoring a specific ideology (say, laissez-faire, or conservatism),[11] but at a more fundamental level, by smuggling in unjustified preconceptions into the process of normative reasoning, thereby lowering its quality. It is ultimately the *top-down* methodology of GD that is ill-equipped to deal with the specific normative challenges brought about in an evolutionary world.

The paper is organized as follows: In section 2, we reconstruct the position held by the GD movement, as it has been specified until now. Section 3 presents the main objections against this approach within a purely positive research agenda. Section 4 then focuses more specifically on the difficulty to think about policy-making, policy implications, and welfare in an evolutionary framework, inferring the need to stick to a non-Darwinian framework in order to cope with the issues involved. Finally, section 5 concludes.

2. "Generalized Darwinism": A roadmap

2.1 Basic commitments

In joint work with several co-authors, notably Thorbjørn Knudsen, Geoffrey Hodgson has recently elaborated upon the case for GD.[12] His thinking is apparently influenced by evolutionary theorists such as Campbell (1960, 1965), Dawkins (1983), Lewontin (1985), Dennett (1994), and in particular Hull (1988). On a most basic methodological level, GD claims the following:

(1) All social science should be committed to "detailed, cumulative, causal

[11] We also do not argue that the use of biologically inspired concepts necessarily implies a "Panglossian" outlook on the economy. There is no mechanism in biological evolution guaranteeing that only "optimal" results will prevail (Whitman, 1998: 49-55).
[12] See in particular Hodgson & Knudsen (2006a; 2008b), Aldrich et al. (2008), Hodgson (2002).

explanations" rather than functional "just so-stories".[13]

(2) A specific causal-explanatory logic applies to all evolutionary processes: All such processes in both the natural and the socio-cultural realm

(2a) share the *same* basic ontological structure,

(2b) which is, more specifically, one that can *only* be described by the Darwinian scheme of a dynamic interplay of variation, selection and inheritance (or replication). In terms of heuristics, the Darwinian scheme is the only framework that can be used to model these processes.

When talking about "evolutionary processes", Hodgson and coauthors focus on phenomena of "complex (evolving and replicating) systems", involving populations of heterogeneous entities that causally interact with each other. Systems of this kind in both nature and culture are taken to exhibit a common ontological basis, viz., one that is characterized by the properties of variation, selection and inheritance. Any system where these properties are present and interact dynamically is said to display Darwinian evolution. Hence, the latter is argued to actually *occur* in both systems: Both natural and socio-economic evolution *are* Darwinian in key respects.[14] In other words, Darwinian processes are identified as generic algorithms that are substrate-neutral. Defining Darwinism – quite broadly – as a "causal theory of evolution in complex population systems involving the inheritance of generative instructions by individual units and a process of selection of the varied population of such entities" (Hodgson & Knudsen 2006a: 13), they insist that any attempt to explain such systems in both nature and society must *necessarily* rely on these three "core Darwinian principles" (ibid.).[15] Note that this is tantamount to stating that natural selection is the *only* mechanism working in complex population systems.

Hodgson & Knudsen (2006a) define their object of study as "complex systems",

[13] Hodgson (2002: 260, 268-269). See Vromen (1995: ch. 5) for a subtle methodological critique of the inadequate functionalism involved in "just-so stories".

[14] The facts that (a) Darwin, when establishing his principles, was influenced by social philosophers such as Malthus, and that (b) Darwin himself speculated about the evolutionary forces transforming morals and language are cited in support of this hypothesis; see, e.g., Hodgson (2007a: 265). Ironically, fact (a) is also put forward by opponents of GD in support of *their* position (see below).

[15] See also Hodgson (2010: 10, referring to Campbell, 1965): "The evolution of any complex population system *must* involve the three Darwinian principles of variation, selection and retention" (italics in the original).

involving populations of "entities of specific types" that are heterogeneous in "relevant respects." These entities absorb both matter and energy and are able to process information about their environment. Being "mortal and degradable" and confronted with the "omnipresent problem of local and immediate scarcity", they are engaged in a perpetual "struggle for existence" (Aldrich et al. 2008: 583).[16] Importantly, the entities are also assumed to possess some capacity to "retain and pass on to others workable solutions to problems" they face in the course of their daily struggle (ibid.). Defined in such an extremely abstract way, Hodgson & Knudsen's entities are argued to include not only "every biological species", but also "human institutions" and business firms (ibid.: 4-5).

As Hodgson et al. hasten to add, Darwin's rather abstract concepts have to be complemented by (yet largely to be developed) domain-specific auxiliary theories and hypotheses in order to get a satisfactory explanatory account.[17] Since they emphatically reject any genetic reductionism,[18] advocates of GD have to acknowledge that on a less abstract level the mechanisms and processes of change are "very different" both within and between different types of (natural and socio-cultural) systems. The concepts themselves are thought to serve as heuristics that guide and structure further theory development in the realm of socio-cultural change. Thus, GD contains not only ontological presuppositions, but also heuristic precepts and, hence, the contours of an ambitious research program.

In order to justify the claim that the three Darwinian principles are necessary to explain the way such complex systems evolve over time, Aldrich et al. (2008: 583-584) set out to define three core explananda that any theory of evolution should be able to confront. According to GD, then, such a theory must necessarily include an account of

[16] Italicized in the original.
[17] Strictly speaking, these are not "Darwin's" principles. Darwin's own account of evolution actually consists of five theories (Mayr, 2001), viz., a theory that organisms are transformed over time, the theory of common descent, plus the (originally more disputed) theories of multiplication of species, gradualism and natural selection proper. See Levit et al. (2011) for further details. The reduction of Darwin's theories to the three "core principles" of variation, selection and retention/inheritance ("mechanisms for preserving and/or propagating the selected variations") is due to Campbell, cf. e.g. Campbell (1965).
[18] See, e.g., Aldrich et al. (2008) and Hodgson (2002: 270-276). According to Hodgson, Darwinism is committed to "determinism" in one of three possible senses, viz., the ontological assumption that "every event has a cause" (ibid.).

(i) how variety occurs,

(ii) how "useful information concerning solutions to particular adaptive problems" – which may be carried, e.g., by social norms or business firm routines – "is retained and passed on" or "copied",

and finally and most importantly

(iii) an account of the "fact that entities differ in their longevity and fecundity".

As regards the last point, it is argued that only the *principle of selection* can explain why some entities or units are more successful (in terms of survival or imitation rates) than others. This principle is regarded as the prime legacy of Darwinism for the general explanation of evolutionary processes that manage to generate "adaptive complexity" (Stoelhorst 2008a). According to Hodgson & Knudsen (2006a: 6), selection is about how new variations are "tested in the real world". The explanation is then based on the attempt to trace changing frequencies of posterior entities to their properties in some given environmental context.

2.2 The importance of selection

The bulk of the argument in favor of GD is based on the rejection of the "self-organization" theory which Hodgson (2002: 264-266) identifies as the most prominent rival to his own approach when it comes to providing a general account of "evolution" (see also Hodgson & Knudsen 2010a: 51-57). According to Hodgson, self-organization is successful in explaining how undesigned social order emerges, but it is not sufficient to explain the "origin of species and of all complex biological phenomena" more general. Interestingly, in order to substantiate this point, Hodgson & Knudsen (2006a) argue that *within biology*, proponents of self-organization such as Kauffman (1993) do actually not see this approach as an "alternative to natural selection" (Hodgson & Knudsen 2006a: 7). For without selection, so the argument goes, it is impossible to explain the "move toward the emergence of *increasingly complex* structures" (ibid., italics added). Only an

explanation using the principle of selection can show why a subset of self-organized units acquire "survival value" by gradually becoming adapted to their environment.[19]

According to Hodgson & Knudsen (ibid.: 8), an approach focusing on self-organization, by concentrating on the way some given entity develops "internally", neglects both the way this entity itself has come about (as a result of some antecedent process of selection) as well as the interactions of the entity with its environment and the resulting process of adaptation. Thus, a distinction is drawn between, first, the emergence of an entity itself, second, the entity's ensuing internal, "endogenous" or epigenetical changes[20] and, third, the way this entity interacts with its environment over time (which may result from "exogenous" change and may lead to adaptation). According to GD, only the second phenomenon can be covered by self-organization theories, while processes involving all three levels of phenomena can *only* be accounted for by Darwin's selection principle. Put differently, self-organization theories are said to focus exclusively on the ontogeny of single organisms or "structures" such as firms. By contrast, GD is argued to also account for phylogenetic processes that involve the evolution of a whole population of entities within which selection occurs. Phylogeny denotes a more general process in that it necessarily also incorporates ontogenetic processes at a lower level.[21]

At this point, the meaning of "selection" deserves some closer scrutiny. First and foremost, Hodgson and Knudsen differentiate between subset selection – i.e. selection by partial elimination (a firm's bankruptcy, say) – and (what they call) successor selection, which involves not only adaptive change, but also the generation of genuine novelty.[22] Through the lens of GD, both processes of selection operate in a rich array of phenomena including "conscious choices, competitive pressures, market forces, or environmental constraints," all operating on "habits, customs, technologies, institutions, regions and even whole economies" (ibid.: 10). GD now proposes to generalize the notion of selection quite radically in order to allow it to include human intentionality. This problem

[19] On this, see the detailed argument by Stoelhorst (2008a).
[20] See FN 12 in Hodgson & Knudsen (2006a: 8), where the self-organization focus on internal change is related to Ulrich Witt's allegedly "confined" conception of evolution as a system's "self-transformation over time".
[21] As Hodgson & Knudsen put it, "from the point of view of the overall evolutionary process, complete evolutionary descriptions require a phylogenetic account of the selection of ontogenetically developing units" (ibid.: 10).
[22] This is inspired by Price (1995).

is related to the task to come to terms with, first, "artificial selection" and, second, "Lamarckian" evolution.

The American institutionalist J.R. Commons (1934) famously objected to this broad application of the notion of selection by arguing that institutional change involves *artificial* rather than "natural" selection. Artificial selection implies humans deliberately controlling the selection process by manipulating the "criteria or environment of selection".[23] The proponents of GD respond by redefining the notion of "selection" itself in a way sufficiently abstract to include those processes that Commons called "artificial":[24] They argue that "the human doing the selection is also a product of natural evolution" – in particular her "dispositions, aims and criteria" are to be seen as resulting from "processes of cognitive and cultural evolution" (Hodgson & Knudsen 2006a: 11). As the latter are seen as being based on the operation of "selection" proper, Commons' distinction is rejected.

The notion of selection is also explicitly redefined in a way that allows to incorporate the "Lamarckian" idea about the retention of acquired characters (Hodgson & Knudsen 2006a: 12-13). This is usually referred to as a typical feature of socio-cultural, as opposed to purely natural, evolutionary processes, since the former are also based on the purposeful change of behavioral traits by creative agents.[25] Hodgson & Knudsen now argue that, first, Darwin himself had actually accepted the possibility that acquired traits can be inherited (thus making it plausible to subsume such a phenomenon under the umbrella of "Darwinism"[26]). Second, they maintain that Lamarckism cannot itself answer the tricky question why in general, *non*-beneficial acquired characters are *not* passed on to the next generation. In order to explain this, it again needs to refer to some overarching Darwinian selection process. Thus, Lamarckism is argued to be a less general account of

[23] See Hodgson & Knudsen (2006a: 11).
[24] See in particular Knudsen (2004).
[25] See, however, Hodgson & Knudsen (2006b) on the pitfalls of a Lamarckian perspective on cultural evolution.
[26] It does not appear to be necessary to engage in Darwinian exegesis at this point, since the question may well be left open whether Darwin himself was a "Darwinist" in the sense of GD, or whether it makes sense to restrict the meaning of "Darwinism" to the state of the art of evolutionary theory before Darwin's death. After all, the conceptual and theoretical body known as Darwinism achieved its logical coherence only decades after Darwin had died in 1882. See FN 14, above, and the excellent point made by Olivia Judson that "calling evolutionary biology 'Darwinism,' and evolution by natural selection 'Darwinian' evolution, is like calling aeronautical engineering 'Wrightism,' and fixed-wing aircraft 'Wrightian' planes." (Judson, 2008).

evolution than Darwinism proper. Again, in a way analogous to the argument concerning "artificial" selection, Hodgson & Knudsen argue that the human capacities involved in the Lamarckian account are to be seen as the product of an anterior process of selection: "Insofar as organisms are purposeful, this capacity too has evolved through natural selection" (ibid.: 13). Hence, they claim that Darwin's three principles "do not themselves exclude the possibility of acquired character inheritance" (ibid.).

2.3 Getting practical: Replicators and interactors

The final issue in the argument for Generalized Darwinism concerns the fact that on a less abstract level, there are many obvious *differences* between the phenomena and mechanisms involved in natural and socio-economic evolution. It is evident that analogues to genes, DNA, or sexual recombination are hard or even impossible to find in places such as the market, the firm, the law or the political arena. Mechanisms involved in generating variety or transmitting information are dissimilar, often extremely so. Even to the casual observer, anything akin to "selection" in the economic sphere works differently than natural selection among phenotypes (see section 3.1, below).

From a methodological viewpoint, it is now quite revealing to see that Hodgson & Knudsen (2006a) readily acknowledge all this,[27] only to declare it perfectly *irrelevant* for their argument: GD is said to be "about ontological communality" rather than about "analogy or metaphor" (Hodgson, 2002; Aldrich et al., 2008: 580). Hodgson & Knudsen (2006a) state that "Darwinism is more general and is not tied to these particulars" (ibid.: 14), meaning that "the transfer of Darwinian principles from biological to social evolution does not imply that the detailed mechanisms of selection, variation and inheritance are similar" (ibid.: 15).[28] Accordingly, Hodgson & Knudsen maintain to be able to neutralize any objection that points toward such differences by redefining the Darwinian core principles in ever more abstract terms in order to strip off any domain-specific biological content (Vromen, 2008). As we have seen, Darwinism in the very

[27] See also, e.g., Hodgson & Knudsen (2008a: 49): "Nothing in social culture remotely corresponds to the DNA code".
[28] See also Hodgson (2007a: 270), Aldrich et al. (2008: 580) and Stoelhorst (2008a: 354): "Whether or not the mechanisms that operate in economic and cultural evolution function in ways that are analogous to the ways they do in biology is an interesting question, but irrelevant to debating the explanatory power of generalized Darwinism as such".

specific sense it is then used by GD is argued to accommodate Lamarckism, intentionality, "artificial selection", "selection" occurring within the life of a single socio-economic unit (such as, e.g., a learning individual or firm), even creative choice (Hodgson 2002: 276) and almost any variation and "inheritance" mechanism one can think of: "As long as there is a population with imperfect inheritance of their characteristics, and not all of them have the potential to survive, then Darwinian evolution will occur" (ibid.: 270).[29] Relative to this, any observable phenomenological differences are declared irrelevant.

While these assertions certainly cannot be denied in the sphere of pure logic, this does not yet validate them from a pragmatic viewpoint. The latter is however essential, given the GD movement's explicitly stated purpose to use Darwinism not just as an anemic framework that is in need of additional auxiliary theories to explain any real-world phenomena of change (this is almost trivially true), but as a productive framework that is able to *inspire*, *frame* and *organize* further theory development in evolutionary economics, i.e., to provide constructive heuristics for future research on a less abstract, applied level.[30]

Can the Darwinian triple effectively inspire, frame and organize theory development? As we will see shortly, this is in fact the key issue in the debate about GD. In order to demonstrate the practical potential of GD, Hodgson and Knudsen leave the abstract heights of ontology in order to apply GD to real-world explananda, in particular in the realm of market competition, firm growth and industry evolution. In order to obtain operational units of analysis, they generalize the biological concepts of genotype and phenotype and borrow the notions of *replicator* and *interactor* (Aldrich et al. 2008: 586-588).

Replicators and interactors are said to play a role in both biological and economic evolving systems. In particular, they are meant to also capture the phenomenon of Lamarckian evolution, with traits being "encoded in an instruction set that is passed on to the next generation" (Hodgson & Knudsen 2007: 356). Such an instruction set is called a

[29] See also Hodgson & Knudsen (2006a: 16).
[30] See Hodgson & Knudsen (2006a: 16) and Hodgson (2010: 13): "[Generalized Darwinism] can ... have an important impact on the development of middle-range theory and serve as a useful guide for empirical enquiry."

"replicator". Hull (1988: 408) defines this term – which is originally due to Dawkins (1976) – as "an entity that passes on its structure largely intact in successive replications".[31] Put differently, it is "an information-retaining and copiable mechanism" (Hodgson & Knudsen, forthcoming). Replication is argued to capture the transmission of information in evolving systems. A replicator, then, denotes any mechanism that carries instructions which can be passed on to the next generation of entities by some form of more or less faithful copying or reproduction. By contrast, an interactor is an entity that "interacts as a cohesive whole with its environment in such a way that this interaction causes replication to be differential" (ibid.).[32] These entities "host" replicators; they manifestly *express* the replicating information.

In the biological domain, paradigmatic examples for these two kinds of entities are genes (as replicators) and individual organisms (as interactors). According to Hull (1988: 409-410), "selection" can then be characterized as involving the interplay of both replicators and interactors in such a way that the differential success of interactors causes differential survival on the part of the relevant replicators. Lamarckism would then imply that the instruction set contained in the replicator is modified in the course of the interactor's adaptation to its environmental conditions. It is then transmitted only after this modification has taken place. Thus, we have the first important heuristic following from GD: When studying socio-economic phenomena, watch out for replicators and interactors!

According to Hodgson & Knudsen (2004a), in the economic domain habits and routines can usefully be modeled as replicators, with firms playing the role of interactors. While they do not follow Nelson & Winter's (1982) notorious suggestion that routines of firms can be described as analogs to genes, they do nonetheless see a similarity in the sense that both genes and routines are replicators. Thereby they suggest that it is the more

[31] See Hodgson & Knudsen (2010b: 15) for three features that characterize a replicator, namely, "causal implication", "similarity" and "information transfer". Earlier, Dawkins (1976) described replicators as being characterized by their "longevity, fecundity and copying-fidelity"; cf. also Hull (1989: 95-98) and Hodgson & Knudsen (2008a) for a detailed discussion of the term's semantic history. Importantly, there are simple processes of adaptive change (viz., subset selection) that do not involve replication of any kind. As a consequence, they *a fortiori* do not have the potential to increase complexity (Hodgson & Knudsen, forthcoming).

[32] Italics in the original.

or less faithful copying ("inheritance") that characterizes these entities.[33] Apart from business firms and single individuals, GD also interprets "social groups or institutions" as interactors (ibid.).

An important final step in the theoretical argument for GD is the attempt to explain the emergence of *complexity*. Hodgson & Knudsen (2010b) argue that a special subset of replicators that they call *generative* replicators are able to increase complexity in any evolving system. This type of replicators transmits information that crucially also contains developmental (program-like) instructions, i.e., a "construction mechanism that can create a new entity on the basis of a fairly simple set of instructions" (ibid.: 13). Defining complexity of an evolving entity as the "amount of information that it stores, about the environment in which it evolves", they show that the capacity to enhance complexity depends critically on the condition that copy errors (as opposed to mere "reading errors") are sufficiently infrequent (ibid., 20). As a paradigm example of such super-faithful copying they mention Intel's strategy to set up new plants by establishing exact copies of the older units (ibid.).

3. ...but how far does it lead us?

This section discusses the main objections against applying the framework, described by GD, to processes of socio-cultural evolution. Given that this is a meta-theoretical approach, how can we tell whether it is useful and adequate? As the discussion in section 2, above, has made clear, GD involves a rather complex set of presuppositions and definitions. It may be useful to make a distinction between three levels, in decreasing order of abstractness:

(i) The level of fundamental metaphysical[34] and meta-theoretical propositions (such as the pledge to ontological monism and causal explanations);

[33] The analysis gets more complicated, though, when it is acknowledged that what may emerge as an interactor at one level of phenomena might act as a replicator at another level: "Human individuals can be seen as interactors (with their genotypes as replicators), but individual preferences or ideas can be regarded as replicators at a higher level of cultural transmission" (Hodgson & Knudsen, 2008a: 49).
[34] On the criteria qualifying statements as "metaphysical", cf. Popper (1989: ch. 11).

(ii) The level of suggested (re-)definitions of the terms "variation", "selection" and "replication";

(iii) and, finally, the more applied level concerning the suggested use of the concepts of "replicator" and "interactor".

Obviously, the statements that we find at levels (i) and (ii) can neither be proven by logic nor falsified by empirical evidence. Nonetheless, most of the recent "defences" of GD's proponents against their critics seem to be motivated by the wish to articulate and justify, over and over again, the belief in the propositions covered by (i) and the logical possibility to define and re-define notions as suggested in (ii).

In itself, this is fruitless. The only relevant issue in our context is whether it makes sense to jump from the combination of (i) and (ii) to those statements that we find at level (iii). This jump from the abstract heights of ontology and notional exercises down to the level of operational units of analysis is what will be discussed in this section. Put differently, the debate on GD should be about whether this approach is useful in framing the perception of explananda and guiding and structuring further theory development and policy applications in evolutionary economics.[35] Hence, the ongoing controversy about GD and the rivaling "Continuity Hypothesis" (see below) has to be understood in light of the importance of the way ontological conjectures, metaphors and analogies are used to *frame* the perception of scientific (or policy) problems and to inspire, guide and organize the development of scientific problem solutions. As Hodgson (2002: 263) puts it, "[m]etaphor in general has a deeply constitutive and subterranean presence in science… by helping to form analogies, the influence of metaphor is neither superficial nor merely preliminary".[36]

Let's look at level (i), first. GD's most fundamental precommitments are rarely contested by evolutionary economists, including those that tend to oppose GD on other grounds. First and most importantly, both camps agree upon the basic assumption that

[35] See Vanberg (2006: 199).

[36] This fundamental insight seems to be neglected by Geisendorf (2009) who, in an attempt to defend GD against some of its critics, downplays the importance of concrete "vocabulary" such as "selection" (ibid.: 380, 386).

there is indeed a need for an abstract, i.e., domain-unspecific concept of "evolution".[37] It is precisely the way to get there that is hotly debated. Second, there is a broad consensus regarding the general "Darwinian world-view", epitomized by a "naturalistic" belief in ontological monism (see GD's claim 2a, section 2, above), i.e., the assumption that "both change in the economy and change in nature belong to connected spheres of reality" (Witt 2008b). Note that in this context, the adjective "Darwinian" has a semantic content that is much more general than in the parlance of GD. Related to this abstract concept of "Darwinism", any reductionist monism is widely rejected (Witt 2008a, Hodgson & Knudsen, 2006a). Third, there is agreement about the separate[38] ontological postulate that there is a general *causal* link between all levels and parts of empirical reality, in particular between the spheres of non-human nature and man-made culture. Accordingly, both camps share the methodological emphasis on the search for commonalities at the level of homomorphic structures of reality,[39] coupled with the focus on causal (rather than functional) explanations (GD's claim 1, section 2, above). All this appears to be by and large uncontroversial.

The argument starts, however, with GD's assertion that processes of natural and sociocultural evolution share a very specific ontological structure, viz., one that allows and prescribes the application of "Darwin's principles" in order to be explainable (GD's claim 2b, section 2, above, which is related to level (ii)). This very specific position directly implies a certain stance on the heuristic level, i.e., on how theoretical problems should be framed and understood to generate meaningful hypotheses. As we will see shortly, the particular ontological position underlying this heuristic stance does not necessarily follow from a general commitment to ontological monism. In other words, a monistic ontology can be more complex in order to allow for a subtle, yet clear distinction between the realm of pure biological and socio-cultural evolution.

3.1 The problem of analogy

[37] See, e.g., Hodgson (2010: 12-13) and Witt (2008b).
[38] See Vromen (2008) on the differences and the basic independence between these ontological precepts.
[39] See Witt (1996b: 709). This is based on the methodological meta-project of "Consilience", suggested by Wilson (1998), where he defines the related quest for a "unity of knowledge" as implying the "'jumping together' of knowledge by the linking of facts and fact-based theory across disciplines to create a common groundwork of explanation."

The most important and most straightforward objection against all attempts, including GD's, to transfer concepts from biology to economics concerns the problem of slipping into the use of *analogies*. The well-known contributions by Alchian (1950) and Friedman (1953) exemplify the flaws inherent in this strategy. To be sure, there is a categorical difference between analogy and generalization, and the latter does not, *per se*, imply the former.[40] Nevertheless, if the generalization leads to abstract principles that are supposed to play a productive heuristic role (which implies that they are not so abstract as to be effectively void), then we cannot exclude *a priori* the risk that the *practical use* of these abstract principles may systematically induce the scientist to end up, perhaps inadvertently, with analogical reasoning. The line separating generalization and analogy, so clear-cut in theory, may become blurred in scientific practice. This practical risk is consistently neglected by Hodgson, Knudsen and the other proponents of GD.

In fact, this risk of falling back into analogical thinking is what worries critics of GD the most. They argue that notwithstanding the assertions of its defenders, GD, through its role as a focusing device, carries the risk of leading to the construction of analogies between socio-cultural and biological phenomena. Everyone in the debate agrees that, while they may look plausible at first sight, these analogies tend to be seriously misleading. As the proponents of GD put it, on the level of "detailed processes and mechanisms," any analogy construction would lead theory development astray.

Why are analogies misleading? Some examples may illustrate this risk. First, regarding any of the three Darwinian categories (variation, selection, replication) in isolation, one may show that things work out (very) differently in the socio-economic domain as compared to the biological domain. Consider *variation*, which can safely be assumed to be "blind" in nature. This holds not only for undirected genetic mutation, but also for the more important recombination of genetically coded information (cross-over) which uses "background knowledge" of past successful adaptations. Even though the latter may be described as containing a higher degree of directedness (viz., towards relatively higher degrees of local adaptedness), it is still "blind" in the sense of being

[40] As Hodgson (2007a: 269) aptly defines these terms, *analogy* refers to taking "one phenomenon or process ... as the reference point and other similar processes are compared to it," while *generalization* "starts from an array of different phenomena and processes, without giving analytical priority to any of them over others. Where possible, shared principles are adduced ... These common principles will not reflect detailed mechanisms found in any one particular domain." See also Aldrich et al. (2008: 579-580).

perfectly pre-programmed. By contrast, in the cultural realm, variation is hardly ever "blind" *in this particular sense*. Humans act on knowledge they have acquired and choose strategies accordingly − in this sense, their choice behavior is always informed, if imperfectly so. Based on their subjective beliefs, humans recombine given elements in a way that is much more directed than is the case in genetic cross-over. The fact that on an aggregate level, the results of human interaction can still never be predicted with certainty, does not render micro level "variation" any "blinder".[41]

Hence, to put it in Darwinian terms, this form of "blindness" (viz., unpredictability) results essentially from the operation of some particularly complex mechanism of "selection", rather than from some features of "variation" itself. On the individual level, where variation is introduced, there can hardly be any doubt that human behavior is not "blind" in the *same* way as the behavior of non-human animals. Humans may not see precisely where their steps will eventually lead them, but they are able to take them with some clear purpose, aspirations, attitudes, beliefs, positive expectations, normative expectations and ideas in mind about how to proceed if the action fails: "In cultural evolution in general, and in economic evolution in particular, the causes of novelty generation are not independent of the wants and longings of individuals" (Witt & Cordes 2007: 325). More importantly, it may be argued that it is precisely around these concepts, i.e., *within this difference in the degree of "blindness"* that most interesting research questions of evolutionary economists are located (see below): Why and how do individual beliefs and attitudes change? Hence, biological variation and cultural "variation" differ in essential respects, and these differences are highly relevant in terms of the research agenda of evolutionary economics.[42]

[41] These are two different meanings of "blind": Following evolutionary epistemologists (such as Campbell, 1987), Vanberg (2006: 202) argues that human behavior is "blind" in the sense that in an evolving economy, humans cannot *predict* with certainty whether their "conjectural trials" will finally be successful. This is uncontroversial. The lack of predictability concerns, however, the level of aggregate results of individual actions (the "social order" resulting from one or many interpersonal interactions), not the level of the grounds of individual action itself (which, even when it follows rules, is never "blind" in the sense of "being perfectly pre-programmed").

[42] Relatedly, *selection* works differently in both domains: at the core of cultural evolutionary processes there are human agents choosing deliberately and purposefully between alternative behavioral strategies, products, ideas, technologies, etc. To call this "selection" may induce one to disregard important characteristics: These conscious choice processes do not necessarily trigger progressive evolutionary adaptation and adaptive complexity, because they do not involve replication or the succession of

The second set of objections concerns the *relationship* between the three Darwinian principles. It can be shown that in socio-economic evolution, these principles cannot be taken to work independently from each other. For example, if in the cultural domain, "variation" is argued to be introduced intentionally and purposefully, on the basis of some subjective anticipation of its effects, then it is evident that "selection" feeds back directly to processes of variation. Variation and selection are thus interdependent. If, on the other hand, the replication or "inheritance" of some piece of information is motivated by the individual's desire to find solutions to problems posed by the "selection environment" (by the desire to manipulate this environment, say), then processes of inheritance and selection cannot be neatly separated (Vromen 2007). Rather, selection is constitutive of the process of replication. Finally, in the socio-cultural realm variation is also often caused by (imperfect) replication. Thus, none of the three Darwinian principles can be regarded as distinct in the cultural domain.

3.2 The "irrelevance hypothesis"

As we have seen, Hodgson & Knudsen (2006a: 15) insist that Darwinian principles can indeed be defined in such a way that they easily encompass phenomena such as "artificial" selection, Lamarckian inheritance of acquired traits, and a variety of cultural processes and mechanisms that are phenomenologically very different from anything known in non-human nature. They also claim that *because of* this possibility of generalization, any criticism pointing toward such real-world differences is simply "irrelevant" (Hodgson 2007a; Aldrich et al. 2008: 580): "[T]he idea of generalizing Darwinism has little to do with biological metaphors or analogies" (Hodgson & Knudsen 2010a: 22).

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generations (Cordes 2007a: 140). Should there arise adaptive complexity, it may have many different causes that cannot be reduced to any overarching process of "selection".

As to the principle of inheritance or *replication*, critics of GD tend to emphasize the fact that in processes of socio-economic change, it is only in exceptional cases that knowledge is transmitted almost perfectly and faithfully, i.e., in the same way as genetically codified information, where genetic variation derives from slight modifications in the "blueprint", making the emergence of novelty part of a "programmed automatism" (Witt 2004a: 138-139). By contrast, cultural knowledge tends to be coded and stored in a way that excludes any automatism. Humans choose whom to imitate. Consequently, cultural "genotypes" are not just transmitted with the aim to produce ideally perfect replica. Their transmission is rather motivated by a multitude of other considerations which may be summarized by the learning agent's desire to find solutions to certain problems (Vromen, 2007). Again, it may be the very imperfection of transmission that leads to the most interesting objects of study for evolutionary economists.

Or has it? It is one thing to define and re-define notions such as variation, selection and retention in a perfectly abstract, trans-disciplinary space, such that any of the phenomena described above are covered, however loosely. While nobody (certainly not GD's critics) denies this possibility, it is also apparent that nothing more than a trivial intellectual exercise is involved here. It is quite a different matter to identify a meaning of "variation", say, that can meaningfully be applied to *both* biological and economic contexts. The task would be to descent from the abstract heights of ontology without, on the way, slipping into analogical (or rather crypto-analogical) thinking that is most probably misguided.

Considering the historical genesis of the Darwinian "triple", it is at least possible that, when applied in practice, they carry economic (mostly Malthusian) as well as biological connotations. As is well-known, Darwin was inspired by social philosophers such as Smith and particularly Malthus.[43] Hence, "cleansing" these principles from any biological content might imply going back to Smith's and Malthus' original ideas about division of labor and competition. This, however, is not what Hodgson and colleagues have in mind. They are explicit in their aim to draw their inspiration from genuine "Darwinian" ideas. Given the fact that after the inspiration by classical economists, Darwin's own principles were not coined in some abstract trans-disciplinary space, but *within biology*, being targeted at explaining first and foremost non-human biological phenomena, it is unclear how such a cleansing might succeed in practice.

More importantly, though, we have to ask whether it is *desirable* to cleanse Darwin's terms of any substantive content. Recall that for GD, the meta-theoretical framework of Darwinism is supposed to play a practical role in *inspiring*, *framing* and *organizing* the development of auxiliary theories in evolutionary economics, i.e., to provide operational heuristics for future research.[44] Obviously, such a role cannot be played by a set of principles that is perfectly abstract, i.e., content-free (Vromen 2007: 19-21). In fact, in their "defence" of GD Aldrich et al. (2008: 588) concede that

[43] Cf. Browne (2006: 43-44, 56, 67), stressing the influence of Malthus' "struggle for existence" ideas and, more general, of "industrial analogies" and the specifically Victorian "competitive, entrepreneurial, factory spirit" on Darwin's thought. As Marx put it in a letter to Engels: "It is remarkable how Darwin recognizes among beasts and plants his English society with its division of labor, competition, opening up of new markets, 'inventions', and the Malthusian 'struggle for existence'" (cited in Guha 1994, EN 1). See also Ghiselin (1995) and Marciano (2009).

[44] See, e.g., Hodgson & Knudsen (2006: 16).

"generalization should not go as far as to become vacuous". The risk of slipping into analogical reasoning when discussing economic issues cannot be ruled out by simple decree. Hence, the first and second set of objections discussed in subsection 3.1, above, cannot be dismissed as "irrelevant" for assessing whether GD provides an adequate framework for evolutionary theorizing.[45]

Consider the problem of the interdependence of variation, selection and replication in the socio-economic sphere. If these pillars of any Darwinian explanation are not independent from each other (at least in the case of the overwhelming majority of "typical" socio-economic explananda), then this may indicate that they fail to establish a truly over-arching concept of evolution. Apparently, such a concept cannot be based on postulating a dynamic interplay of variation, selection and replication, since the mechanisms represented by these principles cannot be properly identified and distinguished within real-world processes of cultural change. This shows that these principles still seem to carry too much domain-specific baggage.[46]

It seems, then, that the differences between processes and mechanisms in cultural as opposed to biological evolution are indeed relevant in at least two senses: First, they constrain the range of possible "middle-range" theories that can be derived from GD's putatively abstract principles in the future. The controversy on the concepts of "replicators" and "interactors" (e.g. Nelson 2006) is exemplary of this (Vromen 2008). Second, the differences should *themselves* be seen as important explananda: For instance, why does cultural evolution proceed so much faster than evolution in nature? Tellingly, advocates of GD hold Darwin's principles to be suitable for generalization beyond the domain of biology exactly because variation, selection and replication operate in different ways also *within nature*. In particular, they may also involve intentionality, sometimes even relatively rapid change. Quoting Darwin himself, they emphasize, e.g., that "animals possess some power of reasoning. Animals may constantly be seen to pause, deliberate

[45] For instance, as Bünstorf (2006: 517) shows, the selection concept used by GD systematically biases the perception of theoretical problems, by downplaying essential *economic* notions, such as the market exchange process that goes on between producer and consumer. It is not hard to see the potential distortionary impact of such a neglect on normative reasoning. See section 4, below.

[46] If, on the other hand, GD is taken to imply the narrow concept of "generative selection" as proposed in Hodgson & Knudsen (2004b), where selection is defined as the entirety of one-period changes in *both* replicators *and* interactors, then variation is strictly attributed to imperfect replication only and no interdependence between replication and (competitive, say) interaction is admitted! Cf. Bünstorf (2006: 516-517) and Hodgson & Knudsen (2008a: 60).

and resolve."[47] As to the issue of evolutionary speed, they argue that "some bacteria evolve quickly, and very rapid biological replication and mutation can occur with viruses."[48] They conclude that "[t]he differences of mechanism *within* the biological world are as impressive in some ways as the differences between the biological and the social."[49]

It is, however, a non-sequitur to jump from this set of observations to the conclusion that Darwin's principles apply to cultural evolution as well. First, even if there are a lot of differences within the natural world concerning, e.g., the way selection works, this does not imply that a principle of "selection" covering these heterogeneous *natural* mechanisms can also be meaningfully applied to cover similar-looking mechanisms in the *cultural* domain. After all, both proponents and critics of GD agree that biological and cultural evolution are *distinct* processes. "Intentionality" in nature may still mean something entirely different than intentionality in human culture; the reason why bacteria and viruses evolve so fast may have nothing to do whatsoever with the reason why certain human technologies, say, evolve quite rapidly. Second, it may be much more *interesting* to enquire into the reasons why processes and mechanisms involved in observable change differ so much between the two domains. Large parts of the literature supporting GD are devoted to explaining the differences between, say, reproduction of haploid as opposed to diploid organisms rather than focusing on the much more relevant (to the economist) question of why exactly cultural information is "replicated" in such a markedly distinct way.

To conclude, objections concerning (lacking) similarities on the lower level of "detailed processes and mechanisms" appear to be relevant, at least in an indirect way. They will certainly be highly relevant as soon as GD starts stepping down from the abstract heights of its allegedly "domain-unspecific" principles to engage in applied practical research. So far, the "irrelevance hypothesis" can be returned to its senders: By trying to show that their principles are truly domain-unspecific, Hodgson et al. have emptied them "from virtually all of their content" (Vromen 2008: 19). Such a "watered-

[47] Cf. Hodgson & Knudsen (2008a: 60).
[48] See (ibid.: 63).
[49] See (ibid.: 64).

down" version of GD may indeed be practically irrelevant for the scientific purposes its authors have in mind.

3.3 The Continuity Hypothesis

As we have seen above, with respect to the most basic ontological presuppositions, the "Continuity Hypothesis" (henceforth CH) and GD are perfectly compatible with each other (Vromen 2008). CH however emphasizes that processes of "evolution" in nature and culture differ too much to allow for the application of a specific common ontological structure as that suggested by GD. On this basis, it goes on to specify exactly in which limited sense Darwinian theory is indeed relevant for understanding economic behavior and change. The ontology CH offers turns out to be richer and more nuanced than GD's (ibid.: 15).

Beyond the fundamental assumption of ontological monism and the causal interconnectedness of natural and cultural evolution, advocates of CH reject the basic methodological approach pursued by GD, viz., to first set up highly abstract principles, which are then, in a top down fashion, mechanically applied to specific cases (Bünstorf 2006). Ironically, Darwin himself worked in a much more inductive, empirically oriented way (Levit et al. 2011). As to ontological commonalities, proponents of CH claim that evolution in both the biological and the cultural realm can be characterized as involving the emergence and dissemination of *novelty*. This is taken to be the only common property of evolutionary processes in different domains of reality. Hence, it is an ontological claim that directly challenges GD's specific ontology. CH's specification of the ontology of evolutionary processes then gives rise to a generic concept of "evolution" as the "self-transformation over time of a system under investigation" (Witt 2002: 9). The basic elements of this self-transformation are argued to be the "endogenous creation of novelty and its contingent dissemination" (Witt 2008b). The "genuinely evolutionary feature" of institutions, technologies, language, the law, scientific theories or any set of ideas is "that they are capable of transforming themselves endogenously over time", i.e., that they are able to create novelty (ibid.). Thus, it is the *endogeneity* of change that is seen as the feature of evolutionary processes that the economist should focus upon.[50]

[50] This is of course inspired by Schumpeter's pioneering work on Evolutionary Economics.

CH postulates a linkage between biological and cultural evolution that is much more specific than anything GD has to offer on this subject. Ongoing processes of socio-economic change are argued to be weakly, but persistently influenced by the products of antecedent genetic evolution (Witt 1999); due to the comparatively slow pace of genetic evolution, the latter are assumed to be "given" for the purpose of economic theorizing. The two processes meet, that is, particularly in those parts of the human genetic endowment that give rise to culturally significant behavior. As Witt (2008b: 550) puts it, "[t]he mechanisms by which the species have evolved in nature under natural selection pressure, and are still evolving, have shaped the ground for, and still influence the constraints of, man-made, cultural forms of evolution, including the evolution of the human economy." This does, however, not imply that there is any similarity between these two processes: "[T]he mechanisms of man-made evolution that have emerged on that ground differ substantially from those of natural selection and descent." (ibid.)[51] In particular, the former appear to be much more complex than the latter.

What distinguishes cultural evolution from biological evolution is exactly the role played by human creativity, intentionality, social learning and the capacity to imitate in an insightful way. According to CH, after their ground has been laid by the products of genetic evolution, these capacities have established mechanisms that provide for problem-solutions ("adaptations") which are generated and tried out much faster and in a much more volatile fashion than problem-solutions in the realm of non-human nature. They have allowed humans, now situated in a state of affluence unique in the history of man, to vastly extend their behavioral repertoire, far beyond genetically encoded dispositions and capacities, as well as far beyond any need for behavioral traits to contribute to an increase in "adaptive fit".[52]

Hence, CH delimits the very range of explananda where Darwinian theories can suitably be applied. In this sense it is more general than GD. The explanatory capacity of

[51] Emphasis in the original.

[52] The way genetically programmed basic wants, dispositions and mechanisms of non-cognitive learning continue to shape economic behavior has been explored in several studies that apply the CH framework without, of course, resorting to any notion of variation, selection, or replication (see Witt, 2001, 2004; Bünstorf, 2006; Cordes et al., 2008; Wörsdorfer, 2009). These theories examine, e.g., the question how individuals acquire new idiosyncratic wants on the basis of (universally shared) basic needs, why new goods and services are continuously consumed although basic wants are mostly satiable, or to understand historical changes in patterns of production or firm organization.

theories of "natural selection" appears to be limited: They are able to explain the "natural origins of, for example, human learning, intentionality and deliberative behavior, but they are ill-suited to grasp the dynamics of cultural evolution that is based on these evolved capabilities" (Cordes 2006: 539).[53] We argue that one part of these "dynamics of cultural evolution" consists in people deliberating about the normative basis, conditions and instruments of *policy* intervention into the ongoing process of economic evolution. Hence, GD's gaps are highly relevant when it comes to developing an evolutionary account of policy-making. This is the topic of the next section.

4. Policy and Welfare in an evolving economy

Evolutionary economists are increasingly interested in developing policy implications. Policy implications depend in important ways on the manner in which we perceive, frame and interpret statements about facts (for example, facts about human nature).[54] While research on the normative implications of evolutionary change is still in its infancy (Nelson & Winter 1982: ch. 15; Witt 2003b; Schubert 2012), there is an emerging consensus that, due to their static character, concepts from standard (Paretian) welfare economics are ill-suited to deal with the issues involved. It is also widely agreed that insights into the biological and psychological background of human attitudes and values can inform and improve policy advice – the difficult issue being what exactly is meant here by "informing".

4.1 Some Preliminaries

While it is trivially true that given the open-ended character of evolution "the outcomes of a selection process are necessarily neither moral nor just" (Hodgson & Knudsen 2006a: 6) and may even lead to "systematic errors" (Hodgson & Knudsen 2008b: 57), we also know that the meaning of normative notions such as "moral" and "just" is itself the

[53] See also Witt and Cordes (2007: 321).

[54] This is self-evident as regards instrumental policy statements, where some goal is externally given, and the economist-advisor looks for the most appropriate policy tools to achieve that goal. It also, however, applies to genuinely normative theorizing in the sense of Keynes (1917), where the plausibility of alternative policy goals or criteria itself is analyzed. Statements of this latter kind depend on facts in an *indirect* way. For instance, if we assume the economy to be a closed stationary system, the criterion of Pareto optimality looks much more attractive than in the case of an open, dynamic system.

product of some anterior set of evolutionary processes. This is uncontroversial. It is, however, a non-sequitur to immediately jump to the conclusion that these processes ought to be specifically modeled as involving some kind of "natural selection" along the lines of GD. As we will argue in this section, such a move may tempt the researcher into thinking that notions such as "moral" and "just" should be interpreted as reflecting some understanding of "fitness" or "adaptive value". Such analogies are highly misleading. We argue that it is ultimately the *top down* character of the methodological approach suggested by GD that makes it likely that normative implications are developed in a misguided way.

Let us be clear at the outset that some regions of the space of conceivable policy implications are excluded by the evolutionary character of society:

(1) First and foremost, it does not make any sense to postulate any kind of overall purpose ("telos") to the evolutionary process *per se*.[55] Closely related to that, it is a non-sequitur to postulate (or to imply) that evolutionary processes per se somehow necessarily generate "optimum" results. As Metcalfe (2001: 565) rightly points out, "one important consequence of the Darwinian theory was to banish the idea of perfection from the discussion of progress". As a consequence, "no means or outcome should be denied moral evaluation" (Hodgson 1999: 241).

(2) Second, given the difficult epistemic conditions reigning in an evolving economy, policy-makers cannot hope to predict precisely how the strategies they implement will affect people's behavior and aggregate outcomes. The most they can do is to modify existing institutional arrangements with a view towards altering patterns of outcomes (Vanberg 2006).

(3) Third, policy implications should at least not be completely detached from the realm of individuals' concerns, i.e., their "quality of life" or "well-being", however broadly understood. A set of decidedly *non*-individualist policy

[55] Note in passing that, although the non-teleological credentials of GD can hardly be disputed, the term "selection" is rather inappropriate for expressing this point (Rosenberg 2000: 173-174).

implications would run into difficulties of legitimization and of practical implementation (see below).[56]

In the following, we show that GD's assumption of a fundamental homology between natural and cultural evolution runs the risk of leading scholars to either stress, in a one-sided way, the supra-individual ("systemic") level of welfare to the detriment of the level of individual well-being, or to conflate biologically determined and culturally shaped norms and values, or to base their normative reasoning on arbitrary foundations, thereby seriously distorting policy advice. In other words, the quality of normative reasoning (as a precondition of developing policy advice) suffers. By "distort" we do emphatically not imply that GD somehow systematically tends to support one ("liberal" or "conservative" or whatever) political doctrine over others. Let us also be clear that our argument is totally unrelated to the century-old history of charges leveled against the so-called "Social Darwinism" school.[57]

We first specify the kind of misdirection that can be expected from a normative approach following GD. We then illustrate this risk by dwelling on Hayek's late, most explicitly "evolutionary" work, as well as a recent attempt, explicitly grounded in a natural selection framework, to develop an evolutionary criterion of societal "progress" (Cochrane & Maclaurin 2012). We then discuss a related risk that is apparent in the way Hodgson himself develops normative implications in his concept of "Evotopia" (Hodgson 1999). Finally, we show more specifically how an approach to policy-making framed by GD and marred by the biases described above may lead practical policy advice astray (or rather prejudge its results), viz., regarding the issues of how to deal with the problem that people tend to adapt their attitudes to their circumstances (Sen 1993; Qizilbash 2007), and the problem of taxes as a way to contain "status races" (Frank 2008; Wilkinson 2006).

[56] This does obviously not imply any call for endorsing, as a matter of normative metric, the kind of individualism that assumes, à la Bentham, that the individual is (always or typically) the best judge of her own well-being. This position is rightly rejected by Hodgson (1999: 244-45).

[57] As Hodgson (2004b) demonstrates, historically, the semantics of the much-abused term "Social Darwinism" have been too volatile for it to be useful. The most contradictory implications have been "derived" from Darwinism over the decades, typically just reflecting the norms and prejudices of the times (see also Ruse, 2006: 204-07). On Darwin's own attitude towards social Darwinism see Ruse (1999: 264-265).

In order to have a criterion to identify what it means for normative implications to be "led astray", we emphasize the importance of point (3), above: Let us postulate that any normative implications should be of practical relevance in a broadly democratic setting. Hence, people have to be convinced by them. Normative economists have to demonstrate that their implications lead to practical advice that, ultimately, connects to what real-world individuals care about. As Kenneth Boulding (1981: 195, italics added) argues, "from the human point of view, progress is improvement *in the state of persons*. Everything else is an intermediate good."[58] This is particularly important in light of the fact that novelty-generating economic processes tend to be "creatively destructive", hence causing hardship for a subset of the individuals involved (Witt 1996a).

4.2 The pitfalls of the Darwinian view of "progress"

When Darwin speculated about evolutionary "progress", he stressed the characteristics (the "endless forms most beautiful and most wonderful") of species, leading to the development of higher mammals and, ultimately, to man.[59] Put differently, he focused on "what we *are*, rather than on what we can *do* or *be*" (Sen 1993: 124, italics added). An alternative and probably more convincing (to the people involved) concept of human progress would argue in terms of man's actual quality of life.

As Sen (1993) shows, this shift in emphasis has far-reaching implications for the likely focus of scientists' normative reasoning. In particular, the Darwinian view lends itself easily to narrowly focus on adapting the species itself, given its environment and the associated selective pressures, rather than the (socio-cultural or institutional) environment in which the species live. Even if the focus is on the rules and practices that constitute the individuals' environment (as in the case of Hayek's evolutionary account of group selection), political options to *purposefully* adapt the environment instead – in order to promote people's quality of life – may be downplayed. Apart from this risk in misdirecting the research focus, there is of course the risk of falling prey to misleading

[58] A normative perspective broadly in line with individualism is perfectly compatible with an evolutionary world-view, as demonstrated, e.g., by Kitcher (2012): "[ethical] changes come about...through the discovery of natural facts, about people, their capacities, sufferings, and aspirations, on the basis of which there are new possibilities for mutual engagement." Assuming that "mutual engagement" here is meant to include "mutual advantage" we have a case for the biological underpinning of individualist morality, linked to the propensity to cooperate.

[59] On Darwin's personal commitment to, and scientific concept of progress see Ruse (2009).

analogies: If progress is to be judged by the excellence of the species produced, it is tempting to define "excellence" by pure reproductive success. After all, this is what "fitness" is about in the biological sphere.

Although the terms "fitness" as well as "adaptive complexity" have a latent normative connotation,[60] the analogy to what is "valuable" or "desirable" in modern human society is fundamentally mistaken. There is no clear relationship between reproductive success or even "survival" to the actual quality of life or well-being of human beings: "We recognize many virtues and achievements that do not help survival but that we have reason to value;[61] and on the other side, there are many correlates of successful survival that we find deeply objectionable" (Sen 1993: 130-31).

Thus, we expect research in the GD framework that is concerned with deriving policy implications from evolutionary theory to display a one-sided focus on the quality of supra-individual entities ("the human species") or processes ("the market system"), and/or to fall into the trap of conflating purely biological criteria of success with culturally formed criteria of welfare. Let us stress again that we do not criticize this on substantive grounds. It is not our aim to defend a particular ideological position or to object to diverging positions on specific policies. Rather, our concern is, more fundamentally, with the *quality of normative reasoning*: A lot of important questions may not be asked due to the fact that the conceptual framework itself induces its users to turn a blind eye toward them. In what follows, we illustrate this risk by discussing some key normative implications given by Hayek (1988), and a more recent attempt to develop an evolutionary account of social progress by Cochrane and Maclaurin (2012).

4.3 Hayek and "Darwinian" policy advice

Hayek is often cited as one of the early proponents of a "Darwinian" viewpoint in economics, a representative of GD *avant la lettre* (Marciano 2009; Whitman 1998: 46-47), despite the fact that he certainly failed to appreciate the originality and significance of Darwin's concept of natural selection (Hodgson 2004a). His positions on the

[60] Ghiselin (1995) suggests interpreting "fitness" as the increase in "useful technological innovation", without however daring to explicitly equate "useful" with "good" in any sense (ibid.: 1036).
[61] To illustrate, modern happiness research shows that the tendency to accumulate consumer goods with strong extrinsic attributes, while certainly explainable by an urge to increase and display "fitness", at the same time decreases subjective well-being, a much more important goal in life (Ng 2006).

normative (or welfare) implications of an evolutionary world-view have oscillated over the years (Kerstenetzky 2000; Vanberg 1994a; Sugden 1993). Throughout his work, there is a tension, ultimately unresolved, between an "evolutionist" attitude – claiming that socio-cultural evolution eventually brings about "group efficiency" and "adaptedness" – and the evolutionary view proper (more in line with Hayek's general methodological-epistemic convictions), according to which evolutionary processes are open-ended and unpredictable. While the former position necessarily translates into some sort of Panglossian passivism, the latter opens the space for a constructive reasoning and deliberation about normative criteria to judge "progress" and, hence, to the critical scrutiny of existing institutions and policies.

Within this perspective, though, Hayek again draws contradictory normative implications: On the one hand, he typically argues that the "common good" should ultimately be conceived, in quasi-contractarian terms, as the "facilitation of the pursuit of unknown individual purposes" (Hayek 1976: 1).[62] In his later, explicitly "evolutionary" writings, however, he switches to supra-individual criteria, obviously borrowed from evolutionary biology – such as "population size" –, arguing that given the way impersonal processes of socio-economic evolution work, it is meaningless to ask whether the individuals affected by them would ever agree to the results, since "in any case, our desires and wishes are largely irrelevant" (Hayek 1988: 134).[63]

Positions such as these can be read as reflecting a notion of "welfare" that is completely detached from the level of individual benefits. This illustrates the point we have made in the preceding section: Framing one's theoretical analysis in terms of the Darwinian paradigm may lead the researcher into conceiving "welfare" as pertaining to supra-individual phenomena rather than the actual quality of life of individuals. Put differently, it introduces a kind of "system bias" into the analysis. A pure system-based view of progress would be problematic on substantive grounds (see point 3, above). In Hayek's particular case, it is also problematic on grounds of methodology: Instead of

[62] See also the references given by Vanberg (1994b: 465-66).

[63] See also (ibid.: 133): "[A]s with every organism, the main 'purpose' to which man's physical make-up as well as his traditions are adapted is to produce other human beings ... There is no real point in asking whether those of his actions which do so contribute are really 'good', particularly if thus it is intended to inquire whether we *like* the results." (italics in the original). On this tension in Hayek's normative argument, see also Vanberg (1994a: 183) and Gray (1999: 154).

carefully arguing his case, he seems to regard his "evolutionary" notion of progress as self-evident; it is, as it were, "smuggled in" more or less subconsciously, due to the particular metaphorical and theoretical framing of the analysis.

The risk of slipping into analogical thinking becomes apparent at this point: Success criteria that were perfectly valid for life in early human hunter-gatherer contexts (such as "population size") cannot be translated into welfare notions in the context of modern society. They cannot substitute for man's critical and creative task to devise, on his own and by using his intellectual and creative capacities (that are, to be sure, a product of anterior processes of evolution) and in discussion with his peers, ethical criteria. From an evolutionary perspective, the process of discussion should of course be informed by insights into the origins and development of, e.g., systems of morals. This refers specifically to man's general capacity for ethics (which is most probably a product of biological evolution; see Ayala 2010). But beyond that, man is free to imagine, to try out and to apply any feasible and generally agreeable moral codes and ethical systems: "Our genetic heritage gives us a biological base on which to build our values, but a base is only a base" (Dennett 1997: 67). Once the base was established, cultural evolution set in, following its own peculiar dynamics. This fundamental insight is somehow glossed over by the repeated insistence of GD's advocates that "the human doing the ["artificial"] selection is also a product of natural evolution" (Hodgson & Knudsen 2006a: 11), that her "preferences and choices" have to be explained (ibid.), and that "[i]nsofar as organisms are purposeful, this capacity too has evolved through natural selection" (ibid.: 13).

A crucial step is neglected by framing research tasks in this way, namely, the transition between genuinely biological and cultural evolution. The (undisputed) fact that human preferences and values are, at least in a basic sense, the product of biological evolution does allow one to conclude that in order to be sustainable, modern systems of morality must be, by and large, compatible with human nature. It does, however, *not* allow one to conclude that ethical precepts, even fairly universal ones, reflect biological fitness (Ayala 2010: 9020-21). Rather, natural selection has endowed humans with the unique capacity to overcome (partly, at least) the original constraints posed by natural selective pressure. This insight is emphasized by CH, but rather sidestepped by GD.

4.4 Cochrane & Maclaurin on "evolutionary progress"

We now turn to a more recent attempt to develop a normative notion of "progress", to be used in the field of evolutionary economics, that is directly derived from evolutionary biology. Cochrane & Maclaurin (2012) suggest that progress should be conceived as being constituted by an increase in a system's "evolvability" over time, a concept which they define as "the rate at which a system can adapt to changes in its environment" (ibid.: 1-2).[64] Note that the *system* is perceived as the evaluandum, rather than the individual states of human agents (such as their degree of preference satisfaction, their happiness or their wealth). The authors are obviously committed to conceptualizing evolutionary processes in terms of GD. For instance, they claim to "believe that evolution in economic systems is evolution by natural selection" (ibid.: 2).

As we would expect, the normative criterion that they propose is, again, completely detached from the level of individual well-being, as they concede themselves (ibid.: 8). As they put it, "[i]ncreases in the evolvability of an economy ... are unlikely to benefit all stakeholders at all times" (ibid.: 9). In their view, linking "progress" to the preferences of actual individuals amounts to "psychologizing" the term (ibid.). They then suggest that "progress" may operate differently at different levels of the economy. "Progress" in the sense of evolvability, though, is not "necessarily desired by, or beneficial for, all individuals that interact in societies at the economic level" (ibid.). Bluntly, they state that they "reject using the desires of economic actors to measure evolutionary economic progress" (ibid.: 10). No reasons are provided for this rather radical (and certainly counterintuitive) step. Instead, some remarks are offered on the importance of separating the "psychological question" from the issue of whether there is any kind of progressive directionality in evolutionary change.[65]

Hence, there seems to be a serious risk for normative accounts following the footsteps of GD to develop biased welfare implications. First, arguing in terms of the GD framework leads scientists to perceive normative issues in a way that focuses on the

[64] The definition that they give in FN 4 (ibid.: 4) is slightly more specific. There, they characterize evolvability as "the rate at which a characteristic will respond to selection pressure".

[65] The normative reasoning presented by the authors is further marred by an implicit Panglossian stance in their view of "selective pressures". Cochrane and Maclaurin seem to postulate that natural selection displays a "directional trend in favor of evolvability over time" (ibid.: 8). As Whitman (1998: sect. 3) shows, though, selection processes cannot guarantee such a trend.

qualities of the whole system, rather than on the quality of life (or well-being) of actual human agents. Second, a GD framework appears to increase the risk that biological and socio-cultural notions of welfare (or success or progress, if you will) are conflated. In both cases, what we describe seems to happen without full awareness on the part of the authors, as evidenced by the lack of serious attempts to justify the shift in perspective.

4.5 Hodgson's "Evotopia" approach to normative reasoning

Geoffrey Hodgson himself seems to be aware of the risk implied by drawing crude analogies between biological and socio-cultural criteria of success or welfare. For instance, the notion of "survival of the fittest" – often wrongly attributed to Darwin –, when translated into a policy criterion, seems to imply the "rejection of any kind of state meddling, subsidy or intervention, and the support of laissez-faire" (Hodgson, 1993: 25). Again, we would argue that the problematic part here is not the specific ideological position that is allegedly supported, let alone justified in this way, but rather the inadequate methodology behind it: A (presumed) notion of biological success is literally translated into the sphere of human affairs, and that's it. No further reasons are typically given.

Does that mean, then, that Hodgson himself is immune to the risks of low-quality normative reasoning that we have discussed so far? Not quite. His "Evotopia" approach, outlined in chapter 11 of Hodgson (1999), illustrates a subtler issue with regard to using GD-inspired theoretical notions in order to arrive at normative implications. Hodgson's key premise is that "diversity and variety" have an "essential, dynamic function" in evolutionary processes. Malthus, Mill and, of course, Darwin are cited as precursors of this concept. Accordingly, "evotopia", his normative benchmark, is defined as a „system that can foster learning, enhance human capacities, systematically incorporate growing knowledge and adapt to changing circumstances" (ibid.: 240). Its "first principle" is argued to be "the necessity of variety" (ibid.: 246). Already in Hodgson (1993: 399) he had asserted that "[t]he adoption of the Darwinian evolutionary metaphor illuminates the need for renewable variety in evolving economic systems." Practical policy implications seem to be straightforward: the goal of economic activity is taken to be "to safeguard and develop human capabilities ... the production of useful and warranted knowledge ...

knowledge that serves human needs, enhances the human life process and helps humanity adapt to, and live in harmony with, its natural environment." (ibid.: 247)

All this sounds like a decent list of reasonable policy goals, properly inspired by an evolutionary perspective on economic life. The notorious "system bias" is somewhat mitigated by a sensitivity to the quality of life of individual agents, constituted by their capabilities (in particular the capability to learn) and degree of need satisfaction. Hodgson also avoids ascribing any overarching "telos" to the evolutionary process; instead, he argues in terms of the multiple subjective goals of human agents.

The problem of this account is, again, of a methodological nature: *Why focus on variation only*? It is, admittedly, a key factor, providing evolutionary processes with the "fuel" without which they would soon stop operating. But "selection", say, is no less important. Without selective pressures, evolutionary processes would quickly degenerate into disorder. And what about "replication"? Without a mechanism guaranteeing some resemblance between replicating entities, natural selection would cease to generate any kind of orderly pattern, let alone "adaptive complexity", and would ultimately come to a halt altogether. Thus, choosing one factor of the "Darwinian triple" only, and then elaborating upon that factor's alleged policy implications, seems arbitrary.[66] One might just as well work through the implications of "selection" and probably end up with a libertarian set of policy proposals, or stress the importance of "replication", in order to emphasize a conservative emphasis on information preservation and the gradual buildup of "complexity".[67]

4.6 Some practical issues: adaptation and status races

The Darwinian view on progress, as described by Sen (1993) has had a considerable, if implicit influence on recent normative work on "happiness politics", exemplified by the influential contribution by Layard (2005).[68] Postulating that man's ultimate goal is "survival" and reproductive success (e.g. ibid.: 27), he defends his position to take happiness as the supreme goal of policy-making by asserting that "what makes us feel

[66] What is more, important concepts in normative economic reasoning, such as "exchange" or "mutual advantage", play no role in Hodgson's variation-focused account.
[67] Hodgson himself has ventured into this direction, in the context of developing normative business advice and referring to Hodgson & Knudsen (2010b). See University of Hertfordshire (2010).
[68] See Qizilbash (2007).

good ... is generally good for survival. And what causes pain is bad for survival." (ibid.: 24). In Layard's view, happiness drives us because it has secured our survival as a species. This is a controversial view.[69]

Sen's rejection of using happiness as a metric of well-being is due to his concerns about the problem of *adaptation*. In his "On Ethics and Economics", he states that "a person who has had a life of misfortune, with very limited opportunities, and rather little hope, may be easily reconciled to deprivations than others reared in more fortunate and affluent circumstances. The metric of happiness may, therefore, distort the extent of deprivation in a specific and biased way." (Sen 1987: 45). He illustrates this case by evoking the image of, inter alia, the „hopeless beggar, the precarious landless labourer, the dominated housewife" (ibid.). Analogous issues arise, of course, in the case of the paraplegic who, as psychological research has shown (e.g. Frederick & Loewenstein 1999), tends to adapt rather quickly to her pre-accident level of hedonic well-being. It is now telling to see that Layard, rather than advising to adapt these people's socio-cultural environment according to their needs, introduces a distinction with respect to how easily they typically adapt to their plight. He then suggests to prioritize those "misfortunes to which it is difficult to adapt [such as persistent mental illness]" (Layard 2005: 121).

Given his commitment to happiness as the supreme policy goal and his claim that happiness still plays a key role in directing us towards ever higher "fitness", Layard sees adaptation in a positive light in those cases where it promotes happiness (and, hence, reproductive success). This position has far-reaching consequences for the policy implications to be drawn with respect to, for instance, whether and how to compensate accident victims in courts.

Finally, let us turn to a policy discussion which has spurred some controversy in recent years. Given that people apparently have a tendency to spend a significant part of their income and wealth on "positional" or "status" goods, despite the fact (often known to them) that the corresponding gains in well-being are – almost by definition – of a transient nature only, some scholars have suggested to tax either income or the consumption of such goods directly (e.g. Frank 2008). Here again, the policy advice,

[69] It is backed by Ruse (1998: 235-238). See, however, Dennett (1997: 66): It would be "naive to suppose that the process of natural selection has somehow endorsed our pursuit of happiness as the proximal mechanism for maximizing our genetic fitness."

while seemingly following the standard economic textbook (provided one buys the characterization of status consumption as generating "externalities"), may be misguided, for the underlying normative reasoning is incomplete at best, and biased at worst. Being narrowly focused on biological drives and instincts that promote status-seeking consumption and the ensuing "status races", it overlooks the manifold ways in which cultural rules factually and potentially mitigate this behavioral tendency in a productive way. Put differently, the critical juncture between biological and cultural evolution is neglected. To illustrate, people have learned to escape the deadlock of status races by creatively inventing novel dimensions in which to strive for distinction (Wilkinson 2006; Frey 2008: 171-172). Policy can try to redirect people's efforts to activities that generate less harmful side-effects in terms of, say, environmental resource use (Ahuvia 2008).

5. Conclusions

As Bünstorf (2006: 515) puts it, adhering to the framework suggested by GD may "induce researchers to adopt a concept because of its correspondence to the Darwinist framework rather than its inherent usefulness, and potentially detracts attention from relevant aspects of the issue at hand". Apparently, this risk not only pervades positive theorizing in the spirit of GD, but also the attempts to develop normative implications on the basis of a GD-inspired theoretical perspective.

As this paper has attempted to demonstrate, GD may indeed, by acting as a focusing device, lead scientists astray in their search for normative criteria and policy goals that are both compatible with an evolutionary world-view and plausible (or defendable) in their own right. It may induce them to construct, if implicitly, analogies between biological criteria of success or "fitness" and cultural concepts of welfare, lead them to narrowly focus on the systemic "quality-of-species", rather than the individual quality-of-life level of welfare, and it may generate policy advice that looks arbitrary for it is unclear what justifies the choice of its fundamental values.

The paper has illustrated these dangers by discussing a variety of cases from the literature, where an explicit or implicit endorsement of a GD perspective has resulted in misguided metrics of people's welfare. By "misguided" we emphatically neither mean a

specific ideological position[70] nor an endorsement of something akin to "Social Darwinism", but rather low-quality normative reasoning at a more fundamental level: This is apparent when theorists slip into a specific mode of reasoning (for instance, taking variation as the cornerstone of evaluation, rather than selection or replication) that prejudges a variety of normative issues, without realizing the need to defend their position by giving explicit reasons for it (and often even without being aware of this). The intricate task of defending normative criteria is left to the simple declaration of analogies to biological evolution. Analogies may be especially mistaken in the realm of normative theorizing, since the key normative notion – "progress" – is particularly problematic in biology (Ruse 1996; Ghiselin 1995).

One may object at this point that the cases discussed reflect, not an adherence to GD properly understood, but rather instances of "reckless overgeneralization" (Hodgson & Knudsen 2010a: 2). This may, for instance, apply to Hayek's case, discussed in section 4.3, above. Moreover, this objection does not invalidate the misgivings about orienting normative analysis toward a GD framework. A conceptual framework that is prone to be (mis-)used with such far-ranging effects (witness the fate of "Social Darwinism") is itself hard to defend.

We submit that the source of the problem is twofold. First, in its fundamental ontological presuppositions, GD does not clearly mark the difference between biological and cultural evolution. In contrast, at this basic meta-theoretical level CH is explicit about the transition between the two levels, thus offering a richer ontology (Vromen 2008). Second, what GD offers is essentially a deductive, *top down* methodology (Levit et al. 2011). Scientists feel compelled to look at economic phenomena through the analytical lens provided by the "Darwinian triple" of variation, selection and replication, and to bend their theoretical concepts so that they fit into the scheme. Not only positive economic theorizing can be misguided by biological analogies (despite all the rhetoric of GD's advocates) – normative economics is subject to the same danger.[71]

[70] We are agnostic as to ideological implications of a "Darwinian" viewpoint, except as to the rejection of an utterly non-individualistic perspective on welfare. See section 4.1., above.

[71] The reader may ask, Does the CH framework fare any better? This would be the subject of another paper, but note that CH at least avoids any risk of inducing scientists to fall into the trap of analogical reasoning, both in the realm of positive theory and normative analysis. By focusing explicitly on the critical juncture

11,570 words

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