Is Social Evolution Lamarckian or Darwinian?

by Geoffrey M. Hodgson

Published in Laurent, John and Nightingale, John (eds) (2001) *Darwinism and Evolutionary Economics* (Cheltenham: Edward Elgar), pp. 87-118.

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ABSTRACT

Is social or cultural evolution Lamarckian in some sense? A positive answer to this question may appear to threaten the consistency of the biological with the social sciences. Furthermore, the modern notion of 'Universal Darwinism' might also threaten any Lamarckian conceptions in the social sphere. It is argued in this paper that while theories of social and biological evolution must be consistent with each other, they do not have to be identical. Arguably, whether social evolution is Lamarckian depends on whether there is something like the inheritance of acquired characters at the social level. This, in turn, raises the question of the unit of cultural inheritance and replication. Some alternative proposals for such a unit are discussed. The essay concludes that a version of Lamarckism in the social sphere can be consistent with Darwinian principles. As Donald Campbell suggested some time ago, both social and biotic evolution are special cases of more general processes of evolution of complex systems. If this general schema can be described as 'Darwinian' then it is a much more powerful label than 'Lamarckian', which by contrast indicates much less.

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1. Introduction

Is social, economic or cultural evolution 'Lamarckian' in some literal or metaphorical sense? Leading economists such as Jack Hirshleifer (1977), Herbert Simon (1981), Richard Nelson and Sidney Winter (1982), Friedrich Hayek (1988), Christopher Freeman (1992) and J. Stanley Metcalfe (1993) have claimed that it is. (Hayek and Simon are both Nobel Laureates.) Other prominent social theorists such as Karl Popper (1972), William McKelvey (1982), John Gray (1984), and Robert Boyd and Peter Richerson (1985) have likewise accepted that social evolution takes a 'Lamarckian' form. Is this widespread view correct?

If so, a possible problem arises. The prevailing wisdom in biology is that Lamarckian ideas are untenable, at least in the biotic context. This raises a question of theoretical inconsistency between biology and the social sciences. Can we be Lamarckians in the social sciences and Darwinians in biology? Is there a contradiction here? Can we be Protestants and Catholics at the same time?

Answers to these questions depend on the precise definitions of the terms involved. What does Lamarckism mean? Lamarckism is typically associated with the principal proposition that acquired characters can be inherited. Accordingly, variations of type occur largely through adaptations to the environment rather than random mutations. This meaning of Lamarckism shall be adopted here.

The term 'Darwinism' is no less problematic. It is often associated with the denial of the central Lamarckian proposition. However, detailed examination of its usage reveals a wider and more accommodating meaning. The answer to the central question of this essay depends in large part in the clarification of what is meant by 'Darwinian'.

The received wisdom that social evolution is 'Lamarckian' has seemingly received a major theoretical challenge from modern Darwinists. In the early 1980s Richard Dawkins (1983) coined the term 'universal Darwinism'. Subsequently, the idea that some basic Darwinian principles apply to a very wide range of phenomena, from psychology to cosmology, has been taken up by a number of authors. If 'universal Darwinism' applies to the social sciences as well, then this may be seen as a objection to lingering ideas of 'Lamarckian evolution' in that sphere. In fact, David Hull (1982) had already rejected some prominent versions of 'Lamarckian' social evolution on theoretical grounds. His position was later endorsed by

[1] The author is extremely grateful to Markus Becker, John Foster, David Hull, Thorbjörn Knudsen, John Laurent, John Nightingale, Peter Richerson, Mikael Sandberg and many others for extensive discussions and critical comments on preceding drafts of this paper. The paper was first presented at New School University, New York, on 28 October 1999.

Daniel Dennett (1995, p. 355 n.) in an influential and popular work. As a result of these developments, the term 'Lamarckian' may seem to be erroneous or redundant in the social as well as in the biological domain.

Some theorists attempt to avoid this question by arguing that social or economic change has little or nothing to do with biological evolution. Several social scientists have argued that biological analogies or metaphors are of little relevance to the social sciences.[2] From the other side of the boundary, prominent natural scientists such as Stephen Jay Gould (1996) have protested against any export of biological metaphors or theories to the social domain. Some possible combinations of views are presented in Table 1.

Combination ⇒	(1)	(2)	(3)	(4)
Biotic Evolution	Darwinian	Darwinian	Darwinian	Lamarckian
Social or Cultural Evolution (literally or metaphorically)	Darwinian	Lamarckian	Neither Darwinian nor Lamarckian	Lamarckian
Prominent Proponents[3]	Dennett, Hull	Boyd, Gray, Hayek, Hirshleifer, Metcalfe, McKelvey, Nelson, Popper, Richerson, Winter	Gould, A. Rosenberg, Schumpeter, Witt	Spencer

Table 1: Some Possible and Prominent Doctrinal Combinations

Clearly, Table 1 does not exhaust all the possibilities. If there are three options in each domain – Darwinian, Lamarckian and neither – then there are nine possible combinations overall, but we do not need to show them all. The table shows four prominent stances. With regard to social evolution, no distinction is made in the table between the literal or metaphorical adoption of an evolutionary theory. To some extent, this additional distinction is explored later in this article. Overall, even if we regard Lamarckism as untenable in biology

[2] Penrose (1952) is a classic early statement of this view, although, in personal conversation with the author shortly before her death in 1996, she became much more sympathetic to evolutionary analogies in economics. Several self-proclaimed 'evolutionary' economists have also been sceptical or dismissive of the value of biological analogies in economic analysis. See, for example, Schumpeter (1954, p. 789), De Bresson (1987), Witt (1992, p. 7), Ramstad (1994) and Rosenberg (1994).

[3] In some cases the position of a proponent may be simplified or interpolated. For example, social theorists do not always make their position on Darwinism in biological evolution clear, and in some cases the adherence to 'Lamarckism' in social evolution is indecisive or ambiguous. The primary purpose of this Table is to show the diversity of apparently conflicting views, not to investigate each individual's conception in detail.

(thus excluding combination (4)) there are still remaining and important differences of view to be resolved.

There is another reason why Table 1 does not describe the many possible variants. In both biology and economics the concept of self-organisation has become popular, and some would claim that it constitutes a new approach or paradigm (Depew and Weber, 1995; Hayek, 1988; Kauffman, 1993; Prigogine and Stengers, 1984; Witt, 1997). This leaves the question open whether self-organised systems are themselves objects of selection in some broader, phylogenetic evolutionary process. It is beyond the scope of this article to discuss this further. We simply note that Kauffman, for one, promotes such a possibility (Lewin, 1992, pp. 42-3). For him, self-organisation is a precondition of natural selection. But he still has natural selection in his story. Evolution is 'emergent order honored and honed by selection' (Kauffman, 1993, p. 644). The question, then, is what kind of selection process we are talking about? In this essay we attempt to answer this question in the social and cultural domain.

Some people fail to ask this question. Consider combination (3) in Table 1. Notably, some dismissals of biological metaphors in the social sciences are based on misunderstandings. For instance, some social theorists suggest that any flirtation with biology would place the theorist on the slippery slope to biological reductionism, in which social phenomena would be explained *entirely* in biological terms. True, biological reductionism is a flawed social doctrine, and is widely regarded as open to ideological abuse. But that is not necessarily what is being proposed.

Much of the exploration is at the level of analogy or metaphor. It is not fully appreciated that all sciences embody metaphor, and often, perhaps unavoidably, these metaphors have a naturalistic ambience (Black, 1962; Hesse, 1966; Klamer and Leonard, 1994; Lewis, 1996; Maasen, 1995). Furthermore, it is not always understood that such metaphors are not only unavoidable but also necessarily inexact – otherwise they would not be metaphors. Such misunderstandings conspire with the now-waning, twentieth-century orthodoxy in the social sciences that all connections between biology and the social sciences, and between biotic and social phenomena, should be broken. A denial that social evolution is Lamarckian or Darwinian is sometimes a coded way of saying to any biologist: 'get thee beyond the social sciences; thou hast nothing to add to our story'.[4]

Inescapably, however, social phenomena are situated in nature, and involve human beings. Humans, in turn, are the outcome of processes of biological evolution, just like other species. Human consciousness and intentionality are also an outcome of biological evolution. The social and the economic worlds interact with the natural, and sometimes with deleterious effects on the ecosystem. On the other hand, it can be accepted straightaway that the social sciences address properties and phenomena not found at the biological level. Consequently, the social sciences are not reducible to biology or ecology. But that does not mean that we can rest content with theories in one domain that are inconsistent with those in another. The specificity of some social properties is not an excuse to sever all connections with the biotic domain. Indeed, given current concerns about the possible damage to nature caused by human economic activity, it would be wise to maintain and explore these interconnections.

This raises the question of the compatibility or otherwise of theories of social or economic evolution with the accepted understanding of the processes of biological evolution. One of

[4] For critical reflections on the split between the social sciences and biology see Hirst and Woolley (1982), Degler (1991), Weingart *et al* (1997), Hodgson (1999).

these questions is whether social evolution is Lamarckian. If so, what are the units and mechanisms of social evolution involved?

The structure of this essay is as follows. Section 2 raises some philosophical and terminological issues that are crucial to the discussion, and rules out a reductionist relationship between the social and the biological sciences. Section 3 discusses the relationship between Darwinism and Lamarckism in biology. It is shown that, contrary to widespread opinion, even in mainstream biology a limited version of Lamarckism is consistent with a modern and full-blooded Darwinism. Furthermore, some fully Darwinian processes may appear to have Lamarckian characteristics at another level. Section 4 reviews the idea of 'universal Darwinism' and shows that even this does not undermine the propositions of the preceding section. Section 5 criticises Hull's rejection of both literal and metaphorical Lamarckism in social evolution. It is noted that Hull's challenge to social Lamarckism is centred on the meme concept and the use of ideas or beliefs as the analogue of the gene. It thus has limited generality. Section 6 looks at habit as an alternative analogue to the gene in the social domain. On this basis, section 7 defends a limited notion of Lamarckian social evolution, consistent with Darwinian principles. Section 8 concludes the essay.

2. Some Philosophical and Terminological Preliminaries

Emphatically, in asking whether social evolution is Lamarckian or Darwinian, it is not being proposed that all sciences can or should be reduced to one. It is not being proposed that biology can be reduced to physics, as suggested by some molecular biologists. It is also not being proposed that the social sciences can be reduced to biology, as some extreme sociobiologists have suggested. Complete explanatory reduction of one level to another 'lower' level is ruled out *in principle*, in part because of problems of complexity and intractability (Wimsatt, 1980; Hodgson, 1993). As Popper (1974, p. 260) has argued: 'hardly any major reduction in science has ever been *completely* successful: there is almost always an unresolved residue left by even the most successful attempts at reduction.' Especially in the real and complex world, a central problem with reductionism is analytical intractability. Attempts to explain one level entirely in terms of another inevitably involve oversimplification.

Reductionism, in which all the phenomena at one level are explained entirely in terms of those of another, is impossible and untenable. But this does not mean that *some* phenomena cannot be explained in terms of entities at a lower level. Indeed reductive explanations of this type are essential to science. But reduction and reductionism are not the same thing. Reductionism involves the injunction that *everything* at one level should be explained in terms of another. Examples of reductionism are the views that all social phenomena should be explained entirely in terms of individual volitions, or entirely in terms of the biological characteristics of the individuals involved, or that biology should be reduced to chemistry, or to physics.

Dennett's (1995, pp. 80-3) condemnation of the sin of 'greedy reductionism' thus creates confusion, because reductionism by its very nature is gluttonous. According to Dennett, those that are guilty of this sin 'underestimate the complexities, trying to skip whole layers or levels of theory in their rush to fasten everything securely and neatly to the foundation' (p. 82). However, such persons are not simply guilty of the sin of greed, but also of haste and sloppiness. All reductionism is greedy. Recklessness is an optional extra to add to this generally unsuccessful credo.

There is an important and additional reason for ruling out the reductionist doctrine that everything must be explained in terms of its constituent units. This is the existence of emergent properties.[5] Crucially, reductionism is countered by the phenomenon of emergence. As Tony Lawson (1997, p. 176) has explained: 'an entity or aspect is said to be *emergent* if there is a sense in which it has arisen out of some "lower" level, being conditioned by and dependent upon, but not predictable from, the properties found at the lower level.'

An example of an emergent property is colour. Colour derives from the properties of atoms and molecules. However, carbon atoms are not black, sulphur atoms are not yellow and a single copper oxide molecule is not green. Colour is an emergent property of these entities, just as a 'social atmosphere' is a property of a gathering of people. 'Self-organising' systems also display properties that a not found in their components (Prigogine and Stengers, 1984; Kauffman, 1993). We cannot deduce the emergent property from the constituent elements of the phenomenon. By this argument, we find in the social domain properties that are not explicable in terms of biology or physics. This means that the social sciences have a degree of autonomy from the natural.

Crucially, the concept of emergence is necessary to sustain any account of distinctively cultural evolution, such as in memetics, dual inheritance theory and so on.[6] Why is this so? The concept of meme, like that of the dual inheritance or coevolution of genes and culture, depends crucially on imitation. But how is imitation itself explained? A true reductionist would have to attempt to explain acts of imitation in terms of the behavioural dispositions in the biological genes. If they are so explicable then the basic idea of cultural evolution must be abandoned, for the simple reason that the notion of culture dissolves into its constituent biotic or other elements. There would be no barrier to the reductionist imperative that imitation and culture must themselves be explained in terms of biology. In general, however, such explanations prove to be too complex and intractable. In this case, does this mean that the scientific project of explanation must be abandoned? Fortunately, with the concept of emergence, science may proceed, by focusing on emergent properties at higher levels. The very idea of a social science that is not itself reducible to biology, depends upon a notion of social evolution that can proceed without necessarily changing the human genes.[7] On the basis of their emergent properties, irreducible features of culture can be retained. Accordingly, a notion of cultural evolution can be sustained.

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[5] The concept of an emergent property was established by Morgan in the 1890s (Hodgson, 1998d).

[6] For discussions of cultural or memetic evolution see Blackmore (1999), Boyd and Richerson (1985), Brodie (1996), Dennett (1995, ch. 12), Durham (1991), Lynch (1996) and Rose (1998).

[7] The flawed and now-unfashionable idea that socio-economic evolution works principally by modification of the human genotype was promoted by Spencer and Marshall. Spencer (1881, pp. 400-1) argued that 'society cannot be substantially and permanently changed without its units being substantially and permanently changed … social evolution … is limited by the rate of organic modification in human beings'. Likewise, the economist Marshall (1923, p. 260) wrote: 'Economic institutions are the products of human nature and cannot change much faster than human nature changes'. The arguments of C. L. Morgan, and especially Veblen, had the explicit objective of explaining social evolution in terms that did not require changes in the human gene-pool (Hodgson, 1998b). Nevertheless, there are genuine but complex connections between human nature and what may be possible in terms of human social organisation and development; for a discussion see the chapter in this volume by Laurent and Caton.

However, the importance of the concept of emergence to social science in general, and to theories of cultural evolution in particular, is not sufficiently appreciated. The concept is hardly touched upon in the literature on both cultural inheritance and memetics. Nevertheless, to put it bluntly: without the concept of emergent properties there is no possibility of any autonomous social science that is consistent with scientific understanding in the physical and biological sciences. Emergent properties endow the autonomous categories of the social science their reality and meaning. Without emergent properties in the social domian, social science becomes reducible to biology.[8]

The existence of emergent properties undermines biological and other forms of reductionism. However, it gives no excuse for the opposite error: that is to sever all connections between biology and the social sciences. We observe an interconnected reality outside ourselves. It involves many elements, including physical matter, living organisms and human relations. Different sciences address different levels or parts of this reality. Nevertheless, theories and explanations at one level must be consistent with those at another. Social phenomena are not explicable in terms of the laws of physics. But they must be *consistent* with those laws. Similarly, biology is unable to explain crucial social phenomena. But that does not mean that we can ignore the processes of evolution or ecological constraints. Emergent properties give no escape from what we may term as the Principle of Consistency: explanations in one domain have to be consistent with explanations in another, despite the examination of different properties and the deployment of different concepts.

Accordingly, the question of the Lamarckian or Darwinian nature of social evolution cannot be avoided. However, both Lamarckism and Darwinism are somewhat plastic terms, without unanimity of definition. Let us first attempt to delineate what is meant here by the term 'Lamarckism'. First, it is not necessary to maintain that 'the biology of Lamarck' and 'Lamarckism' are the same thing; just as the term 'Keynesian' does not always, nor even typically (Leijonhufvud, 1968), comply with 'the economics of Keynes'. For much of the twentieth century, 'Darwinism' has been seen as a theory opposed to the 'Lamarckian' doctrine of the inheritance of acquired characters. If that is the case then Darwin himself was not a 'Darwinian'. In the *Origin of Species* and elsewhere, Darwin (1859, pp. 82, 137, 209) repeatedly considered the possibility of the inheritance of acquired characters. Keynes, it could be said, was not a Keynesian; and Darwin himself was not a strict Darwinian in an overly-restrictive but widely-used modern ('neo-Darwinian') sense.

Having made this point, we are not required to do a detailed textual exegesis of the writings of Jean Baptiste de Lamarck.[9] It shall simply be established that Lamarck believed in the

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[8] Prior to Morgan's development of the concept in the 1890s, social scientists often relied on devices such as the metaphor of society as an organism. By identifying such an object of analysis, a place for social science was retained. However, the organism metaphor is widely criticised for its defective and inadequate depiction of the relationship between individual agency and social structure. Similar objections have been raised against various structuralist and holistic developments in twentieth century social science. In contrast, a social science based on the concept of emergence provides a means of avoiding the defects in these approaches.

[9] For discussions of Lamarck's ideas and their impact see Boesiger (1974) and Burkhardt (1977, 1984). Although his position has often been misinterpreted, Lamarck did believe that the inheritance of acquired characters is possible. In fact, the idea of acquired character inheritance was widespread at the time and Lamarck adapted it from others (Burkhardt, 1977, 1984). Lamarck also believed that organisms – in an upward drive towards perfection – become progressively more complex. Similar ideas were promoted by Spencer, and they survive in some quarters today.

inheritance of acquired characters. Indeed, in his *Zoological Philosophy* of 1809 he elevated this notion into a 'law', writing, with emphasis as in the original:

> *All the acquisitions or losses wrought by nature on individuals, through the influence of the environment in which their race has been placed, and hence through the influence of the predominant use or permanent disuse of any organ; all these are preserved by reproduction to the new individuals which arise, provided that the acquired modifications are common to both sexes, or at least to the individuals which produce the young.* (Lamarck, 1984, p. 113)

Although Lamarck was not the first to promote this idea, and was far from alone in doing so, 'Lamarckism' in common usage today generally involves one principal proposition: that the inheritance of acquired characters is possible and significant.

Note also the importance of 'the influence of the environment' in Lamarck's conception. Essentially, Lamarck's notion of evolution is driven by environmental changes rather than by the (genetic) variety within a population. In Lamarckism, organisms adjust continuously as if attempting to reach harmony with their environment. On this point the contrast with Darwin is clear. Lamarck argued that variation was a function of the environment, but for Darwin 'variation was present first, and the ordering activity of the environment ("natural selection") followed afterwards' (Mayr, 1982, p. 354). For Lamarck, the environment was the key agent of change. In contrast, Darwin developed the view that intergenerational change resulted from a combination of renewed variation and environmental selection. For Darwin, variety is the evolutionary fuel. Nevertheless, as we shall see below, there are fully Darwinian theories that see behavioural adaptations as driving some evolutionary processes. There is nothing in Darwinism that necessarily commits us to seeing variation as entirely 'random' in origin. Whether its source is haphazard or guided in some way will depend on the circumstances, and will be a matter of empirical investigation rather than doctrinal conflict.

A question within Lamarckism is the role of intention or volition in driving the presumed adaptations to the environment. This raises the issue of the causal status of intentionality or will. The position of Lamarck himself is far from clear on this question. In some of his writings he stressed the role of volition in causing adaptations. In many passages it is excluded or downplayed. Furthermore, as Ernest Boesiger (1974) argues, Lamarck was a materialist rather than a causal dualist: he saw intention or volition as rooted in material causes. However, the compatibility or otherwise of human purpose with physical or materialistic causality would require full-length discussion in its own right. Hence we shall address questions of will or purpose only tangentially, or when they are called for directly. The term 'Lamarckism' here will be primarily associated with the proposition that acquired characters can be inherited.

Particularly from a historical perspective, the identification of the essence of 'Darwinism' is no less problematic (Hull, 1985; Depew and Weber, 1995). Later in this essay an attempt will be made to identify Darwinism in terms of some core characteristics. It will be argued that Darwinism involves a detailed, causal, step by step, understanding of evolution based on the features of variation, inheritance and selection. This causal schema is the central element that links Darwin and the modern Darwinians. Darwinian evolution occurs when there is some replicating entity that makes imperfect copies of itself, and these do not have equal potential to survive. The genetic constitution of that replicating entity is known as the 'genotype'. The characteristics of the organism are the 'phenotype'.

At the core of Darwin's theory is an insistence on causal explanation. If organisms are volitional, then Darwinism would require that volition itself has to be explained in

evolutionary terms (Hodgson, unpublished). Darwinism attempts to provide a detailed explanation of the evolution of complex phenomena, without recourse to any *deus ex machina*.

In addition, some biologists go further, and associate Darwinism with the denial of the possibility of the inheritance of acquired characters. This combined doctrine is often referred to as 'neo-Darwinism'. However, as noted above, Darwin himself presumed such a Lamarckian possibility. It is thus rather restrictive to associate Darwin's name with the denial of a doctrine that he repeatedly entertained.

There are further reasons for adopting a broad rather than a narrow definition of Darwinism. These are elaborated later below, but we can make the point briefly here. When Dawkins and others use terms like 'Universal Darwinism', they do not in principle exclude the possibility of the inheritance of acquired characters, even if it is absent from biotic life on Earth. The empirical discovery of some acquired character inheritance would not be seen by them as a refutation of Darwinism. What they would insist is that the Darwinian explanation of evolution – based on inheritance, variation and selection – is more compelling and complete than any of its rivals.

In his attack on Lamarckism, August Weismann (1893) proposed a 'barrier' between the organism and (what we now call) its genes. Such a barrier would rule out the Lamarckian inheritance of acquired characters. For the reasons given above, it is best not to build the Weismann doctrine into the definition of 'Darwinism' used here. As elaborated in more detail below, Darwinism is defined here as a broader doctrine, involving variation, inheritance and selection, and insisting on step-by-step causal explanations of evolutionary processes. The word 'Weismannism' can be taken to mean the denial of the possibility of the inheritance of acquired characters. The Weismannian version of Darwinism is described as 'neo-Darwinism'. The three definitions to be used here are summarised in Table 2 below.

Term	Definition
Darwinism	A causal theory of evolution in complex or organic systems, involving the inheritance of genotypic instructions by individual units, a variation of genotypes, and a process of selection of the consequent phenotypes according to their fitness in their environment.
Lamarckism	A doctrine admitting the possibility of the (genotypic) inheritance of acquired (phenotypic) characters by individual organisms in evolutionary processes.
Weismannism (or neo-Darwinism)	A doctrine denying the possibility of the (genotypic) inheritance of acquired (phenotypic) characters by individual organisms in evolutionary processes.

Table 2: Definitions of Three Doctrines

The modern neo-Darwinism conception of evolution is portrayed in Figure 1 below.[10]

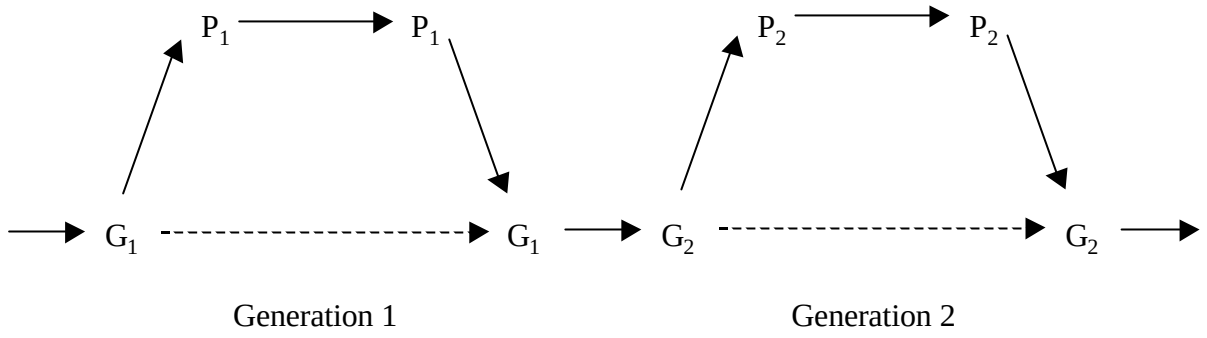

Figure 1: Neo-Darwinian (Weismannian) Evolution

In Figure 1, G_1 represents the population of genotypes in the first generation. These genotypes instruct the formation of the population of phenotypes P_1. These phenotypes interact and mate. Some die. The surviving adult population is P_1 . Associated with this surviving population is the revised gene-pool G_1 . They give birth to the next generation, with a sexually recombined, and possibly also mutated, population of genotypes G_2. The whole process repeats, indefinitely. The solid lines indicate the causal relationships of organism development (ontogeny), natural selection (phylogeny) and so on. The broken lines indicate the persistence of genetic information through time within the 'vehicles' of the organisms. The genetic information may alter along the course of the broken line, but, according to the Weismann doctrine, only as a result of the differential survival and alteration of the population of phenotypes.

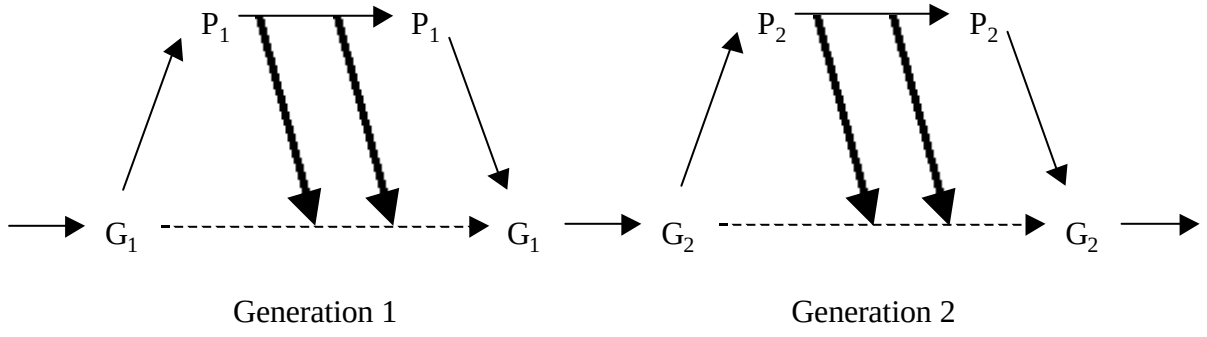

Figure 2: Lamarckian Evolution

[10] Diagrams of this type are found in Lewontin (1974), Boyd and Richerson (1985), Durham (1991) and elsewhere. The author also acknowledges the inspiration of unpublished work by Thorbjörn Knudsen.

Figure 2 illustrates the Lamarckian doctrine of the inheritance of acquired characters, again cast in a modern framework. (Lamarck, like Darwin, was unaware of the nature of the genes.) Again, the symbols G_t, $G_{t'}$, P_t and $P_{t'}$ refer the pool of genotypes and phenotypes in the population. Lamarckism presumes that characters acquired during the development of the phenotype – from P_t to $P_{t'}$ – may alter the genetic information by other than differential survival of a population of phenotypes. The twin-lined arrows indicate the supposed Lamarckian causal connection from phenotype to genotype. The result is that Lamarckian evolution can result in significantly greater genetic change, from G_t to $G_{t'}$. Genetic change can result not simply from differential survival through natural selection but also through the inheritance of acquired characters. This also can result in more significant genotypical and phenotypical changes from generation to generation. Hence Lamarckian evolution can be much 'faster' than the Weismann doctrine would allow.

3. Darwinism and Lamarckism in Biology

The basic Darwinian principles – of variation, inheritance and selection – have been applied with considerable persuasiveness and explanatory success. Darwin's theory was not primarily about destinations or outcomes, but a causal theory of the process of evolution itself. What makes the Darwinian approach so powerful is its concern with the detailed, step by step, and 'algorithmic' explanations of causal processes.[11]

Of course, most modern biologists reject the possibility of the inheritance of acquired characters in the biotic realm. A major problem for Lamarckism in biology is to render the inheritance of acquired characters consistent with what is known about the genetic code. There are good reasons why organisms have evolved in a way that their acquired characters are very unlikely to lead to an alteration of their genes. The genetic coding has to be protected from most outside influences. Otherwise the valuable genetic information – the product of millions of years of struggle, testing and evolution – would get contaminated or lost. For this reason the genetic information has to be largely inert and unreactive. It is argued that this is a reason why the Weismann barrier has evolved. The biologist Conrad Waddington (1969, p. 369) later made a similar point about the preservation of the genetic code: 'If it was capable of being changed by all sorts of environmental influences, of the kind which exert natural selection on the organisms, it would soon be reduced to a jibbering nonsense.'

To make Lamarckism work, acquired characters must be inherited in the genetic code, without chaotic damage to it. The DNA program would have to be changed in a meaningful and effective way to reflect the characters acquired, so that they could be passed on to the next generation. This presumes that the environment acts like an expert computer software

[11] The useful metaphor of Darwinian evolution as an algorithm is deployed in Dennett (1995). The same emphasis on the detailed and processual nature of Darwinian evolution is found in the writings of the institutional economist Veblen (1904, p. 369 and n.): 'Darwin set to work to explain species in terms of the process out of which they have arisen, rather than out of the prime cause to which the distinction between them may be due. This is the substance of Darwin's advance over Lamarck, for instance.' However, where Dennett and Veblen differ is that Dennett fails to deploy the standard concept of an emergent property, and thus lapses into reductionism. In contrast, Morgan and his concept of emergence influenced Veblen in choosing the institution as the unit of selection (Hodgson, 1998b). Nevertheless, Veblen's use and apprecation of the vital importance of the concept of emergence was also inadequate.

redesigner, somehow understanding the complex interconnections between each piece of coding. Such a degree of detailed, complicated and fortuitous reprogramming is unlikely to happen in the haphazard turmoil of nature.

However, 'Lamarckism' remains of interest among small groups of biologists. For instance, there is a minority view that the inheritance of acquired characters may be possible in a restricted set of circumstances, such as the transfer of acquired immunities from mother to child (Steele, 1979; Ho and Saunders, 1984; Jablonka *et al*, 1992; Steele *et al*, 1998). It is not the job of the social scientist to adjudicate in this debate. Biologists themselves will have to sort this matter out. It is a matter of causal explanation and expert empirical enquiry into real phenomena. The social scientist would reasonably take an interest in this investigation, but she does not have to place any reputational bets on the scientific outcome.

In contrast, the more general *theoretical* and *philosophical* presuppositions of Lamarckism or Darwinism should be subject to close scrutiny by the social scientist. Some of the problems involved do not depend upon the precise mechanisms of reproduction that we find in Earthly life forms, based on DNA. It is at this general philosophical and theoretical level that consistency across the social and biological domains must be obtained.

Let us consider some further problems at this theoretical level. Lamarckians assume that the source of new characteristics, that are acquired and then passed on, is the organism's adaptation to its environment. Richard Dawkins (1983, 1986) explores a problem with this Lamarckian assumption. He writes: 'It is all very well inheriting acquired characteristics, but not all acquired characteristics are improvements. Indeed, the vast majority of them are injuries' (Dawkins, 1986, p. 299). It is necessary to explain why disadvantageous acquired characters do not cumulate into extinction. It is also necessary to explain why some acquired characters are improvements.

For example, we acquire thicker skin on our hands and feet because we put these surfaces of the body to greater use. The Darwinian explanation of this is as follows:

> Skin that is subject to wear and tear get thicker because natural selection in the ancestral past has favoured those individuals whose skin has happened to respond to wear and tear in an advantageous way. … The Darwinian maintains that the only reason even a minority of acquired characters are improvements is that there is an underpinning of past Darwinian selection. In other words, the Lamarckian theory can explain adaptive improvement in evolution only by, as it were, riding on the back of the Darwinian theory. (Dawkins, 1986, p. 300)

Dawkins's argument is persuasive. Essentially, Lamarckism lacks an explanation as to why there is a propensity to inherit improvements rather than impairments. But note: if Lamarckism is simply defined as the admission of the possibility of the inheritance of acquired characters, then Dawkins's argument does not refute Lamarckism. What Dawkins shows is that some Darwinian mechanism of natural selection is a necessary *complement* of any viable Lamarckian theory. Darwinism and Lamarckism would thus dovetail together. However, as Dawkins demonstrates, the complementarity is asymmetrical. Any viable Lamarckism requires Darwinism as a prop, but the reverse is not true.

Dawkins's argument earmarks a problem that must be addressed and resolved in any Lamarckian framework. It is the problem of the inheritance of acquired impairments. It shall be raised again below when we discuss the application of Lamarckian ideas to the socio-economic domain.

There is another theoretical and philosophical problem concerning the Lamarckian notion of will or volition. There must be a causal explanation of why organisms seek to adapt to their environment. In an attempt to fill this gap, Lamarckism presumes a voluntarism of will. But the origin of this will itself remains unexplained. A causal explanation of why organisms strive for advantage or improvement is lacking. In short, Lamarckian theory has another gaping hole in it that has to be filled by a Darwinian or other explanation. Darwinism explains why organisms seek to adapt to their environment in terms of the production of random variations of genotype, leading to different behaviours, some of which involve successful adaptations. Darwinism thus points to an evolutionary explanation of the very origin of will of purpose itself.[12] Even if acquired characters can be inherited, Lamarckism may again require Darwinism as an explanatory crutch.

Having noted serious theoretical problems within exclusively Lamarckian explanations, we move on to explore some ways in which residual versions of Lamarckism may persist even within a Darwinian framework, and without posing a threat to it. Indeed, a much looser version of 'Lamarckism' lingers even within modern biology. It is raised here because it is highly relevant to the discussion of the broad compatibility or otherwise of Lamarckism or Darwinism, across both biology and the social sciences. It is important to consider this carefully because these ideas are not, and were not designed as, a challenge to Darwinism. In fact they were originally developed as a buttress to Darwinian theory.

In the 1890s, two biologists, James Baldwin in the USA and C. Lloyd Morgan in Britain, independently addressed the problem of explaining a sufficiently rapid pace of evolution within a Darwinian framework. This was a pressing problem at the time, because a prominent Lamarckian objection to Darwinism was that evolution would happen too slowly and haphazardly without the inheritance of acquired characters. The Lamarckians claimed that the allegedly 'blind' and 'random' principles of Darwinism could not explain the rate and effectiveness of biotic evolution.[13]

Baldwin (1896) and Morgan (1896) developed and published in the same year an argument that showed how evolution could be hastened without the inheritance of acquired characters. Morgan was relatively unlucky, for the phenomenon acquired the name of the 'Baldwin effect'. But, in absolute terms, Baldwin was unlucky too, for as Darwinism became ascendant after the 1930s, overcautious thinkers dismissed the Baldwin-Morgan arguments because they seemed to smack of Lamarckian heresy. Ironically, however, the Baldwin-Morgan theories had been devised to rebut Lamarckism and rescue Darwinism. Some time later, the British Darwinian biologist Waddington revived and refined the argument. There are technical differences between Waddington's notion of 'genetic assimilation', Morgan's argument and the Baldwin effect. I shall gloss over these, and concentrate on Waddington's theory.[14]

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[12] As Veblen (1934, p. 80) put it in 1898: 'By selective necessity he [the human] is endowed with a proclivity for purposeful action.'

[13] Morgan (1896) and Baldwin (1896, 1909) also addressed the problem of accounting for the even more rapid pace of *cultural* evolution, in a manner consistent with Darwinism. I have argued elsewhere that Morgan's thoughts on this matter were crucial for Veblen and the development of institutional economics (Hodgson, 1998b).

[14] Morgan's argument depends upon a notion of the organism making an 'intelligent choice'. But this choice is itself inadequately explained by natural selection. The Baldwin effect depends upon the luck of fortuitous

Since Weismann, Darwinians have doubted the possibility of the inheritance of acquired characteristics. But this does not rule out *the inheritance of the capacity to acquire* particular characteristics. The ability to be fortuitously adaptable, or to learn, can be inherited, without any threat to the Darwinian framework. As Waddington (1969, p. 373) argues:

> Natural selection has built into all the more highly evolved organisms some capacity for reacting to stress in ways which tend to make the organism more effective in dealing with it. Such responses can be considered as a very generalized form of learning. It is clear enough that responding to a stress in this way would be useful to the organism and would therefore be favoured in natural selection.

In other words, natural selection may not simply lead to the development of species which are more adapted to their environment, but also to different capacities to respond by further adaptation to future changes in the environment. After Waddington, similar ideas have been developed by John Campbell (1987) and Christopher Wills (1989). The central thrust of the arguments of a sizeable group of Darwinian biologists is that 'natural selection will favor traits that enhance the possibility of further evolution'. This reveals 'evolvability to be the greatest adaptation of all' (Depew and Weber, 1995, p. 485).

Returning to the previous illustration: if we do manual work, then the skin on our hands thickens. However, our children will not inherit skin of extra thickness. Nevertheless, we do pass on, through our genes, the capacity to grow thick skin in response to manual work. Over time, considering the population as a whole, natural selection may favour those with a genetic disposition to grow thicker skin more readily. Accordingly, an acquired character is not inherited directly. But through natural selection the capacity to acquire that character becomes enhanced in the population as a whole. As Waddington (1975, pp. v-vi) puts it:

> although an 'acquired character' developed by an individual is not inherited by its individual offspring, a character acquired by a population subject to selection will tend to be inherited by the offspring population, if it is useful ... genotypes, which influence behaviour, thus have an effect on the nature of the selective pressures on the phenotype to which they give rise.

All this is consistent with Darwinism. There is no breach of the Weismann Barrier. To check this, we zoom in to observe the processes of acquisition of thick skin: we see that an adult does not pass on the acquired attribute of thick skin to its offspring. The infant's skin is thin and vulnerable. It will stay so, unless the hands are used. At this micro level, the Weismann Barrier is apparently intact, and there is no whiff of Lamarckian heresy.

Figure 3 shows this. The pace of evolutionary advance is more rapid, as in the Lamarckian process illustrated in Figure 2. However, there is no Lamarckian mechanism involved and the process is identical to the neo-Darwinian one shown in Figure 2. At the level of the individual organism there is no direct influence of phenotype upon genotype.

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mutation after habits are established. In contrast, Waddington's genetic assimilation works through progressive selection of the appropriate capacity to respond to stress. See, for example, Dennett (1995, pp. 77-80), Hardy (1965, pp. 161-70), Maynard Smith (1975, pp. 303-7), Piaget (1979, pp. 14-21), Richards (1987, pp. 480-503).

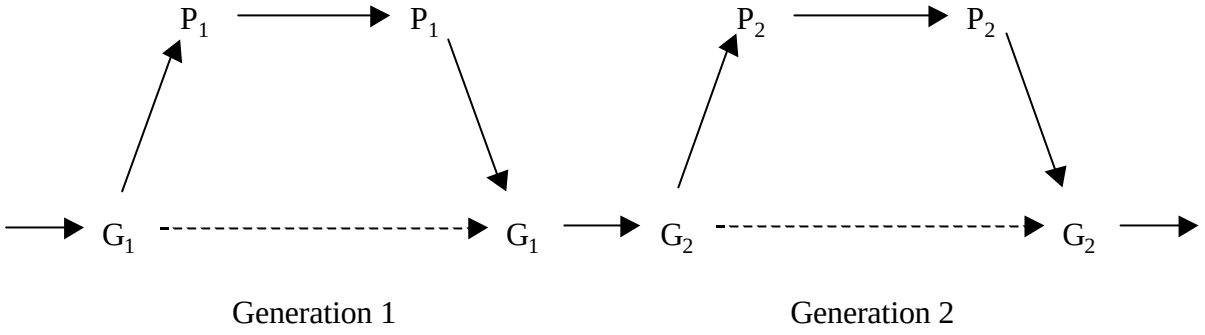

Figure 3: Genetic Assimilation

But let us change our viewpoint. Instead of observing micro-transmission, we zoom out to observe the population as a whole. Instead of the proverbial trees, we now see the forest. New and contrasting properties emerge at this level. Because the capacity to acquire harder skin increases through time, we observe at the population level that harder skin spreads more rapidly and widely among the population. And – here comes the crunch – *at the species or population level* these acquired capacities and characteristics are, in a sense, 'inherited'. However, the acquired characteristics are not transmitted from an individual to its offspring. For that reason, the word 'inherited' is used with a slightly different meaning in the penultimate sentence. If we view the population as if it were a single individual, then the acquired character is 'inherited' from one generation to the next. Through time, some things are acquired and 'passed on' *within that population*. But we are now using the words 'inheritance' and 'individual' as metaphors, and with a slightly changed meaning. It is important to point this out, in order to avoid any slippage of imprecision in the use of terms. Nevertheless, the population-wide view does give us a different picture. Emergent properties are revealed. At the population level, properties and processes emerge that have quasi-Lamarckian characteristics but which strictly do not involve Lamarckian inheritance at the level of the organism.

To use another metaphor, consider the method of painting known as *pointillism*, developed French painter Georges Seurat in the 1880s. Small, closely juxtaposed dots or strokes of pure colour were deposited on the canvas. Seen from a distance, these points produce the illusion of the solid forms and intermediate colours of people and landscape. At the micro level, there is nothing but separate points of pure colour. At the macro level there is a sense of complete and continuous form. The meanings and representations in paintings are emergent properties, not present in the points at the micro level. This results in an apparent but resolvable 'contradiction' between isolated points at one level and solid forms at another.[15]

[15] The mind handles the detail by pattern recognition and 'chunking', discussed by researchers into cognitive psychology, artificial intelligence and elsewhere. Such chunking is often indispensable to make sense of a complex system, but at the cost of a loss of some precision and predictive power. For a stimulating discussion of chunking and the problem of 'levels of description' see Hofstadter (1979). Related themes are discussed in Cohen and Stewart (1994).

In a similar manner, Waddington's theory of genetic assimilation produces an apparent contradiction between Darwinian processes at the micro level and the Lamarckian 'inheritance' of acquired characters for the population as a whole. However, the contradiction is apparent not real. There is no contradiction, *even within biology*, between the quasi-Lamarckian notion of genetic assimilation and the principles of Darwinism. This does not in any way undermine Darwinism, nor give victory to any lingering group of Lamarckians, as Waddington and others have made repeatedly clear. What it does show, however, is that the layered ontology of complex systems and the existence of emergent properties makes the pattern of causal laws much more complicated than any dogmatic reductionist would admit or imagine.

Furthermore, the Waddington story should warn us about being over-hasty in applying the label 'Lamarckian' to social or cultural evolution. What might look like Lamarckism from a distance might not actually be so at the micro level.

The existence of emergent properties would support the possibility of different kinds of evolutionary processes at different ontological levels. The example of genetic assimilation also suggests such a possibility. It also warns us of the complications involved in addressing two levels at once. We can be ambitious with analogies, but ultimately we have to be careful about details. Above all, the Principle of Consistency requires that theories and explanations at a higher level do not overthrow or contradict those at a lower level. Waddington's theory of genetic assimilation exhibits this feature.

For some, however, the idea of 'Universal Darwinism' may be seen as a challenge to this relatively tolerant outcome. If Darwinism has universal explanatory power, why complicate the story by adding still more, different, types of explanation? This is one of the questions that must be addressed in the following sections of this essay.

4. Universal Darwinism

Apart from examining the 'effect' named after him, Baldwin (1909) was one of the first to argue at some length that the Darwinian principles of natural selection applied not simply to biology but also to mental and social evolution. Like William James and Thorstein Veblen, Baldwin was an early pioneer of the idea that Darwinism had a wider application than to biology alone. However, the term 'Universal Darwinism' was probably first coined much later, by Dawkins (1983). Dawkins argues that if life existed elsewhere in the universe, it would follow the Darwinian rules of variation, inheritance and selection. The crux of this issue has been discussed already: even if there was a very different system of replication, including one that allowed the inheritance of acquired characters, a coherent account of the evolutionary process would still require the key elements of the Darwinian theory. As long as there is a population of replicating entities that makes imperfect copies of themselves, and not all of these entities have the potential to survive, then Darwinian evolution will occur.

As such, Darwinian evolution is not tied to the specifics of genes or DNA: essentially it requires some replicating entity. On planet Earth, we find that DNA has the capacity to replicate. But other 'replicators' may exist, on Earth and elsewhere. One relevant example is the propensity of human beings to conform and imitate, making the replication of habits and ideas a key feature of human socio-economic systems. 'Universal Darwinism' is not a version of biological reductionism or 'biological imperialism' where an attempt is made to explain everything in biological terms. On the contrary, 'Universal Darwinism' upholds that there is a

core set of general Darwinian principles that, *along with auxiliary explanations specific to each scientific domain*, may apply to a wide range of phenomena.

As a result, Universal Darwinism is not an 'imperialistic' doctrine in the manner of the 'economic imperialism' of neoclassical economists such as Gary Becker (1976) or Jack Hirshleifer (1982).[16] Such 'imperialisms' involve the claim that a wide range of phenomena can be explained *completely and exclusively* in terms of a single set of principles. By leaving an opening for domain-specific, auxiliary explanations, Universal Darwinism does not necessarily involve such a claim.

Accordingly, in his key chapter on 'Universal Darwinism', Henry Plotkin (1994, ch. 3) considers a number of Darwinian-type selection mechanisms. He discusses the early suggestion, made by Darwin himself, that 'the struggle for life' may be going on among such entities as the words and grammatical forms of human language, as well as among organic life. Darwin (1859, p. 422) hinted that languages may evolve like species. As another example of the extension of 'natural selection' to different entities, Plotkin cites the proposal of James (originally made in 1880) that ideas themselves replicate and produce random variations, upon which social and natural circumstances select the survivors (James, 1897, p. 247).[17] Such a notion is now familiar to us in the form of the 'evolutionary epistemology' of Karl Popper (1972), Donald Campbell (1974a) and others.

Plotkin also places within his framework of 'Universal Darwinism' the ideas of 'neural Darwinism' pioneered by Gerald Edelman (1987). Furthermore, he also brings in the immune system. In these cases there is selection process working on a regenerating variety of replicating units, be they lymphocytes (in the evolution of the immune system) or neural connections (with neural Darwinism). He makes the point that what is being proposed is not merely an evolutionary analogy or metaphor but the existence of multiple processes that are *actually* evolutionary, and they are evolving in accord with basic Darwinian principles of variation, replication and selection.

It is important to re-emphasise that in making Darwinian evolution universal, Dawkins, Plotkin and others do not attempt to explain everything in *biological* terms. The alleged universality of Darwinian mechanisms does not mean that the process involved is always that of *genetic* variation and selection. Furthermore, when genetic evolution does exist, this does not rule out additional evolutionary processes, acting on different entities, at different ontological levels. Plotkin (1994, p. 101) himself proposes 'a hierarchically structured evolutionary theory' in which there are different units of selection at each level. Plotkin's anti-reductionism is explicit. He explicitly rejects the notion that evolution at a higher level can be explained entirely in terms of evolutionary processes at a lower level:

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[16] Hirshleifer (1982, p. 52), for example, thus favours an '"Economic imperialism" – the use of economic analytical models to study all forms of social relations rather than only the market interactions of "rational" decision makers'. It is based on the assumption that: 'All aspects of life are ultimately governed by the scarcity of resources.' For a critique of 'economic imperialism' see Udéhn (1992).

[17] James's remarkable 1880 essay 'Great Mean and Their Environment' (reprinted in James, 1897) not only sketches an evolutionary epistemology, it also contains a powerful critique of Spencerian evolution. He attacked what today would be called cultural determinism, with a plea for the retention of a notion of individual agency. Furthermore, glistening within are the nugget ideas of bounded rationality (p. 219), cumulative causation (p. 227) and path dependent evolution (p. 238). James pioneered the notion – by 1898 affirmed by Veblen (1934, p. 79) – that laws and explanations in the social and the biotic domains must be consistent with each other.

> What saves intelligent behaviour from such a [genetic] reductionistic account is the presence of selectional processes in the mechanism of intelligence. As long as the secondary heuristic operates, even if in only small part, by Darwinian processes involving unpredictable generation of variants, then the products of that secondary heuristic, intelligent behaviour, cannot be reductively explained by genetics or genetics and development. (Plotkin, 1994, p. 176)

We could explore 'Universal Darwinism' even further than Plotkin. More than a century ago, the American philosopher Charles Sanders Peirce proposed in 1898 that *the laws of nature themselves evolve* (Peirce, 1992). This idea is being further developed by physicists today, involving the argument that key physical constants take the values they do because alternative universes in which the constants took different values failed to survive (Smolin, 1997). What could be more universal than to see the universe in which we live as a result of a Darwinian process of selection among alternative universes? Here, it seems, Universal Darwinism triumphs by making Darwinism play God.

The theistic allusion is not intended as an invitation for ridicule. Like God, there is something both wondrous and worrying about universal theories. The Darwinian theory is extremely powerful, because it is the only adequately detailed causal account of the evolution of complex systems, including organic life. It has the quality – to use another metaphor – of the 'universal acid' (Dennett, 1995) dissolving every theoretical receptacle into which it is placed. Seemingly, as a theory, it cannot be contained. Instead it apparently provides an encompassing framework within which all lesser theories are placed.

We have to leave these cosmological questions to the physicists. Coming back down to earth, the universality or otherwise of Darwinism is not something that can be resolved by mere social scientists. What is important for the social scientist to note is this: the notion of Universal Darwinism itself provides no alternative to a detailed explanation of the particular emergent properties and processes at the social level.

It is important to establish another conclusion here, before we move on. The work of Dawkins, Plotkin and others on 'Universal Darwinism' shows that the terms 'Darwinian' or 'Darwinism' are each being used prominently in two senses rather than one.[18] One sense is more restrictive than the other. The less restrictive sense is that 'Darwinian' processes involve variation, inheritance and selection. The more restrictive sense would also exclude the possibility of the inheritance of acquired characters. This is the Weismannian version of Darwinism: it is alleged by most biologists to apply to organic life. As noted above, Weismannism and Lamarckism are logically incompatible. But, in general, and more broadly, Darwinism and Lamarckism are not. In this sense we investigate the possibility that social evolution can be consistent with some notion of Lamarckism, which does not overthrow Darwinism in the biological domain. We explore this possibility in more detail in the remainder of this essay.

5. Hull's Rejection of Lamarckism in Social Evolution

Having found some breathing space for a version of Lamarckism within a (Universal) Darwinian framework, it is useful at this stage to consider an attempt to exclude Lamarckian

[18] See Hull (1985) for an extensive discussion of the problems of identifying the essence of 'Darwinism' from the perspective of the history of ideas.

ideas from social evolution. David Hull's (1982) article is a rare challenge to the notion that social evolution can in any sense be Lamarckian. Hull argues that 'sociocultural evolution' is Lamarckian in neither a literal nor a metaphorical sense. He attacks the proponents of Lamarckian social evolution with two arguments, of which the first can be dealt with more briefly.

Hull emphasises that intentionality plays a major role in human social evolution, but he regards the use of the Lamarckian label as misleading, even in this respect. Hull (1982, p. 312) writes:

> The trouble with terming sociocultural evolution 'Lamarckian' is that it obscures the really important difference between biological and sociocultural evolution – the role of intentionality. In sociocultural evolution, Lamarckian correlations exist between the environmental causes and the conceptual effects, but the mechanism responsible for these correlations is not the least Lamarckian. Rather, it is the conscious striving of intentional agents.

The key claim here is that Lamarckism excludes intentionality. However, Lamarck himself did not completely exclude a role for intentions, even in the evolution of non-human species. In the text of a lecture given in 1800, Lamarck wrote:

> the bird of the shore that *dislikes* swimming, and which none the less needs to approach the water to find its prey, is continually exposed to sinking in the mud; but, *wishing* to avoid the immersion of its body, its feet will get into the habit of stretching and lengthening. The effect of this, for those birds which continue to live in this manner over generations, will be that the individuals will be raised if on stilts, on long naked legs, that is to say legs bare of feathers up to the thigh and often beyond. (Lamarck, 1984, p. 415, emphasis added)

In this passage, Lamarck clearly sees an adaptation resulting from the volitions of the bird. Any suggestion that Lamarck himself *completely* excluded intentionality in evolution would thus be mistaken. However, such suggestions play a very minor role in his writings. Overall, Lamarck stressed habit much more than conscious will (Burkhardt, 1984, pp. xxx-xxxi).

When it comes to Lamarck*ism*, as opposed to the writings of Lamarck himself, it is much more difficult to belittle the role of intentionality. Lamarck's own views and those of the many subsequent 'Lamarckian' biologists are not identical. In embracing the category of intentionality, many 'Lamarckians' went much further than Lamarck. Furthermore, by promoting versions of vitalism, some Lamarckians elevated the notion of intention into a distinct category of causality. Hull's denial of a concept of intention in what he describes as 'Lamarckism' is thus misleading.[19]

Let us consider the second and more substantial of Hull's arguments. He criticises both 'literal' and 'metaphorical' notions of Lamarckian social evolution. For him, the processes of social evolution cannot literally involve the key Lamarckian idea of the inheritance of

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[19] Also misleading in some respects is my own earlier treatment of this issue. Hodgson (1993) insufficiently differentiated the views of Lamarck himself from those of later Lamarckians. Accordingly, I failed to note the very limited role of volition or intention in Lamarck's own writings, despite its widespread use by later Lamarckians. In general, my mistake was to identify Lamarck too closely with the Lamarckian tradition. Hull (1982) made the opposite error: the Lamarckian label was identified too closely with the personal ideas of Lamarck. Hodgson (1993) also failed to explore in sufficient detail the core characteristics of Darwinism as identified in this present essay.

acquired characters. Hull (1982, p. 278) considers the question of social learning, arguing that 'social learning is not an instance of the inheritance of acquired characters'. For him, it is more like infection or contagion. Unlike a disease, learning can be beneficial, but Hull suggests that a similar mechanism of contagion takes place. For example:

> a mother can transmit syphilis to her unborn child. Such transmission is congenital, not hereditary, and for this reason is no more an example of the inheritance of acquired characteristics than is the transmission of fleas. In order for acquired characteristics to be literally *inherited*, the genetic material cannot be bypassed. … In order for sociocultural evolution to be Lamarckian in a literal sense, the ideas which we acquire by interacting with our environment must somehow become programmed in our genes. (Hull, 1982, p. 309)

There is no feasible way in which the ideas we acquire by learning can lead to the reprogramming of *our own* biological genes. (Although ideas can, for instance, affect our choice of sexual partner and thereby influence the genes of our offspring.) Accordingly, social evolution is not literally Lamarckian: it does not involve Lamarckian processes at the individual, biological level. Hull is right in this respect. But the validity of this conclusion simply flows from the established argument in biology that there is no way in which an organism can inherit an acquired character. In the passage quoted above, Hull simply uses the word 'literal' to mean 'biological'. By this token, and given the prevailing view in modern biology, any 'literal' sense of Lamarckism must be excluded, in any context. Hull's critique of the notion that social evolution is 'literally' Lamarckian is correct, but simply by virtue of the fact that biological evolution is not Lamarckian.

We may agree with Hull that social evolution is not Lamarckian in a 'literal' or *biological* sense. But the question of whether social evolution is Lamarckian in a 'metaphorical' sense remains. When Hull criticises the idea that social evolution is 'metaphorically' Lamarckian, it is important to understand the type of analogy that he criticises in this respect. Hull takes it for granted that the unit of cultural evolution is the idea or meme. He concentrates on memetic versions of sociocultural evolution, neglecting other sociocultural theories that have been described as 'Lamarckian'.[20]

With this specific version of sociocultural evolution in mind, Hull (1982, p. 311) argues that 'ideas are analogous to *genes*, not characteristics'. Hull thus rejects the notion that something like Lamarckian transmission is involved. For him, the inheritance of acquired ideas or memes is not an instance of the inheritance of acquired characters, because ideas and memes are analogous to genes, not characteristics.

Furthermore, for Hull, the idea itself does not acquire characteristics. Hence there is no parallel to the genotype-phenotype distinction: there is no idea-genotype that helps to determine a distinguishable idea-phenotype. Given these assumptions, there is indeed a problem with the Lamarckian analogy: 'In order for sociocultural evolution to be Lamarckian in a metaphorical sense, conceptual genotypes must be distinguishable from conceptual phenotypes and the two must be related in appropriate ways' (Hull, 1982, p. 309).

Hence, for Hull in his 1982 paper, social evolution is in no sense Lamarckian. 'At the metaphorical level, however, a consistent story can be told for sociocultural evolution being

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[20] Many of the prominent and non-memetic statements that social evolution is 'Lamarckian' – such as those cited earlier in this essay – appeared after Hull's article. This may partly explain his one-sided concentration on the memetic version of social or cultural change, as prompted by Dawkins (1976).

Darwinian' (Hull, 1982, p. 311). Two years later, Hull (1984, p. lx) modified his position. At first he repeated his earlier argument that

> memes (or ideas) are the analogs of genes, not characters. Social learning is an example of the inheritance of acquired memes and *not* an example of the inheritance of acquired characters.

He then continued:

> Learning from experience is a better candidate for Lamarckian inheritance in sociocultural evolution. While baking a cake, a cook may make a mistake and use sour cream instead of sweet milk … he or she might alter the recipe accordingly. … When we learn from experience, conflicts between our ideas and their applications cause us to change our memes. If such applications count as part of our conceptual phenotype, then sociocultural evolution is in this sense Lamarckian. (*ibid.*)

This is a much more accommodating position than he took in his 1982 essay. He goes on, however, to express reasonable 'doubts as to whether the ability to learn from experience and pass on knowledge to others as a form of Lamarckian inheritance is all that informative.'

Hull's (1982, 1984) discussions of Lamarckism in the social domain are based on a narrow notion of culture as ideas or memes. Working in the same framework, Susan Blackmore (1999, pp. 61-2) rightly argues that whether memetic evolution is Lamarckian or not depends on whether, respectively, it is meme-as-behaviour or meme-as-instructions that is being copied. Copying-the-product brings the possibility of inheritance of acquired modifications to the outcome, whereas copying-the-instructions does not; any alterations in behaviour or outcome will not be passed on, because it is the instructions, not the outcomes, that are being replicated.

Blackmore then goes on to argue that the transmission of some memes involves the copying of behaviour by imitation while others involve the copying of instructions. Accordingly, her devotion to the concept of the meme leads her to an agnostic conclusion on the central issue here. In fact, Blackmore (1999, p. 62) concludes that 'the question "Is cultural evolution Lamarckian?" is best not asked.' The question is thus evaded. However, despite her wishes, the question will not go away. In fact, Blackmore is led to an evasive conclusion because she does not probe more deeply into the notion and mechanics of such terms as 'copying' and 'instruction'. Indeed, the concept of the meme is itself ambiguous. The literature on memetics suffers from some confusion concerning the casual use of 'information' or 'ideas' as the analogue of the gene.[21]

The casual identification of memes with ideas has a crucial defect. The nature of ideas and the causal mechanisms by which ideas lead to behaviour are not spelt out. It is simply assumed that one leads to the other. As a result, in a very real sense, memetics is insufficiently Darwinian: it does not identify the detailed, causal mechanisms involved.

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[21] Regrettably, the contemporary enthusiasm for 'memes' and 'memetics' far outstrips the achieved degree of clarity and consensus concerning such core categories. A meme has been variously described as a unit of cultural imitation (Dawkins, 1976), a unit of information residing in a brain (Dawkins, 1982), units of culturally transmitted instructions (Dennett, 1995), an influential and replicable unit of information in the mind (Brodie, 1996), actively contagious ideas (Lynch, 1996), or behavioural instructions stored in brains and passed on by imitation (Blackmore, 1999).

6. Habit as a Cultural Analogue to the Gene

An earlier tradition of evolutionary thinking in the social sciences saw the analogue of the gene in the social sphere as habits, rather than information or ideas. These were the pragmatist philosophers such as Charles Sanders Peirce, William James and John Dewey. American institutional economists such as Thorstein Veblen and John Commons built their ideas on these pragmatist foundations.

The pragmatists argued that the interpretation of information and the following of instructions depend crucially on ingrained habits of cognition, thought and behaviour. They are established through custom, practice and habit. Mere codifications or declarations are not enough. As Peirce (1878, p. 294) put it: 'the essence of belief is the establishment of habit'. Ingrained habits of thought and behaviour are necessary to unlock information, so that it can help form part of the motivational fuel for human agents.

Habits are defined as self-actuating propensities or dispositions to engage in particular responses or forms of action. All ideas and beliefs are built upon habits, but the reverse is not always true. Some habits arise from instincts, not ideas. Writers such as Plotkin (1994), Margolis (1994) Murphy (1993) have argued that habits are an essential foundation for even the most deliberative and rational thoughts.[22] In turn, acquired habits are founded upon inherited instincts. Accordingly, habit is a bridging concept between, on the one side, the biological and, on the other, the psychological and social domains.

As well as habit, the concept of tacit knowledge is an important section of this bridge. In a classic work, Michael Polanyi (1967) showed that ideas and deliberations depend on an essential, tacit substratum, which in principle cannot entirely be made explicit. This, in turn, rests on a lower substratum of inherited instinct. In many respects, Polanyi's argument that human deliberation must be placed in its evolutionary and physiological context is redolent of the earlier work of instinct psychologists such as James (1890) and the institutional economist Veblen (1899, 1914, 1919).[23] Although the modern literature on memetics makes a bold attempt to place ideas and culture in an evolutionary perspective, it can often be criticised for ignoring the tacit and habitual substratum of all ideas and beliefs. By Polanyi's canon, much of the literature on memetics is not evolutionary enough.

A habit is an adaptation. The capacity to acquire habits parallels the aptitude for learning. Acquired habits can be passed on by the imitation of the behaviour of others. Some have described this as 'Lamarckian'. But the acquisition of those habits is also ruled by Darwinian principles at the biological level. In any theory of cultural or memetic evolution, it is necessary to understand both the nature and the evolution of the unit of culture – or meme – itself. Otherwise, the meme or unit is left in explanatory mid-air. Given this, disentangling the Lamarckian and Darwinian features of social and biological evolution is no longer an option, nor a matter that can be avoided. It is essential to any theory of cultural or memetic evolution and for understanding how such a process relates to biological evolution.

Habits are not themselves behaviour, they are dispositions or propensities. They are thus closer by analogy to the genotype than to the phenotype. Accordingly there is a strong *prima*

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[22] See also the arguments in Hodgson (1997, 1998a).

[23] See also the discussion of evolutionary psychology in Plotkin (1994).

facie case for considering habits as units of cultural inheritance. We pursue this argument in the next section.

7. Darwinism and Lamarckism in Social Evolution

In discussing the mechanics of evolution, Dawkins (1982) makes a useful distinction between replicators and vehicles. A replicator is an entity of which copies are made. In the biotic world, an organism is not a replicator, because alterations in it are not passed on to subsequent generations. In evolutionary processes, individual or group selection is about the selection of vehicles. Gene selection is about the selection of replicators.

Similarly, Hull (1980, 1981, 1988) states that there are two ingredients involved in any form of selection at any level. For selection to occur, there must be both 'replicators' and 'interactors'. Hull's concept of replicator is identical to that of Dawkins. For both authors, a replicator is an entity that passes its structure directly in replication. However, Hull's concept of 'interactor' is slightly different from Dawkins's 'vehicle'. For Hull (1981, p. 31), interactors are 'entities that produce differential replication by means of directly interacting as cohesive wholes with their environments'. Hull's concept and definition is preferred here, because of its emphasis on interaction with the environment as well as the relative cohesiveness of the unit.

Dawkins and Hull rightly argue that much of the debate about units of selection confuses replicators wiith vehicles/interactors. In the biotic world, genes are the replicators and organisms are the vehicles/interactors. Using these terms, let us now recapitulate the basic differences between Darwinian and Lamarckian evolution.

Genes are like chunks of read-only memory, carrying coded instruction systems directing the growth and behavioural propensities of the organism. Genes are carried within the organism (that is, the 'vehicle' or 'interactor') of which they are a part. The organism produces the 'seeds' of new organisms, carrying copies of its own genes and the instructions within them. These genes program each seed to interact with its environment to help create a new organism from the seed.

Evolution is Darwinian in the narrow, Weismann sense if the genetic memory is strictly read-only, with the additional possibility of a small number of copying errors or mutations. Accordingly, there is little or no change in the genes of the seed compared to the genes of its parents, even if the adult organisms differ substantially as a result of growth in, and adaptation to, different environments. Changes occur through the natural selection of the fitter organisms in the prevailing environment.

Evolution is Lamarckian (in the sense of the acceptance of the possibility of the inheritance of acquired characters) if the genetic memory is not read-only, and can be modified to embody and characters acquired by the organism as it adapts to its environment. Changes in a population occur through natural selection of the fitter organisms in the prevailing environment, and through advantageous acquired adaptations being passed on via the genes to succeeding generations. As explained above, Lamarckism relies on a Darwinism as a prop to explain the adaptive behaviour of the organism in its environment and to overcome the problem that some acquired characters may be impairments.

Consider the two most important rival understandings of the 'unit of culture' or 'meme' addressed above: ideas versus habits. The plausibility of Lamarckian or Darwinian analogies will be considered in each case.

In the ‘culture as ideas’ version, ideas are regarded as coded instructions that somehow (in a manner that is not adequately explained) direct the growth and behaviour of the organism. Ideas are carried within the organism (that is, the ‘vehicle’ or ‘interactor’) of which they are a part. The human organism makes progeny through biological reproduction, and through socialisation, within the family or community, makes copies of some of its own ideas. Although ideas do not themselves ‘produce the organisms of which they are a part’ (Hull, 1982, p. 311), neither, at the literal and biological level, do the genes alone ‘produce the organisms of which they are a part’. Both ideas and genes can help to produce the organism, in interaction with its environment. Crucially, some ideas help human offspring to interact with their environment to create new organisms.

Is this version of cultural evolution a Lamarckian process? The answer depends primarily on whether ideas themselves are seen as modifiable as a result of behaviours and experiences not themselves encoded in prior ideas. In principle they are. Hence a Lamarckian possibility must be admitted. Although some ideas are difficult to modify and resistant to change, the possibility of Lamarckian alterations and consequent transmissions cannot be excluded. As Lamarckism is here defined in terms of the possibility, rather than the necessity, of acquired character inheritance, then this version of cultural evolution can be deemed Lamarckian.

Consider the second analogical possibility: habits as genes. Habits are acquired and imprinted instruction systems made up of instruction elements that direct the growth and behaviour of the organism. Habits are carried within the organism (that is, the ‘vehicle’) of which they are a part. The human organism make progeny through biological reproduction, and through imitation of behaviour, largely via socialisation within the family or community, it makes imperfect copies of some of its own habits in its progeny. These habits dispose each descendant to interact with its environment, eventually and possibly to create a new adult human organism from its seed. A Lamarckian possibility seems to emerge here because the replication of habits proceeds by the replication of behaviour, rather than of the ‘software’ of the habits themselves.

Although habits can be treated as analogous to genes, the mechanisms of replication and transmission are very different. Unlike the replication of DNA, habits do not directly make copies of themselves. Instead they replicate indirectly. They impel behaviour that is, in turn, consciously or unconsciously imitated by others. Eventually, this copied behaviour becomes rooted in the habits of the imitator, thus transmitting from individual to individual an imperfect copy of each habit by an indirect route.

Especially when transmitted in codified form, ideas may seem to replicate more directly than habits. Written documents can be readily copied. This may partly account for the popularity of the ideas-as-genes analogy. However, it rests on a positivist view of knowledge. Ideas do not replicate on their own. Ideas are replicated through the existence of common concepts and habits of thought.

It is largely through the strong propensity to imitate that habits are acquired. Clearly, what is required in the habits-as-genes version of cultural evolution is an explanation of the propensity to imitate or conform to the behaviour of others. One strong possibility is that the propensity to imitate is instinctive, and this instinct has itself evolved for efficacious reasons among social creatures (James, 1890; Veblen, 1899; D. Campbell, 1975; Boyd and Richerson, 1985). The habit-based version of cultural evolution may thus require a (Darwinian) biological explanation to be complete.

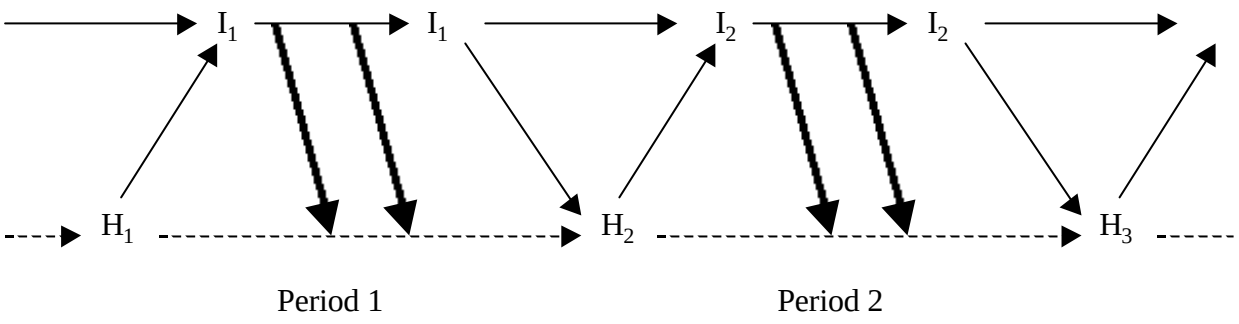

Figure 4: Lamarckian Social Evolution

Figure 4 illustrates the Lamarckian process of social evolution. The phenotypic level, from I_1 to I_2 – and so on – is the level of manifest behaviour and social institutions. Each 'period' can be seen as the lifetime of the individual. There is no close analogue of mating or sexual recombination. The twin-lined arrows show the effects of imitation, conformity and institutional constraints on the formation of new and changed habits. Although the picture is significantly different from both Figure 1 and Figure 2, it is Lamarckian in the sense illustrated in Figure 2, in that there is a downward effect from the higher to the lower level, in addition to the differential selection and survival within the population of institutions.

At this point a further important distinction must be established. There are two types of arguments against the notion of Lamarckian social evolution: theoretical or empirical. They are quite different. As we have seen, Hull (1982) rejects Lamarckian social evolution on theoretical grounds. According to him, the very concept is misleading and misconceived. In contrast, Michael Hannan and John Freeman (1989, pp. 22-3) argue that Lamarckian selection processes are unimportant in the population ecology of social organisations. In their view, selection takes places around deeply embedded rules. New adaptations modify organisations only at a higher and more superficial level. This is an empirical rather than a theoretical rejection of Lamarckism, because it is based on a factual claim concerning the evolution of organisations. Hannan and Freeman may be right or wrong, but in no case does their argument imply that Lamarckian social evolution is impossible in principle. This distinction between theoretical and empirical critiques of Lamarckian social evolution further complicates the picture.

Let us sum up. If an acquired characteristic can affect the social equivalent of a gene then social evolution can be described as Lamarckian. If ideas are analogous to genes then there is no compelling reason to assume that acquired characteristics change the programme of instructions in the idea. In which case Lamarckism would not apply. However, if behaviour is programmed by habits, and imitations of behaviour establish new habits, then acquired characteristics become incorporated in habits and Lamarckism may apply. These comparative points are summarised in Table 3.

	Replicator	Interactor or vehicle	Phenotype	Can there be Lamarckian inheritance?
Definition ⇒ Genotypic Units ⇓	An entity that passes its structure directly in replication.	Vehicle for replicator that, as a cohesive whole, interacts with its environment, resulting in differential replication.	Phenomenal form and behaviour of interactor/vehicle. Outcome of the interaction between genotype and environment.	Lamarckism involves inheritance from generation to generation of a character acquired by the interactor or vehicle.
Genes	Genes can replicate via sexual recombination, with occasional mutations.	An organism.[24]	The organism and its behaviour.	No – An acquired character cannot modify the replicator, due to the Weismann barrier.
Ideas	Ideas replicate via imitation of codifiable instructions, with possible mutation	An individual or group.[25]	The behaviour of individuals or groups.	It depends whether or not the ideas themselves can be modified as a result of behavioural experiences.
Habits	Habits replicate indirectly, via behavioural imitation, with possible mutation	An individual or institution.[26]	Individuals and institutions: their constitution and behaviour.	Yes – Because habits are replicated through behavioural imitation. Without direct replication of the habit itself, any acquired behaviour can modify the replicator.

Table 3: Is There Lamarckian Inheritance in Biotic or Social Evolution?

The upshot of this discussion is that there is a basis to describe social evolution as Lamarckian, in the sense of admitting the possibility of the inheritance of acquired characters. Research into the degree to which this possibility is realised is a matter of empirical enquiry. However, to repeat a general theoretical point made earlier, Lamarckism must always rely on Darwinism as a complement. Because it is an incomplete explanation of an evolutionary process, Lamarckism can never substitute for Darwinism. Any Lamarckian inheritance of acquired characteristics does not in any way, or at any level, undermine Darwinism.

[24] Possibly groups are also interactors or vehicles. This depends on the verdict on the group selection controversy. We do not need to go into this debate here. For discussions see Hodgson (1993), Sober (1984) and Sober and Wilson (1998). See also Laurent's introductory chapter in this volume.

[25] The admission of groups as interactors or vehicles is also controversial. Notably, Hayek (1988) emphasised groups and not simply individuals as units of selection.

[26] Note Veblen's (1899, p. 190) definition that 'institutions are, in substance, prevalent habits of thought with respect to particular relations and particular functions of the individual and of the community'.

According to the prevailing view in biology, biotic evolution is exclusively Darwinian: here the Weismann barrier rules out Lamarckism. Genetic assimilation in biology is Darwinian, but it involves at the population level something that looks like – but strictly is not – Lamarckism. Social evolution is Darwinian and can *also* be Lamarckian. At this level, the two dovetail together.

This leaves an outstanding problem that must be addressed and resolved in any Lamarckian framework. As noted above, Lamarckism lacks an explanation as to why there is a propensity to inherit improvements rather than impairments. Consider this problem in the social domain. It has been argued that habits are typically replicated by behavioural imitation. But imitation is not always slavish or automatic. People are selective; they make choices. Some behaviours will not be imitated because people will see them as deleterious, or whatever.

There is nothing in principle that rules out the imitation of detrimental behaviours. The Aztec and Mayan civilisations probably stagnated partly because of their appetite for human sacrifice. The modern military-industrial complex may yet lead to the nuclear or ecological ruin of our civilisation. Even in biology, there is nothing in evolution that suggests that the outcome is always beneficial or optimal (Hodgson, 1993). Once we escape from Panglossian conceptions of evolution then this possibility of decline or extermination can be admitted. But this is not the central issue here. Essentially, the Lamarckian problem of the inheritance of acquired impairments requires us to explain why people choose to imitate one set of behaviours rather than another. On this point, Lamarckism requires further theoretical explanation. It is not principally a matter of evaluation of outcome.

Any answer to this question must involve a theory of social agency. It must show the basis on which imitative choices are made, and the causal mechanisms involved. As noted above, Lamarckism does not itself provide such an explanation. Whether or not Darwinism is of help here is a matter of dispute. Evolutionary psychologists argue that it is (Plotkin, 1994). At a minimum, a theory of human agency must be consistent with our understanding of the biological evolution of the human agent. What is also clear is that Lamarckian theory does not provide a complete explanation of social evolution. The statement that social evolution is Lamarckian is thus generally inadequate rather than necessarily wrong. John Maynard Smith (1988, p. 61) has rightly pointed out: ‘Cultural evolution is commonly said to be Lamarckian rather than Darwinian, but there has been surprisingly little effort to work out a precise theory of its principles.’ Even at the most general and sketchy level, there are large gaps in the Lamarckian story that the social scientist is obliged to fill. Lamarckism, as such, may provide little help in filling them.[27]

8. Conclusion

Social evolution conforms to the basic Darwinian principles of variation, inheritance and selection. Consistent with the notion of ‘Universal Darwinism’, social systems embody the same fundamental Darwinian mechanisms as other complex, evolving systems. But also, social evolution has the additional and ‘Lamarckian’ feature of the inheritance of acquired characters. It is quite wrong, therefore, for evolutionary economists to distance themselves completely from either Darwinism or Lamarckism. In general, and broadly interpreted, the

[27] On this issue, see also Nightingale (unpublished).

two are compatible. But it also has to be recognised that the Darwinian principles are more fundamental, because Lamarckism itself always relies on Darwinian props.

Where biotic and social evolution differ is that we find a Weismann barrier in the former, but not obviously nor necessarily in the latter. But, as is well known, even Darwin himself was unaware of its existence.

Furthermore, discourses on 'Universal Darwinism' establish a sense of 'Darwinian' evolution that is more general than the specifics of genes, DNA and Weismann barriers. Accordingly, social scientists are mistaken if they reject the Darwinian analogy in the social domain for the reason that evolution therein is different from biological evolution. Of course it is different. But the analogy is relevant at a more general and basic level because of the 'universal' features of complex, evolving systems. D. Campbell (1965, p. 24) made the point some time ago that the appropriate analogy for social evolution is not biotic evolution, but the more general processes of evolution of complex systems 'for which organic evolution is but one instance'.[28] Such a general conception of evolution would be close to the broad notion of 'Darwinism' discussed above. The formulation of this conception would inevitably rely on biology, alongside other materials, for inspiration. Biological metaphors are useful materials, if used critically and unslavishly, with which to help construct such a more general theory.

The question is not whether social evolution is either Lamarckian or Darwinian but: 'Can social evolution be Lamarckian without contradicting Darwinism?' It has been argued here that the answer is 'yes'. Social evolution must be consistent with the presuppositions of 'Universal Darwinism' but these do not exclude the possibility of the inheritance of acquired characters *at the social level*.

This position should lead us to examine the causal details behind variation, inheritance and selection within societies. Of course, the precise details of social and genetic evolution will differ: habits are not nearly so durable as genes, the social context of selection is less stable, social imitation may prevail over random mutations of habit, the generative sources of variety in the social domain may not be so great as in the biotic, and so on. But nevertheless they are all subject to the most general principles of 'Darwinism' as defined here.

We have reached a position that was not earmarked among the options in Table 1. Biotic evolution is Darwinian. Social evolution can be Lamarckian; it is *also* Darwinian in some broad or 'universal' sense. This position is also consistent with Weismannian evolution at the biotic level. Apart from Veblen (1899, pp. 192, 248; 1904, p. 369 and n.) – who accepted the cultural inheritance of acquired traits but also the methodological superiority of Darwinism even in the social sciences – there have been very few proponents of this doctrinal combination hitherto.[29] If the argument in this paper is correct, this neglected possibility is the only one that is generally viable.

Having reached this conclusion, the remaining question is to consider, along with Hull (1984) and others, whether these labels are really useful, especially outside biology. Here the case for the use of 'Darwinism' is much stronger than 'Lamarckism', even in the social

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[28] In his fascinating book on cultural evolution, Durham (1991, p. 187) dubs this insight 'Campbell's Rule'. In a useful development of the argument, Cziko (1995) describes the acknowledgement of such a 'universal selection theory' as 'the Second Darwinian Revolution'.

[29] As exceptions, Boyd and Richerson (1985, 1992) social evolution as both Lamarckian and Darwinian. Some of the other researchers listed in Table 1 may take a similar view but it is not prominent.

context. Darwinism connotes a detailed causal examination of ongoing processes through time, based on the principles of variation, inheritance and selection. This is a much more substantial package than one that merely involves the possibility of acquired character inheritance. When we are talking of social evolution, not only is it important to insist that Lamarckism does not exclude the possibility of Darwinian ideas, but also – in the broad but powerful sense used here – Darwinism is a much more useful and substantial label even *at the social level*.

Furthermore, a 'post-Darwinian' social science, as envisaged by Veblen (1919), would involve a major paradigm shift. It would involve a detailed examination of causal processes and the resolution of the problem of intentionality and agency in the social context. In contrast, a Lamarckian theory of social evolution does not necessarily involve a departure from the existing menu. The challenge for social scientists, as it was for Veblen over 100 years ago, is to develop explanations of human institutions and social structures that are consistent with the Darwinian paradigm. This does not mean that Darwinism provides all the answers; but that it is a powerful theory of widespread consequences, which cannot be overthrown or ignored by social science.

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