# Biological and Cultural Evolution: Similar but Different

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Ever since *The Origin of Species*, but increasingly in recent years, parallels and analogies have been drawn between biological and cultural evolution, and methods, concepts, and theories that have been developed in evolutionary biology have been used to explain aspects of human cultural change (e.g., Muller 1870; Darwin [1871] 2003; Pitt-Rivers 1875; James 1880; Huxley 1955; Gerard et al. 1956; Campbell 1975; Cavalli-Sforza and Feldman 1981; Durham 1992; Henrich and McElreath 2003; Mesoudi et al. 2004, 2006; Boyd and Richerson 2005; Richerson and Boyd 2005). Many others, however, while accepting the need for some form of evolutionary approach to culture, have consistently emphasized the differences between biological and cultural evolution (e.g., Gabora 2004; Sperber and Claidière 2006; Tëmkin and Eldredge 2007), with these differences often presented as being problematic for existing evolutionary analyses of culture. Here I argue that this is largely a false debate, given that its protagonists agree on the majority of key points. Apparent disagreement may stem partly from simple differences in emphasis, and partly from the diversity of both biological and cultural evolutionary processes.

## Extreme Opposition to Cultural Evolution

First, it is important to distinguish between those who emphasize the differences between biological and cultural evolution, and those who oppose any kind of evolutionary approach to culture. The latter extreme position holds that cultural change does not resemble biological evolution in *any* respect, that no parallels can (or should) be drawn between biological evolution and cultural change, and consequently evolutionary theory can tell us nothing of use regarding how human culture operates. Although I would like to say that this is a fictitious "straw man" position, many cultural anthropologists do in fact hold this view (e.g., Ingold 2000, 2007). Although it is not the central message of this article, it should be noted that this position is both theoretically and empirically untenable. Both biological and cultural change entail the same fundamental processes of variation, selection, and inheritance/transmission, all of which can be empirically demonstrated in culture (Mesoudi et al. 2004, 2006). Methods developed to analyze biological evolution can be, and are being, used successfully to analyze cultural change, such as population-genetic-derived "gene-culture coevolution" models (Cavalli-Sforza and Feldman 1981; Boyd and Richerson 1985; Feldman and Laland 1996) and phylogenetic methods (Mace et al. 2005; Lipo et al. 2006). Concepts from evolutionary biology have proven useful in explaining many cultural phenomena, concepts such as drift (Neiman 1995; Bentley and Shennan 2003), runaway selection (Boyd and Richerson 1985), and adaptive landscapes (Boyd and Richerson 1992; Mesoudi and O'Brien in press).

## Reasonable Disagreement over Cultural Evolution

Here, however, I wish to focus on the more reasonable view that, while cultural change resembles biological evolution in important respects, there are also important differences between the two processes that warrant the suitable modification of biological methods and concepts, or the development of entirely novel analytical techniques. For example, Sperber and Claidière (2006) have argued that cultural transmission often differs from biological inheritance in ways that make Darwinian evolutionary approaches to culture problematic. They argue that, whereas biological inheritance, which acts to preserve or faithfully replicate information, can be clearly separated from "environmental factors," which determine the relative success of different genes, in cultural evolution no such distinction can be drawn. The processes of cultural transmission act not only to preserve information but also to transform that information, blurring the distinction between preservation and selection. Gabora (2004), meanwhile, has argued that,

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whereas biological replicators have two distinct and separate functions—to replicate themselves (using a "self-assembly" code) and to construct phenotypes (using a "self-description" code)—cultural entities do not contain distinct self-assembly and self-description instructions, because "in a cultural entity such as an idea or artifact, a self-assembly code is simply not present" (Gabora 2004: 132). Consequently, cultural entities cannot reproduce without some external interpretive mechanism (such as a brain), and in culture there is no clear distinction between replicator and interactor. Hence cultural evolution may involve the inheritance of acquired characteristics, making it "non-Darwinian" (Gabora 2005). Finally, Tëmkin and Eldredge (2007), Borgerhoff Mulder et al. (2006), and Nunn et al. (2006) have all argued that caution should be used when applying phylogenetic methods to cultural data because of the greater incidence of horizontal cross-lineage transmission in culture compared to biological evolution. This cross-lineage transmission may, they argue, distort the results of phylogenetic analyses, which assume treelike vertical transmission such as that typically generated by genetic inheritance.

Although each of these critics fully advocate evolutionary approaches to culture, they often use the above arguments to criticize existing work regarding cultural evolution, such as the many studies of cultural evolution reviewed by Mesoudi et al. (2006). For example, Sperber and Claidière (2006: 22) conclude that "merely adjusting the general model of Darwinian selection to describe cultural evolution involves idealizing away properties crucial to the proper explanation of the phenomena," while Tëmkin and Eldredge (2007: 151) argue that "cultural systems present greater complexity than their biological counterparts and call for the development of novel approaches to historical inference."

## A Dogmatic Straw Man

To a certain extent, these constitute arguments against a "straw man" position, one which holds that biological and cultural evolution are identical in every respect, and that biological methods can be applied unthinkingly and without modification to cultural cases. (Note that this "biology-identical-to-culture" straw man is different from the "biology-completely-different-to-culture" straw man discussed earlier; indeed, they are opposite extremes). None of the advocates of cultural evolution cited above hold this dogmatic "biology-identical-to-culture" position, and I am not aware of anyone who does. Advocates of cultural evolution have often incorporated novel processes that are not usually considered to be present in biological evolution into their analyses of culture. For example, gene-culture coevolution models have been developed with continuous, nondiscrete, and nongene-like traits, as well as with non-Mendelian blending inheritance and the Lamarckian-like inheritance of acquired characteristics (Boyd and Richerson 1985). Similarly, the practitioners of cultural phylogeny are well aware of the problem of horizontal transmission with respect to tree-like methods, and are actively testing the effect of horizontal cultural transmission in cultural datasets (Collard et al. 2006) and developing methods that explicitly incorporate horizontal cultural transmission (Forster and Toth 2003; Riede 2007). As Mesoudi et al. (2006: 346–347) stated, "Although we advocate the adoption of a number of methods and approaches developed within evolutionary biology, we do not advocate the slavish and dogmatic imitation of evolutionary biology. Cultural inheritance is undoubtedly different in many respects from biological inheritance, and novel mathematical analyses and empirical investigations into cultural dynamics that deviate from the biological case are necessary."

So let us be clear: No one believes that biological and cultural evolution are identical in every respect, and any such position should be considered a false "straw man" position. All parties accept that biological and cultural evolution are similar in key respects but also that they may differ in important ways, such as those raised by the critics in the previous section. Of course, on specific arguments there may be valid and genuine disagreements, and I leave it to the reader to examine the relevant papers cited above and judge whether this is the case and also the merits of each individual argument. In this brief article, however, I would like to propose that most of the time these differences are more a matter of emphasis than of substance, and differences between what are actually perfectly complementary approaches have been needlessly over-emphasised. In the following sections I suggest some possible reasons for this confusion.

## Differences in Emphasis

Much of the apparent disagreement might more properly be seen as simple differences in emphasis. Some (e.g., Mesoudi et al. 2004, 2006; Richerson and Boyd 2005) emphasize the similarities between biological and cultural evolution, attempt to apply biological theories, methods, and concepts to culture, and modify these methods where appropriate. Others (e.g., Sperber 1996; Gabora 2004; Sperber and Claidière 2006; Tëmkin and Eldredge 2007) focus on the differences from the outset and do not draw so explicitly on biological methods and theory. Both approaches have their advantages: the former ("similarities-first") approach allows us to draw on existing and established biological methods and concepts and provides greater common understanding with evolutionary biologists. The latter ("differences-first") approach prevents us from becoming too tied to underlying assumptions that may be inherent in biological methods but that may not apply to culture. The problem comes when these different approaches or emphases are misconstrued as constituting more fundamental theoretical differences. Everyone in fact seems to hold the same basic

position: that biological and cultural evolution are similar but different, and that this allows us to draw on biologically inspired methods and concepts where these are warranted, and suitably modify them or discard them when necessitated by specific cultural phenomena. The sole criteria for using methods derived from biology to analyze culture should be whether they can tell us something useful about a specific cultural phenomenon.

## Talking at Cross-Purposes

Some of this apparent disagreement might also stem from the fact that biological evolution is itself an incredibly diverse range of phenomena and processes, and that different researchers who use the same term (e.g., "biological evolution" or "Darwinian") may be referring to quite different aspects of that diversity. For example, Sperber and Claidière's (2006) point concerning the blurring of preservative and constructive processes in cultural evolution might be reasonable when we take a Dawkins-like replicator-centered view of biological evolution. However, when we consider such phenomena as genomic imprinting, where the details of inheritance (whether a gene comes from the father or from the mother) determine the form and expression of that inherited character, we find a similar blurring of preservative and constructive processes in biological evolution, and the distinction between biological and cultural evolution becomes less clear. Gabora's (2004) point concerning the lack of self-assembly codes in cultural entities is, again, well-taken when compared to many biological organisms, but may not hold if we take viruses as our biological exemplar, which similarly cannot self-replicate in the absence of a host, or, as Gabora herself notes, the evolution of early RNA-based life before DNA-based replication mechanisms evolved. Finally, Borgerhoff Mulder et al. (2006) and Tëmkin and Eldredge (2007) are correct to emphasize the importance of horizontal transmission in culture, but this is far less problematic if we take bacteria or plants, which frequently transmit genetic information across lineages (Doolittle 1999; Abbott et al. 2003; Rivera and Lake 2004), as our biological parallel rather than, say, mammals.

In general, a mammalian-focused, gene-centric view of biological evolution might serve as an inadequate model for certain aspects of cultural evolution, but a more diverse and, many would argue, more accurate version of biological evolution might well fit better (Mesoudi 2007). Recent conceptualizations of biological evolution (e.g., Carroll 2000; Odling Smee et al. 2003; West-Eberhard 2003; Jablonka and Lamb 2005) stress the horizontal transfer of genetic material across lineages (Doolittle 1999; Abbott et al. 2003; Rivera and Lake 2004), the Lamarckian-like inheritance of acquired characteristics through epigenetic processes (Jablonka and Lamb 1995), and the active role of the organism in shaping its own selective environment (Odling Smee et al. 2003). Recognizing the sheer diversity and complexity of biological evolutionary phenomena makes it easier to see useful parallels with cultural change.

In a related aside, it is ironic that Charles Darwin himself held a view that seems closer to this modern view of biological evolution, given that he accepted for biological evolution both blending inheritance and the inheritance of acquired variation (Darwin [1859] 1968, [1871] 2003). Hence describing cultural evolution as "non-Darwinian" (Gabora 2005) because it exhibits these features seems both historically and theoretically unwarranted. Ultimately this confusion may arise because, as Mayr (1982: 505–510) notes, the term "Darwinian" has multiple meanings, including common descent, gradualness, non-Lamarckian inheritance, natural selection, and population thinking, each of which may occur independently of the others. Again, then, I would like to suggest that any apparent disagreement here is more over labels and terminology than substantive theoretical issues.

Another source of problems may stem from a narrow view of cultural evolution. The term "culture" covers an extremely broad range of phenomena, from conservative, vertically transmitted traditions such as religious beliefs and means of subsistence (Ohmagari and Berkes 1997; Hewlett et al. 2002; VanPool et al. in press), to rapidly changing, horizontally transmitted fads and fashions such as tastes in pop music (Salganik et al. 2006; Bentley et al. 2007). Those aspects of culture that have been claimed to differ from biological evolution, such as the nature of transmission mechanisms (Sperber and Claidière 2006), the inheritance of acquired characteristics (Gabora 2004), and the greater prevalence of horizontal transmission (Tëmkin and Eldredge 2007) may well apply to some cultural phenomena, but not all. Given the diversity of both biological and cultural evolution, it is easy (and ultimately unproductive) to cherry-pick examples from in order to illustrate both how similar, or how different, are biological and cultural evolution. For example, while the cultural evolution of color terms may indeed be heavily influenced by the inbuilt biases of the perception system (Sperber and Claidière 2006), the cultural evolution of baby names appears to follow a drift-like pattern of change (Bentley et al. 2004) and shows no such systematic bias toward genetically specified focal forms. This is not intended to show that Sperber and Claidière are wrong; for the example they picked, color terms, they are quite right. The intended point is rather that the diversity of human culture makes such example picking somewhat unproductive.

## Modeling Cultural Evolution: No-One Said It Would Be Easy

Finally, it is also often claimed that cultural evolution is a complex or difficult subject to study, more so than biological evolution. This can be seen in the quote from Tëmkin and

Eldredge (2007) given above ("cultural systems present greater complexity than their biological counterparts"), and is also reflected in the title of Sperber and Claidière's (2006) article, "Why modeling cultural evolution is still such a challenge." I have three points to make here. First, blanket statements such as those claiming that cultural evolution is more "complex" than biological evolution are problematic given that it is unclear how one might define and compare the "complexity" of such broad and diverse phenomena as biological and cultural evolution, and such claims often appear to underestimate the immense complexity of biological evolution, as noted above. Second, we should not confuse evolutionary models that simplify reality with claims that reality is itself simple. Simple models are often used by biologists to understand biological phenomena, but this does not mean that the phenomena being modeled are simple. Rather, simple models are a good way to understand and explain complex real world phenomena. Similar simple models of cultural evolution also do not assume that cultural evolution in reality is simple, they are merely a useful tool for understanding that complex reality (McElreath and Boyd 2007). Third, as I am sure Sperber, Claidière, and others would agree, the fact that studying cultural evolution is challenging or difficult should be no reason not to study it. It may be challenging, but no one said it would be easy.

## Conclusion

The recent explosion in evolutionarily inspired studies of human culture (Mesoudi et al. 2006) potentially has huge scientific significance. Evolutionary theory can serve to synthesize and invigorate the social sciences just as it invigorated the biological sciences. It would be lamentable if this progress were hindered by arguments between different parties who in fact all agree on the most important points, and simply differ in emphasis or approach, or are mistakenly talking at cross-purposes.

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