Evolutionary social science beyond culture

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Abstract: Mesoudi et al.'s case can be improved by expanding to compelling selectionist explanations elsewhere in the social sciences and by seeing that natural selection is an instance of general selectionist process. Obstacles include the common use of extreme idealizations and optimality evidence, the copresence of nonselectionist social processes, and the fact that selectionist explanations often presuppose other kinds of social explanations.

Mesoudi et al. do a nice job of arguing for the usefulness of evolutionary models in the social sciences. In what follows, I suggest that they both understate their case and underestimate some of the problems that evolutionary models face in the social sciences.[1]

There are substantial bodies of social science research employing variation/selection/retention models that Mesoudi et al. do not cite, and some of that work is probably more rigorous than the work they do cite. One such area is organizational ecology in sociology (Hannan & Freeman 1989). This work develops large databases to show that different organizational strategies – generalist and specialist – cause differential survival and persistence of organizations in different kinds of environments (fine-grained, patchy, etc.). The arguments made parallel much of Endler's reasoning which Mesoudi et al. cite as a paradigm. In my view, this work is very well done and strongly supports Mesoudi et al.'s case.

Another important body of work comes from the enormous amount of work done in game theory in economics, political science, and history. The most obviously relevant is evolutionary game theory, which took its inspiration from Maynard Smith but has since been developed with considerably more mathematical rigor by economists (e.g., Gintis 2000). But even standard rational-choice game theory studies are relevant, since the Nash equilibrium they describe is unlikely to be reached by rational agents working out in their heads the relevant equilibrium but, instead, by a trial-and-error process where strategies are competing with each other and survive because of their payoffs. The work of Bates et al. (1998) is a particularly strong instance of this research program that combines detailed historical evidence with rigorous modeling.

Mesoudi et al. also understate their case at a theoretical level in several ways. First, they claim that borrowing of models and formalism across fields is unusual, when in fact it is standard practice in several areas. It is standard practice in physics, particularly in the search for what are called "universalities" (see Morgan & Morrison 1999; Batterman 2002). Applying the same formalism across multiple domains is a way of unifying different fields without reducing them to some more fundamental level. Advocates in evolutionary game theory explicitly invoke this rationale for their work (Gintis 2000).

Second, the authors' case could be made stronger by explicitly noting that evolutionary mechanisms can be described at various levels of abstraction in terms of details of the process. At the most abstract, selectionist mechanisms identify a causal effect of a character (strategy, practice, etc.) and show that having that effect causes the trait to persist. There are various ways to realize such causal processes, where direct copying and differential survival of genes is a paradigm case. But even in biology, literal copying is not essential (heritability can be achieved by other routes). So the common doubts about evolutionary accounts in the social sciences on the grounds that social selection is not analogous to the biological, miss the point. At one level, they are trivially analogous: As causal processes they are dynamical systems that we can trace through state space. The real question is whether there is differential survival and persistence, not whether there are social "genes." You can think the memes idea hopelessly fuzzy and still think there are good selectionist explanations. The work of Hannan and Freeman (1989) is a case in point.

I would argue that Mesoudi et al. miss such support for their case because they restrict their discussion to explanations of culture. Obviously there is much more to the social sciences than cultural anthropology or the study of ideas, beliefs, and so on. Moreover, there are good reasons to think that culture as information in people's heads sets up an unnecessarily difficult situation. There are multiple problems here. Identifying units is hard, even if it can sometimes be done. Moreover, there is much cognitive science and social science research that suggests that "information in the head" is the wrong way to think about culture. From cognitive science the support comes from the idea that mental process are essentially tied up with an external "scaffold" that makes information processing possible in the first place (Clark 1997). From the social sciences, the argument is that knowledge and culture are distributed across individuals and embedded in institutions, social practices, and organizations (Hutchins 1995). These facts explain both why the narrow notion of culture may be hard to work with and why the social sciences gravitate toward selection mechanisms of practices, institutions, organizations, and so on.

On the downside, there are four important obstacles that Mesoudi et al. do not much discuss. (1) On their view, formal models are an important route to progress and should be in the social sciences as well. However, at least one social science – economics – uses formal models extensively; models based on idealizations that will make your head swim. So there is the big question of when and where evolutionary game theory is telling us something about the world. (2) Selectionist explanations in the social sciences are often supported by optimality arguments rather than direct evidence of selection, and the value of these arguments is an open question. (3) Selectionist causal processes are not incompatible with other, nonselectionist processes acting at the same time, as Mesoudi et al. acknowledge in the case of drift. A norm, for example, may promote coordination and persist in part because it does so, but may also exist in part because it furthers the interests of the powerful. This is not an inherent problem, but it may be a common one in the social case and it definitely does complicate things. (4) It is unclear how far selectionist stories can go in the social sciences, because frequently a selectionist account (cf. Bates et al. 1998) takes as given the organizational and institutional structures that determine payoffs and possible strategies. Perhaps these situations describe a social parallel to the kind of issues that worry advocates of niche construction and developmental systems in biology, and so these ought to be issues the authors are sensitive to, given their own work in this area.

NOTES

1. The comments that follow are based on Kincaid (1996, Ch. 4; 2006)

Cultural evolution is more than neurological evolution

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Abstract: Advancing a general Darwinian framework to explain culture is an exciting endeavor. It requires that we face up to the challenge of identifying the specific components that are effective in replication processes in culture. This challenge includes the unsolved problem of explaining cultural inheritance, both at the level of individuals and at the level of social organizations and institutions.

https://doi.org/10.1017/S0140525X06339088 Published online by Cambridge University Press

The central argument of this stimulating article is the need for a unifying evolutionary framework to span the social and biological sciences. We endorse the argument and also agree with Mesoudi et al. – against the views of some of our fellow social scientists – that such an evolutionary framework must essentially be Darwinian.

Arguments against extending the theory of evolution from the biological to the social domain are quite common. The critique of such arguments by Mesoudi et al. is considerably weakened by their neglect of an immense literature in the social sciences, particularly in evolutionary economics (e.g., Nelson & Winter 1982; Young 1998) and organizational ecology (e.g., Hannan & Freeman 1989), where Darwinian themes are central. Their stance is further weakened by its neglect of the recent development of general Darwinian concepts of replication and selection in the theory and philosophy of biology (e.g., Frank 1998; Hull 2001; Knudsen 2004; Price 1995). Even though David Hull's work is mentioned, one of its central messages is neglected: An adequate definition of selection processes where variety is replenished demands consideration of the causal relation between interaction and replication.

This neglect involves much more than inadequate referencing: It means the underdevelopment of a number of crucial themes concerning the units and mechanisms of cultural inheritance, which are highly relevant for a generalized Darwinian framework in the social domain (Hodgson & Knudsen, in press b). For example, refined concepts of replication and selection are essential to identify the *causes* of cultural change. Mesoudi et al. do not provide an explicit definition of cultural selection processes. Consequently, they overlook the fact that some of the most important cultural (and biological) selection processes are defined in terms of differential replication caused by environmental interaction (Hull et al. 2001). Crucially, without an adequate definition of selection processes and an identification of the entities involved in these processes (the interactors and replicators), there is no way of knowing whether cultural changes are outcomes of selection processes, drift, or something else.

Mesoudi et al. skip over these issues by loosely describing culture as information and referring to the literature on memes. They defend the meme concept against the criticism that it is vague and inadequately defined, by explaining that the concept of the gene also has changing and different meanings. But this ducks the fact that we know much more about the emergence and replication of genetic combinations than we do about the emergence and replication of cultural combinations. Furthermore, the genotype-phenotype distinction (or replicator-interactor distinction) is well established in biology, but largely unacknowledged in the literature on memetics. The status of a meme as a genotype (replicator) or phenotype (interactor) remains unresolved – a testimony to its inadequate definition.

Biology has a well-developed theory of inheritance but there has been little progress in explaining cultural inheritance, a problem that involves identification and empirical verification of the specific components that are effective in the replication of cultural combinations. Neither do studies of cultural inheritance compare to the empirical studies that helped establish Mendel's laws in biology, nor do models of cultural inheritance command explanatory power similar to Mendel's laws. The way in which cultural components combine and replicate is presently unknown.

Apart from pointing to possible future advances in neuroscience, Mesoudi et al. largely ignore these problems and many recent attempts to resolve them. Their message for social scientists is to wait for the neuroscientists to situate cultural inheritance in the human brain, ignoring the significant contributions that some social scientists have already made to the theory of social evolution.

Indeed, the authors make matters worse by suggesting that in the social domain the genotype-phenotype distinction is "speculative" and possibly "unproductive." They go on to argue that further progress in this area will "also bear on whether cultural inheritance can be described as 'Darwinian' or 'Lamarckian'" (sect. 3.5.3, para. 5). Mesoudi et al. thus replicate the widespread but mistaken dichotomy that Darwinism and Lamarckism are mutually exclusive (Dawkins 1983; Hodgson & Knudsen, in press a), and provide an unwarranted excuse to dismiss the application of Darwinian principles in the social domain because of the common (but conceptually problematic; Hull 1982) assumption that acquired social characters can be inherited.

For a number of reasons, we need at least a preliminary understanding of cultural inheritance. First, we must explain continuity and stability in the social realm. Second, we must avoid the erroneous attribution of phenomena to absent or ineffective causes. It matters whether cultural changes are outcomes of selection processes, drift, or something else. Indeed, analyzing time-series of trait distributions without properly identifying the underlying causes is highly problematic; we must account for cultural inheritance, cultural fitness components, and more.

Inheritance at the level of individuals is very different from inheritance at the level of social organizations and institutions. For evolution to be truly social, it must involve social units. Social units are more than mere collections of individuals: They entail structured interaction. The idea that institutions or organizational routines can also be considered as organism-like or gene-like units in the evolutionary process has been around for more than 100 years (Hodgson 2004) but it is unmentioned by Mesoudi et al. Their vision is confined to "ideas" as evolutionary units, which they treat largely as neurological phenomena in the brain. It is necessary to consider social entities as well. Significantly, recent literature rehabilitates group selection in culture as a higher-level complement to individual-level selection (Henrich 2004a). Mesoudi et al. mention the issue of group selection once, but fail to elaborate on its significance. Institutions are mentioned only once in passing. There is no mention of social structure, one of the central concepts of the social sciences. They fail to elaborate on key differences between human and nonhuman culture, where the former involves a developed abstract language and capacities to attribute intentions and meanings (Bogdan 2000; Richerson & Boyd 2005; Tomasello 1999). This amounts to a neglect of critical aspects of culture that pose interesting challenges for the identification of the specific content of a general Darwinian framework applied to culture.

Overall, Mesoudi et al. make a commendable attempt to generalize Darwinism across the social and the biological sciences but engage inadequately with the nature of the social realm. Advancing a general Darwinian framework to explain culture is an exciting endeavor. It requires that we face up to the challenge of identifying the specific components that are effective in replication processes in culture. This challenge includes the unsolved problem of explaining cultural inheritance at the level of individuals, as well as social organizations and institutions. In essence, we submit that cultural evolution is more than neurological evolution. It involves social processes beyond those that can be situated in the human brain. An adequate theory of cultural evolution must therefore build on the combined efforts of neuroscience, psychology, and social science.

Cultural traits and cultural integration

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Abstract: Modern efforts to model cultural transmission have struggled to identify a unit of cultural transmission and particular transmission processes. Anthropologists of the early twentieth century discussed cultural traits as units of transmission equivalent to recipes (rules and ingredients) and identified integration as a signature process and effect of transmission.

https://doi.org/10.1017/S0140525X06339088 Published online by Cambridge University Press