Won't You Please Unite? Cultural Evolution and Kinds of Synthesis

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"Nothing in biology makes sense except in the light of evolution," Dobzhansky (1973) famously said. Today the phrase seems to have mutated to an all-encompassing slogan, spanning all areas of science and society: nothing at all seems to make sense except in the light of evolution. Almost everything that is able to change and does not change in a sudden and abrupt way is said to evolve. Political agendas, partnerships, economies, firms, behavioral patterns, and theories – they evolve. Stars, galaxies and the universe – they evolve too. Richard Dawkins (1983) has tried to convince scientists and the public that we need a 'universal Darwinism', while Donald Campbell (1997) and David Hull et al. (2001) defend a 'general selection theory'. Finally, since the so-called 'Modern Synthesis' has gone stale, a new grand synthesis has been announced, or called for, in expanding or (re-)widening the 'evolutionary synthesis' of the 1930s to 50s in various directions: towards neutral evolution, post-genomics, epigenetics, eco-evo-devo, and, last, but not least, towards culture.[1] 'Won't you please unite,' in the name of evolution, is the slogan that seems to be everywhere.

For this paper, the most important aspect of these calls for an extension of the Modern Synthesis is that they seem to rely on an implicit epistemic bias: a bias that favors unity rather than difference. It is this bias and the value of specific kinds of syntheses that will be central here. What kind of synthesis the Modern Synthesis actually was, and what or whom it left out, are issues that have since long been a matter of debate.[2] I won't say anything on these issues. I will rather address the kinds of synthesis that are involved when we extend the evolutionary synthesis towards culture. By using the history of theories of cultural evolution, I will then develop an outline for an argument against the bias towards synthesis.

After illustrating in section 1 in more detail how culture enters the evolutionary frame and what I mean by an epistemic bias towards synthesis, I shall present in section 2 a short history of theories of cultural evolution, followed by a review of two contemporary models: memetics and contemporary dual inheritance theories. In section 3, I will proceed to an analysis of four kinds of synthesis that usually enter the debate about the relationship between culture and evolution. I will distinguish between *(i) the integration of fields, (ii) the heuristic generation of interfields, (iii) expansion of validity,* and *(iv) the creation of a common frame of discourse or a 'big-picture'*. These will encompass the four most important kinds of synthesis involved in theories of cultural evolution. Central for the issue about the epistemic value of synthesis is the relation between (i) and (ii). I shall thus develop in section 4 some critical notes on the value of synthesis from a historical point of view.

The overall aim of the paper is also to introduce a new stance in discussions about cultural evolution. So far, theories of cultural evolution have been addresses from mainly two stances. There are those who take a skeptical stance (e.g. Fracchia and Lewontin 1999): this skeptical or critical stance focuses on conceptual analysis and on finding or denying at a theoretical level the perils of theories of cultural evolution. Yet, there are also those who are fed up with such debates

[1] See the short report in Whitfield (2008) or Blute (2008). For more details on the extended evolutionary synthesis see Pigliucci and Müller (forthcoming).

[2] See, for instance, Mayr and Provine (1980), Gould (1983), Bechtel (1986), Mayr (1993), Smocovitis (1996), Love (2009).

and simply test the theories in the wilderness of empirical research, i.e. in the different fields touched by theories of cultural evolution. They take the empirical stance. I will take a third, a reflective stance. Its aim is, first, to make the often implicit epistemic criteria explicit – criteria used for evaluating the analogy in the skeptical and the empirical stance. Its aim is, second, to compare how these criteria are connected to specific kinds of synthesis.

1. Three theoretical roles of culture and a bias towards synthesis

In principle, culture can enter an all-encompassing evolutionary perspective in three different ways. First of all, culture can be considered as a factor in the development of individuals, influencing the phenotype and co-determining with other factors the selection pressures of individual organisms. The disciplinary contexts in which this role is important include developmental psychology, other fields of psychology, educational research, and the like.

Second, culture can be taken as a separate system (or process) of heredity and evolution. Cultural change is then treated as an evolutionary process in its own right, i.e. as cultural evolution occurring in addition to biological evolution of organisms and biological species. If culture occupies this theoretical role, then culture is not a factor (part of the explanans of development) but an explanandum, i.e. a phenomenon or subject matter that one wants to explain. The disciplines that have culture as an explanandum in this sense are cultural anthropology, sociology, economics, history, and the like.

Third, culture can appear as a phylogenetic factor in the overall system (or process) of evolution of organisms, which have a body, a mind as well as a culture. As a factor in the phylogenetic evolution of organisms, culture changes not only the phenotype, but also the environment and can lead to effects known as co-evolution, niche construction, or the so-called Baldwin effect etc.[3]

Here, the second role will be in focus. It is the one that is most interesting if forms of synthesis are at issue, since, historically, the concept of cultural evolution has been involved in two diametrically opposed initiatives: one opposing a specific kind of synthesis at the beginning of the 20th century, and one furthering a specific kind of synthesis today. Both initiatives – the one for separation and the one for unity – led to new important insights, as this paper aims to illustrate.

One of the reasons, however, why unity is often favored is that it is thought to be fruitful in the sense of leading to new insights, theories, or even fields. That this does not exclude that separation can be equally fruitful should be evident, but might well be ignored in discussing synthesizing social sciences and humanities with evolutionary thinking. The close coupling of the proliferation of disciplines in the last 200 years, and the accelerated change in the sciences since then, points already against a bias towards synthesis. Separation has fruitful potential. In this paper, however, I will look at one specific example: theories of cultural change that use concepts from biology to understand culture can be maintained with a clear separationist stance and can be fruitful nonetheless. In other words, the claim is that a separationist stance can also lead to important novel scientific fruits to harvest for scientific change. To use an analogy myself: the evolutionary synthesis showed us that 'geographic' isolation is a creative factor in the evolution of species and this paper aims to provide a first step towards a more balanced and contextualised view of the value of synthesis: *isolation and plurality can equally be creative, not only in nature, but also in science.*

To reach this balanced and contextualised point of view the kinds of synthesis involved in the analogical transfer of the concept of evolution to the phenomenon of culture have to be clearly

[3] For an analysis of the origin of these three roles and a more detailed account of them see Kronfeldner (2009).

delineated. Let me first point to the kinds of unities that are not at issue. An analogical transfer of evolutionary ideas to culture is neither concerned with, nor excludes hierarchical kinds of a general 'unity of science'. At issue here is not the question of whether culture is part of a compositional hierarchy of entities, with the entities of physics as the most fundamental ones (*ontological unity of science*). Theories of cultural evolution are simply not concerned with this kind of synthesis, even though they are compatible with a compositional hierarchy and the related unity of science. Similarly, at issue is not whether the theory of cultural evolution can be reduced to the theory of biological evolution (*reductive unity of scientific theories*). Most of the time, the question of the unity of the *scientific method* is also not at issue, except for the discussion about quantitative versus qualitative methods in social sciences and humanities.[4] Thus, we do not have to worry about these traditional, complicated, and in history and philosophy of science extensively treated issues of ontological, theory-reductive, or methodological unity of science. With this in mind we can proceed to discuss other kinds of synthesis. But before we can do so, a clearer picture about theories of cultural evolution has to be outlined.

2. Cultural evolution from Darwin till today

If we extend evolutionary theory to culture as a separate system of heredity and change, we apply the Darwinian 'paradigm' to culture in an analogous or formal manner. Darwinian analogical reasoning was used already back in the days of Darwin. Charles Darwin (1859; 1871) himself spoke of the evolution of languages: they develop and differentiate in a similar fashion as biological species. At the end of first edition of *"On the Origin of Species"* he then wrote: "In the distant future I see open fields for far more important researches. Psychology will be based on a new foundation, that of the necessary acquirement of each mental power and capacity by gradation. Light will be thrown on the origin of man and his history" (Darwin 1859, p. 487). Yet, with 'distant' and 'important' he did not mean fellows like us at the beginning of the 21st century. This becomes evident from the edition of 1877, where he decided to be a bit more specific. The same passage now reads: "In the future I see open fields for far more important researches. Psychology will be based on THE foundation already well laid by Mr. Herbert Spencer, that of the necessary acquirement of each mental power and capacity by gradation. MUCH light will be thrown on the origin of man and his history." (Darwin 1876, p. 427; Emph. added)

Herbert Spencer applied evolutionary thinking to almost everything, including culture, society, and mind.[5] The latter is often ignored since his social Darwinism has dominated the reception of his philosophy. William James (1880) also wrote in his famous essay on *Great Men and Their Environment*: "A remarkable parallel, which I think has never been noticed, obtains between the facts of social evolution on the one hand, and of zoological evolution as expounded by Mr. Darwin on the other" (James 1880, p. 163). But according to William James, Spencer was still too much of a Lamarckian, which he was. He therefore ends up, James complains, with false pictures about mind and culture. For James, Spencer was not a Darwinist since the decisive part of Darwin's theory was that it allowed portraying humans as free in the following sense. Humans are not just reacting to the world, as in a Lamarckian picture, which he treated as analogical to theories of associationist learning; on the contrary, humans freely create ideas and select them afterwards. After having ideas freely generated in the mind, ideas are tested against the world. Some survive the test, some die. Since it is the accumulation of free acts of individuals, the same holds for

[4] See for instance Mesoudi (2007) for defending theories of cultural evolution because they allow for quantitative approaches. See Fracchia and Lewontin (1999) for a critique of this as narrow-minded scientism.

[5] See, for instance, Spencer (1898).

cultural change (i.e. history). In a nutshell, Darwinism applied to mind and culture meant for James freedom, in strong contrast to most people at the end of the 19th century. But it could do so only since he applied evolutionary theory in a strictly analogous manner.

Then Alfred L. Kroeber (1917) came along and used Weismann's Neo-Darwinism, in a similar manner as James used Darwin. But while James focused on the historical importance of the individual and on the independence of the human mind from sense experience and thus from the 'law of association,' Kroeber focused on the independence of cultural change from biological evolution. Yet, he used, as James did, Darwinian theorizing to do so. The point of view he defended was that culture is a phenomenon *sui generis,* and comes 'on top' of biological evolution, since it is, as biological evolution, a system of heredity and change in its own right. And most importantly, he claimed that we could see this parallel only if we take Neo-Darwinism seriously and that meant: to abandon any belief in Lamarckian inheritance of acquired characteristics. I will say more on his case below.

Cziko (1995, p. 134) refers to Alexander Bain as the first one stressing an analogy between biological evolution and scientific discoveries as early as 1868. For Bain the key about scientific discoveries was trial-and-error, which was interpreted as analogous to the process of biological evolution as Darwin described it. Augustus Pitt-Rivers, Thomas H. Huxley, James M. Baldwin, Chancey Wright, Paul Souriau, and Ernst Mach, and certainly many others are also on the list of having drawn an analogy between evolution and the development of human culture and mind.[6]

As indicated above, today evolution is everywhere. There is "evolutionary-" epistemology, game theory, computing, medicine, ethics, aesthetics, economy, psychology, linguistics, pedagogy, evolutionary approaches to creativity, etc., and, last but not least, theories of cultural evolution – the heirs of James' and Kroeber's approaches, focusing on human history or cultural change and using evolutionary theory to understand it. Even if all these different approaches use evolutionary theory, they all try to describe and explain different phenomena, cultural change is only one of them.[7] Furthermore, even if they want to describe and explain the same phenomenon, they might still pick different elements from contemporary Darwinism or interpret the elements in different manner. One of the differently interpreted elements is the concept of heredity.

Today, there are two schools that dominate the analogical applications of evolutionary theory to cultural change: memetics and dual inheritance theories. The standard reference point of both are two classical papers of Donald T. Campbell (1960; 1965): *Blind Variation and Selective Retention in Creative Thought as in Other Knowledge Process* and *Variation and Selective Retention in Socio-Cultural Evolution*. Before I describe how memetics and dual inheritance theories differ, let me summarize why they are labeled 'Darwinian' and why the label is denied to others. Darwinian models are usually taken to assume specific 'mechanisms' of change, e.g. selection processes, and try to derive macro-patterns from these.[8] They do not refer to progressive stages. They are variational and populational rather than transformational or essentialist.[9] They rely on a tripartite model for the mechanism of natural selection: variation – differential reproduction – heredity.[10] Finally, they do allow for neutral change (e.g. drift) and for multi-level selection (e.g. cultural group selection).[11] All these points are common characteristics shared by Darwinian approaches

[6] See Campbell (1960) or Cziko (1995, pp. 134-140).

[7] For a review of the diversity of evolutionary approaches in the social sciences see O'Malley (2007).

[8] See Campbell (1965) and Mesoudi (2007).

[9] See Mayr (1959), Lewontin (1983), Kronfeldner (2007b), and Mesoudi (2007) on this issue.

[10] See Lewontin (1970) and Fracchia and Lewontin (1999).

[11] See Mesoudi (2007) for references on drift and Richerson and Boyd (2005) for cultural group selection.

to cultural evolution.[12] Yet, there are also great differences between them: first, with respect to heredity, and second with respect to what the theory is meant to explain.

Memetics relies on the postulate of so-called 'memes,' the alleged basic building blocks of culture, which are considered as having analogous properties and causal roles as genes in biological evolution. Richard Dawkins introduced this idea in his book *The Selfish Gene* (1976). It was mainly Daniel C. Dennett[13] and David Hull,[14] who backed up memetics with philosophical details. Others followed the idea with varying sophistication and emphasis.[15] For memetics, cultural items are, like genes, replicators and it is the fitness of the meme itself that accounts for the diffusion of cultural items. As evolutionary biology is reducible to the replication of genes, cultural diffusion is reducible to the replication of 'memes' – a process that is guided by the fitness of genes or memes alone. Organisms, in the case of genes, and minds, in the case of memes, are mere hosts that are built by these replicators. They are mere consequences of the replicative power of memes. We can eliminate mind in our account of cultural change – if not ontologically, then as an explanatory important unit. Susan Blackmore is, besides Dennett, most famous for defending this seemingly radical thesis. At the end of her book, *The Meme Machine (1999)* she writes:

> This is the power and beauty of memetics: it allows us to see how human lives, language, and creativity all come about through the same kind of replicator power as did design in the biological world. The replicators are different, but the process is the same. We once thought that biological design needed a creator, but we now know that natural selection can do all the designing on its own. Similarly, we once thought that human design required a conscious designer inside us, but we now know that memetic selection can do it on its own. […] If we take memetics seriously there is no room for anyone or anything to jump into the evolutionary process and stop it, direct it, or do anything to it. There is just the evolutionary process of genes and memes playing itself endlessly out – and no one watching (Blackmore 1999, p. 242).

In a nutshell, according to memeticists, the unit that plays the main *causal role* in cultural change, and hence an important explanatory role, is not the human person, it is memes, which are thought to be 'selfish replicators' like genes. The explanatory goal is the diffusion of cultural units in a population of humans (or even the nature of mind). The time frame for the first explanandum is rather limited, as Gayon (2005) has stressed: it is about 100 years.

In parallel to memetics, Luigi L. Cavalli-Sforza and Marc W. Feldman (1981), Robert Boyd and Peter Richerson (1985, 2005), and William H. Durham (1991) developed the philosophical frame of Campbell into *dual inheritance theories*, quantitative theories of cultural change. The literature on this field, also called gene-culture co-evolution, has exploded in the last couple of years. It finally was widened towards multiple inheritance views, claiming that we actually have at least four different systems of heredity interacting in the evolution of organisms: genetic, epigenetic, behavioral, and cultural heredity (Jablonka and Lamb 2005). It is a tradition that now also includes detailed phylogenetic applications of the Darwinian frame (Gray et al. forthcoming). Cultural evolution is then a part of the overall process of evolution, relying on a specific channel of heredity between organisms. All the approaches here summarized under the label 'multiple inheritance theories' use Darwinism in the sense that they try to describe and explain diffusion processes and

[12] Mesoudi (2007) states that a further common characteristic is that they allow for the inheritance of acquired characteristics. See Kronfeldner (2007b), claiming that it is either wrong, misleading, or tautological to say that cultural evolution relies on the inheritance of acquired characteristics.

[13] Dennett (1995; 2001; 2002).

[14] Hull (1982; 2000).

[15] E. g. Brodie (1995), Lynch (1996), Balkin (1998), Aunger (2002).

the consequent higher frequency of the cultural items, either in a given population or over phylogenetic, i.e. historical time. Their explanatory goals are mainly two-fold: they either try to uncover cultural changes itself, e.g. the effects of different transmission patterns on the pattern of diffusion; or they try to study how culture coevolves with biology, i.e. how they influence each other. Tracking the phylogeny of cultures and studying the co-evolution of culture and biology includes a much longer time frame than the one for studying cultural change.

Let me refer to three examples to illustrate that these approaches let to some interesting new hypotheses. They try to show for instance in a statistical manner how biologically maladaptive behavior can evolve on the basis of specific cultural transmission settings. Preferences for reduced family size, for instance, are maladaptive in the biological sense, since they reduce the reproductive output. These preferences can nonetheless spread in a population, if the transmission of these preferences is not vertically, between parents and children, but horizontally, between peers and unrelated people. Given horizontal transmission, biologically maladaptive traits can spread. Furthermore, they try to show that different modes of learning (individual learning, prestige bias, conformist bias, success bias, etc., all settings analogous to the biological mechanisms of heredity) lead to different macro-evolutionary patterns. Mesoudi (2007) refers to the following as an example. Bettinger and Eerkens (1999) studied variation in projectile point designs from the prehistoric Great Basin.

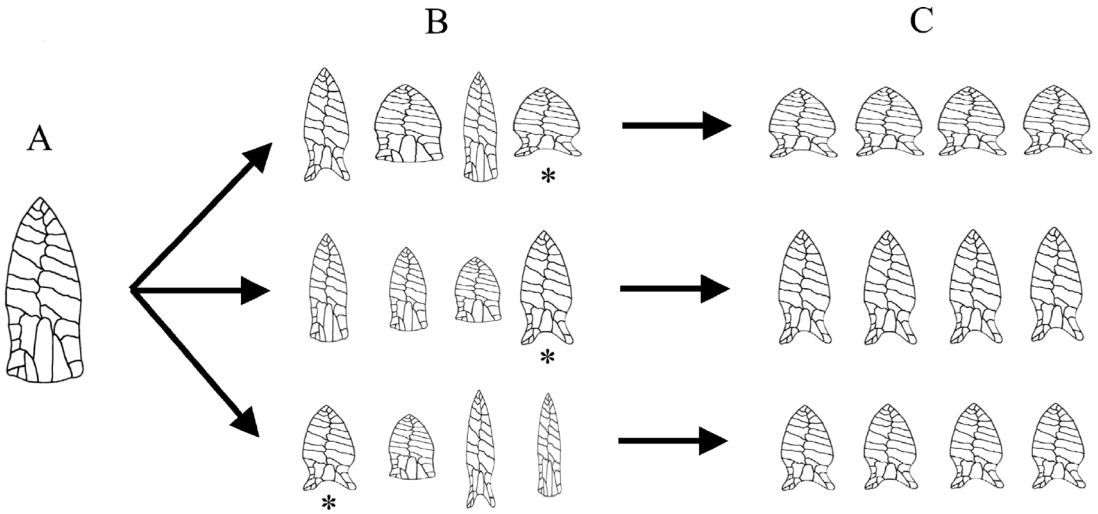

Figure 1 (from Mesoudi 2007, p. 270).

Mesoudi summarizes their account, depicted in Figure 1, as follows: "An ancestral point design (A) spreads to different groups (B) where it diverges due to idiosyncratic individual learning. In C, indirectly biased cultural transmission causes the single point design used by the most successful hunter (marked with a * in B) to spread within each group. According to Bettinger and Eerkens, prehistoric California resembled B, where point attributes correlated poorly with one another, while prehistoric Nevada resembled C, where point attribute inter-correlations were high. This scenario (A→B→C) was simulated experimentally by Mesoudi and O'Brien (in press)."

Finally, dual inheritance theories often argue that culture is a phylogenetic factor in the evolution of organism. Lactose intolerance is the standard example (Richerson and Boyd 2005; Durham 1991). Since some people in some areas relied in the past heavily on dairy farming they now have genes that allows them to digest cow milk even as adults, which fosters dairy farming. In turn, this fosters the selection of genes for milk digestion, etc. This is co-evolution, where we have

nature via culture and culture via nature, not only ontogenetically but also phylogenetically, even though there are no 'genes for' dairy farming. The important consequence that can be derived from such examples of co-evolution is that it revises our dualistic picture about the evolutionary relationship between nature and culture. We learned to believe that humans are distinct because of culture, and that we (as a species) grew out of nature and into culture. We don't. We evolved to our nature via culture and we got our culture via our nature. That is an important message harvested from the 'tree of sciences', (if it is a tree at all), made possible by mutual interaction between the strong but flexible branches of science, i.e. made possible by the disciplinary structure of science allowing for interdisciplinary interaction.

Let me stress some of the differences between memetics and dual inheritance theories. Although dual inheritance approaches rely on the idea that culture is a diffusion process that is analogous to a selection process in nature, they deny that there is a strong analogy between cultural change and biological evolution. According to these approaches, cultural items do not replicate, the origination of novelty is not 'blind' as in biological evolution, and the selection is driven by more-or-less rational decisions of individuals. They also deny that memes have explanatory priority over individuals. In other words, the model is not built on a narrow 'meme selectionism'. They insist that the fate of cultural items is determined by a set of multiple factors, including the more-or-less rational decisions of human persons and the structure of the social system, which are not memes. Nonetheless, they insist on the fruitfulness of using the evolutionary paradigm for describing cultural change.

Thus, the question remains: what do we gain by synthesizing the now often called 'two cultures'[16] of science by using an analogy between biological evolution and cultural change?

3. Evaluating an analogy and four kinds of synthesis

Analogies never state similarities in all respects, i.e., a total equivalence of the base and the target of the analogy. An analogy states similarity in dissimilars. We can therefore not condemn an analogy as ill guided, wrong or fruitless simply because there are differences between the base and the target of the analogy, e.g. between cultural heredity and biological heredity. Yet, somehow we have to evaluate the analogy, but how? I suggest using some of the standard epistemic virtues or values discussed in philosophy of science to do so. These values will, finally, also guide us to four kinds of synthesis that can be achieved by using the analogy.

If an analogy is to be a good one, then relevant similarities (e.g. those stressed by the analogy) must exist. That is, the resulting theory must fulfill the standard of empirical adequacy. If the theory claims that culture consists of replicators and this is wrong, which I think it is, than the analogy is empirically inadequate. If it is true that culture is variational, which I think it is, then it is empirically adequate to claim that cultural evolution is a selection process as biological evolution is.[17]

The resulting theory should also be internally and externally consistent, as any theory. External consistency is especially important since it asks for *integration* of insights from other disciplines or fields. External consistency leads to integration and provides us thus with the first kind of synthesis that we have to take into account, if we want to understand why people want to use the analogy. Integration is a kind of synthesis often asked for by stakeholders at the crossroad of biology and social sciences. An example will follow below.

[16] With reference to Snow (1969).

[17] See Kronfeldner (2007a) for detailed arguments in that direction.

An analogy should furthermore lead to a theory that is explanatorily adequate. Explanatory adequacy obtains, if an explanation is not tautological and if it is competitive, i.e. if it is offered at a level of 'depth' of explanation that is standard in a specific domain occupied with a specific subject matter. Large parts of psychology, for instance, have reached a 'depth' of explanation that includes cognitive mechanisms and not merely beliefs and desires. Yet, most of them have not reached the level of neuronal patterns. Yet, the problem for memetics is that it not even reaches the standard of cognitive mechanisms. If meme replication, for instance, simply says that people learn from each other, then replication is not a concept offered at the level of cognitive mechanisms and the claim that culture rests on replication is thus explanatorily fruitless, i.e. trivial.[18]

An analogy should also be *heuristically fruitful*, i.e. leading to new descriptions, explanations, or at least new problems. Heuristic fruitfulness is, as external consistency, an important value, especially for this study, since it is, as external consistency, connected to a kind of synthesis between academic disciplines or fields. The three examples of new hypotheses generated by the co-evolutionary program mentioned above indicate that dual inheritance theories can fulfill this standard. In addition, above I presented co-evolutionary explanations, such as the explanation of lactose intolerance, as creating not only new insights but a whole new theory for an area belonging neither to natural sciences nor to social sciences alone. In other words, co-evolutionary theory is an interfield theory.[19] It creates or defines new problems or even fields of problems. This is more than integration, which is crossing boundaries between disciplines in order to get resources for a given problem. Coevolutionary theories thus established what I would like to call a *heuristic synthesis*: the heuristic establishment of new problems or even new interfields.

In classical accounts of epistemic values, discussed in post-Kuhnian approaches to confirmation theory, scope is also on the list of virtues for theories. Yet, an increased scope can refer to different issues. One is expansion, i.e. increasing the validity of a theory by *expanding its range of application*. This is connected to the quest for a reductive unity of science: you reduce a theory if you show that you can derive it from a more general theory, i.e. if this general theory is shown to apply to the to-be-reduced part of the 'world'. One example should suffice: when you try to reduce mental properties to physical ones, you try to show that physical laws hold for this part of the world in the same way as they hold for stones. Fracchia and Lewontin (1999, p. 54) are thus very likely correct in stating that "the demand for a theory of cultural evolution also arose from among the natural sciences, particularly among evolutionary biologists for whom the ability to explain all properties of all living organism, using a common evolutionary mechanism, is the ultimate test of the validity of their science." Even though one would have to support this claim with detailed case studies, I think that the motivation biologists have for applying evolutionary theory outside of the realm of biology is very likely often driven by the epistemic value of increasing scope. Richard Dawkins (1982, p. 112), for instance, justified his idea that culture is governed by 'memes' along these lines. He did so after he was severely criticized for the idea as not being a fruitful theory of culture. In a nutshell, his reply to the critique was that what he intended was not a theory of culture but rather to illustrate the scope of his concept of replication, which secures the foundation of his gene selectionism.

Others, however, might appreciate theories of cultural evolution for a different reason connected to scope. Philosophers, and certainly many others as well, often watch out for a common frame of discourse or a 'big picture'. Thus, they want, for instance, a *'Menschenbild'*, a unified image of man, which none of the specialized sciences can provide anymore from its own sources alone. The current specialization of sciences and the consequent division of labor between them is increasingly judged to be devastating for any such unified understanding of being human. With

[18] See Kronfeldner (2007a) for a detailed critique along these lines.

[19] The term interfield theory stems from a paper from Darden and Maull (1977).

the disciplinary structure of science, human life has been stratified. But for practical or existential reasons, we still strive for a unified picture of ourselves. Thus, a *'Menschenbild'* has to be synthesized out of the bits and pieces offered by the multitude of sciences. Consequently, concepts that allow knitting the bits and pieces together are very likely much welcome, even though they might not do any explanatory or heuristically fruitful work, except the one that it allows the knitting together of the bits and pieces. One of the reasons why David Hull (2000, pp. 43, 46) appreciated memetics is that it allows us to have a common language for constructing a big picture.[20] More examples could certainly be named. Yet the intention here is simply that this *can* be the motivation beyond bringing culture and evolution together. It is an important motivation since it provides us with our fourth kind of synthesis: *big-picture-synthesis*.

Four kinds of unity thus emerged from our analysis. They are: (i) *integration,* (ii) *heuristic synthesis,* (iii) *increasing scope,* and (iv) *big-picture-synthesis*. I will not use them to discuss the value of specific version of the analogy between cultural change and human history. Only the following will be important. Given that resistance to the analogy between culture and evolution relies on one or more of the values above, disagreement about the analogy probably also depends on the choice of the value. The analogy might turn out to be justifiably given one value and might fail to do so given another one. One example has to suffice. In their well-known critique of theories of cultural evolution, Fracchia and Lewontin (1999, pp. 67-78) complain, besides other things, that integration or expansion is gained at the cost of explanatory depth, a price they are not prepared to pay. "[B]ecause cultural evolutionary theories are based on a unitary, transhistorical principle, they produce explanations that are too broad to be either falsifiable or explanatory." (ibd., p. 76) Yet, they ignore that others might have reasons for paying that price or that the theory might be heuristically fruitful with respect to specific hypotheses and a good one on that ground. Still others, in turn, might wrongly correlate integration with heuristic fruitfulness and ignore that resisting integration can also be fruitful. They would ignore or wrongly assume a certain relation between the disparate epistemic values.

What I shall do in the remaining is to show that integration and heuristic synthesis – and the respective epistemic values supporting them – are distinct and independent: one can occur without the other. There can be integration that fails to be heuristically fruitful and there can be heuristic synthesis (generation of new ideas, fields, etc.) without integration, i.e. on the basis of separation. Only the latter will be illustrated. There are cases where it is more productive, in the service of scientific change, to batten down the hatches of ones scientific horizon. Sometimes it is fruitful to separate one from other perspectives and to ignore, for specific goals, that, well, everything in reality hangs together and nothing is thus autonomous.

4. Integration, separation and the fruits from the tree of sciences

I treat the following views as representative for a widespread bias in current debates about evolution and culture. Outlining the reasons why social scientists have to listen to the 'insights' of evolutionary psychology, Barkow, Cosmides and Tooby write:

> Conceptual integration generates this powerful growth in knowledge because it allows investigators to use knowledge developed in other disciplines to solve problems in their own. The causal links between fields create anchor points that allow one to bridge theoretical or methodological gaps that one's own field may not be able to span. This can happen in the behavioral and social sciences, just as it has happened in the natural sciences. Evidence about cultural variation can help cognitive scientists decide between competing models of universal cognitive processes; evidence about the structure of memory and attention can help cultural

[20] See also Geertz (1966) against the 'stratificatory' account of man.

> anthropologists understand why some myths and ideas spread quickly and easily while others do not […] At present, crossing such boundaries is often met with xenophobia, packaged in the form of such familiar accusations as 'intellectual imperialism' or 'reductionism.' But by calling for conceptual integration in the behavioral and social sciences we are neither calling for reductionism nor for the conquest and assimilation of one field by another. Theories of selection pressures are not theories of psychology. And theories of psychology are not theories of culture; they are theories about some of the causal mechanisms that shape cultural forms. […] conceptual integration simply involves learning to accept with grace the irreplaceable intellectual gifts offered by other fields. To do this, one must accept the tenet of mutual consistency among disciplines, with its allied recognition that there are causal links between them. Compatibility is a misleadingly modest requirement, however for it is an absolute one. Consequently, accepting these gifts is not always easy, because other fields may indeed bring the unwelcome news that favored theories have problems that require reformulation. (Barkow, Cosmides and Tooby 1992, pp. 12-13)

As indicated above, nobody involved in debates about evolution and culture asks for reductionism in the sense that we should give up the disciplinary structure of science. The disciplinary structure of science developed hand in hand with Darwin's brainchild and stands today as a bulwark in the way of any imperialist, reductionist unification and does so for a reason. But, as said, Barkow, Cosmides and Tooby do not ask for this, they ask for integration, i.e. external consistency.

Describing the way scholars and scientists from different backgrounds discussed the biological foundation of human culture, Peter Weingart reports:

> […] we experienced a Babylonian confusion of disciplinary languages, the thematic unity and social proximity gradually led to the realization that methods could be transferred, terms borrowed, explanations integrated, and intellectual unity achieved, after all. Thus, a consensus emerged. The issue of human culture poses a challenge to the division of the world into the realms of the 'natural' and the 'cultural', and hence to the disciplinary division of scientific labor. In our view, the appropriate place for the study of human culture is located between biology and the social sciences. (Weingart 1997, viii)

Cosmides and Tooby refer to integration in the sense that cultural anthropologists have to take care that what they claim is consistent with well-established knowledge from evolutionary theory, while considering their version of evolutionary psychology as providing the new 'irreplaceable intellectual gifts' everybody has to take into account. I take Weingart to be referring to something else, namely to the interdisciplinary endeavor to join forces in order to explore new fields, e.g. co-evolution, which is more a case of our second kind of synthesis, heuristic synthesis, the creation of something new.

Implicit or explicit in claims such as Barkow et al. seems to be an important assumption: that it is *because of integration* (and probably only in case of integration) that we reach *novelty* (i.e., new ideas, new methods, or new interfield theories representing whole new interdisciplinary fields). In other words, there might be an assumption involved that only integration 'generates this powerful growth in knowledge' as Barkow, Cosmides and Tooby put it. A review of a historical example from the history of theories of cultural evolution, representing a standard example in the development of disciplines, shall illustrate that such an assumption is ill guided.

Alfred L. Kroeber (1876-1960), the first 'Boasian', had a specific and explicit attitude towards separation and fruitfulness. He wrote the following in 1952, reviewing a productive career in 'cultural anthropology':

> Any theory that specializes on culture must of course recognize that, in the case of man, society and culture always co-occur, so that the phenomena available necessarily have both a social and a cultural aspect. Since societies comprise individuals and especially since

> individuals are heavily shaped by their culture, there is also a third aspect or factor immediately involved in the phenomena, that of psychology or personality – apart from more remote considerations, such as the biological nature of people and the subhuman environment in which they operate. It is of course possible to try to study the cultural, social, and psychological aspects simultaneously and interwoven, as they occur. Such a meshed understanding is obviously the broadest and is therefore desirable in principle. However, it is also much the most difficult to attain, because more variable factors are involved. Also it is plain that the most valid and fruitful synthesis, other things being equal, must be the one which is based on the most acute preceding analysis. Such analysis is going to be more effective if directed at an isolable set of factors than at several interacting ones. Premature and short-circuiting synthesizing is thus avoided by discrimination between the aspects or levels that come associated in phenomena, and by unravelling, out of the snarl with which actuality presents us, the factors of one level at a time and seeing how far they can be traced as such, before retying them into a web of larger understanding with the other strands. The level which I have personally chosen or become addicted to is the cultural one. This is not the only way of proceeding, but it is my way, and it seems the most consistent with an integrative-contextual or 'historical' approach. (Kroeber 1952, p. 7).

Kroeber followed this strategy from the very beginning of his career. He is well-known for his boundary building, defending what has been called a 'cultural determinism', the claim that only culture explains culture, which is demonstrated in the just quoted statement. From the very beginning, cultural determinism was not meant ontological, but epistemological and pragmatic: Kroeber claimed the right to focus, the right to ignore, for a while at least. At the same time, he claimed that others should equally focus since the phenomenon that cultural anthropologists study with their tools are different from the subject matter of biologists. Thus, he claimed authority for a neatly defined part of the phenomena under scrutiny in science, and this part he termed, interchangeably: culture, the superorganic, history, civilization. It is a phenomenon *sui generis*, with its own scientific experts, the cultural anthropologists.

As indicated in the first part of this paper, Kroeber used an analogy between biological and cultural change to establish this autonomy of cultural anthropology. Thus, he secured boundaries by dialectically crossing them. He referred to new developments in biology, mainly the Weismannian theory of heredity. Weismann denied that any inheritance of acquired characteristics is possible and claimed on this basis the all-sufficiency of selection. As Weismann did before him, Kroeber said that only if we replace Lamarckian inheritance with the concept of cultural inheritance, would we be able to see that cultural change is historically not correlated with biological change. One can change without the other and is autonomous in that sense. As long as there is a belief in Lamarckian inheritance, however, we will think of culture as reducible to nature. In the grip of Lamarckism, culture slowly but steadily becomes nature, habit becomes instinct, acquired becomes innate – all via the biological inheritance of acquired characteristics. In the Lamarckian picture, the two kinds of evolutions are correlated: if one changes, the other does too. Historically, belief in the inheritance of acquired characteristics was used to explain the evolution of mental abilities and to claim that cultural differences correlate with racial differences, for instance in Herbert Spencer's philosophy. On the basis of a Weismannian point of view, however, you cannot infer racial differences from cultural differences since the two are independent, decoupled from the very first moment when the first animal managed to learn socially, i.e. from the birth of culture via nature.

Even though people have and still defend scientific racism on all kinds of grounds, I regard Kroeber's claim of the 'autonomy of culture' as a historically important insight that helped to fight the scientific racism of the early 20th century, which was supported by the belief in the inheritance

of acquired characteristics. Thus, Kroeber developed an important and fruitful thesis by using an analogy between cultural and biological heredity.

The analogy was, however, not used for synthesis but for a hard divide: between culture and nature and between cultural anthropology on the one hand and physical anthropology and genetics on the other hand. Note that he did not want to say that physical anthropologists or geneticists don't have a word to say on humans. He only believed that it is fruitful, if each of these has a domain of its own. In the context of his time, I believe, he was right: it certainly was more fruitful at that time that each had a domain of his own.[21]

Since Kroeber used the concept of dual inheritance, he can be considered as a kind of 'precursor' of contemporary dual inheritance theories. Thus, the history of theories of cultural evolution shows that with respect to cultural inheritance there never was a historical hourglass of heredity: heredity was narrowed, but it was not hardened. The multiple inheritance view brought home so vividly now by multiple inheritance theories, was present all the time. Yet heredity was fragmented by the division of scientific labor and by and large stays so until today, even if the fragmented channels of heredity are looked at now from a more integrative and interactionist perspective. We approach a new synthesis, but it is one that presupposes the foregoing separation of the perspectives that shall be united – as separate ones.

In sharp contrast to contemporary dual inheritance theorists, Kroeber used the concept of cultural inheritance to demarcate the domain of cultural anthropology, which was still in the making at that time. He thus defended the place of cultural anthropology, against the social and political hegemony of racist hereditarianism and the scientific force of the new genetics. He crossed the field of anthropology towards biology and used Weismann's theory of heredity in order to establish clear boundaries between the two disciplines at a time when both were expanding their scientific and institutional setting. He was doing so in order to establish a clear specialization, a differentiation, i.e. a clear division of labor, between anthropology and biology, and between physical anthropology and cultural anthropology. When disciplines emerge, it is unlikely that their representatives are open-minded, for 'worldly', i.e. merely pragmatic, reasons: they have to establish themselves first and get a place in the midst of other disciplines. They have to appropriate phenomena. In other words, separationist initiatives have their institutional, social, or political background, as do unificationist ones (Galison and Stump 1996). But despite these social reasons both can lead to fruitful scientific results.

Conclusion and outlook

Depending on context, crossing borders can be used to divide disciplines or to unite them. In both cases, the results may contribute important new insights or even open up whole new continents for research, such as the discipline of cultural anthropology and the field of co-evolution. This is the main point I wanted to make in this paper. A bias towards integration (as an epistemic value) is thus unjustified, and it is so on the following grounds: If integration is valued because it helps us to progress, then separation has to be taken as equally valuable, if it helps us to progress. Whether integration (or separation) is fruitful certainly depends on the circumstances.

The argument for the fruitfulness of integration as well as separation rests on the distinction between four kinds of synthesis: integration, heuristic synthesis, expansion, and big-picture-synthesis. These represent four ways of how two domains can unite via the exchange of methods, concepts, theories, a hypothesis, or evidence.

[21] See Kronfeldner (2009) for more details and references on his case.

Many issues have been left aside here. The most important ones should at least be named before closing: ambiguity might play an important fruitful role in the trading between disciplines, the epistemic values in the use of analogies might conflict in further ways and it is unclear whether there is a clear hierarchy between them. Finally, many historical details regarding the social and cultural background of the kinds of synthesis and of separation are missing.

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The Hereditary Hourglass. Genetics and Epigenetics, 1868–2000

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